OnGuard®

Hardware Installation Guide

LenelS2 OnGuard® 8.3 Hardware Installation Guide
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Table of Contents

Hardware Installation Guidelines 21

Hardware Installation Guidelines 23

1. Inputs, Outputs and Interface Signals 23

1.1 Power Inputs 23

1.2 Alarm Inputs 24

1.3 Reader Inputs/Outputs 25

1.4 Relay Outputs 25

1.5 RS-485 Communication Overview 25

1.6 RS-232 Interfaces 28

2. System Wiring, Security, and Other Considerations 29

2.1 General Wiring Considerations 29

2.2 Mounting Boards in Enclosures 34

2.3 Ground Wiring 41

2.4 Alarm Input Wiring 42

2.5 RS-485 Communication Wiring 42

2.6 RS-232 Communication Wiring 45

2.7 Relay Contact Protection 45

2.8 Weatherproofing Considerations for Magstripe Readers 46

3. System Power-up Considerations 47
3.1 Device Configuration Checks 48
3.2 Ground Potential Difference Checks Before Connecting 48

4. Maintenance 49
4.1 Firmware Updates 50

5. UL/ULC Certified Installations 50
5.1 Power 54
5.2 Typical Combinations for UL Installations 56
5.3 UL/ULC Requirements 60
5.4 CAN/ULC-S319-05 Requirements 60
5.5 CAN/ULC 60839-11-1 Requirements 61

6. EN Certified Readers 62

Intelligent Controllers 63

Controller Web Page Configuration 65

7. Using a Web Browser to Configure LenelS2 Intelligent Controllers 65
7.1 Secure Access to Controller Web Page Configuration 65
7.2 Open the Configuration Web Page and Log In 67
7.3 Configure Network Settings 68
7.4 Configure the Host Communication Settings 69
7.5 Display Controller Information 74
7.6 Configure User Accounts and Other Settings 74
7.7 Configure Auto-Save Options 78
7.8 Manage Certificates 79
7.9 View Status 81
7.10 Configure Security Options 82
7.11 Diagnostic 82
7.12 Restore Settings 82
7.13 Apply Settings 82
7.14 Log Out 83
7.15 LNL-4420, LNL-X4420, and LNL-M4420: Auxiliary Authentication Module Web Configuration 83

LNL-M2210 Intelligent Controller 89

8. LNL-M2210 Installation 89

9. LNL-M2210 Reference 89

9.1 General 89
9.2 LNL-M2210 Hardware 90
9.3 LNL-M2210 Wiring 91
9.4 Bulk Erase Configuration Memory 93
9.5 Input Power 93
9.6 Communication Wiring 93
9.7 Reader/Serial I/O Device Wiring 93
9.8 Input Circuit Wiring 96
9.9 Relay Circuit Wiring 97
9.10 Memory Backup Battery 98
9.11 IT Security 98
9.12 Status LEDs 98
9.13 Specifications 100
9.14 Additional Mounting Information 103
9.15 Regulatory Information 104

LNL-M2220 Intelligent Controller 105

10. LNL-M2220 Installation 105

11. LNL-M2220 Reference 105

11.1 General 105
11.2 LNL-M2220 Hardware 106
11.3 LNL-M2220 Wiring 107
11.4 Bulk Erase Configuration Memory 109
11.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring 110
11.6 Communication Wiring 111
11.7 Reader Wiring 111
11.8 Input Circuit Wiring 113
11.9 Relay Circuit Wiring 114
11.10 Memory and Real Time Clock Backup Battery 114
11.11 IT Security 115
11.12 Status LEDs 115

11.13 Specifications 117
11.14 Regulatory Information 119

LNL-M3300 Intelligent System Controller 121

12. LNL-M3300 Installation 121

13. LNL-M3300 Reference 121
13.1 General 121
13.2 LNL-M3300 Hardware 122
13.3 LNL-M3300 Wiring and Setup 123
13.4 Bulk Erase Configuration Memory 125
13.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring 125
13.6 Communication Wiring 126
13.7 Memory and Real Time clock Backup Battery 126
13.8 IT Security 127
13.9 Status LEDs 127
13.10 Specifications 128
13.11 Regulatory Information 130

LNL-M4420 Intelligent Dual Reader Controller 131

14. LNL-M4420 Installation 131

15. LNL-M4420 Reference 131
15.1 General 131
15.2 LNL-M4420 Hardware 132
15.3 LNL-M4420 Wiring 133
15.4 Bulk Erase Configuration Memory 135
15.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring 136
15.6 Communication Wiring 136
15.7 Reader Wiring 137
15.8 Input Circuit Wiring 139
15.9 Relay Circuit Wiring 140
15.10 Memory and Real Time Clock Backup Battery 140
15.11 IT Security 141
15.12 Status LEDs 141
15.13 Specifications 142

15.14 Regulatory Information 145

LNL-X2210 Intelligent Controller 147

16. LNL-X2210 Installation 147

17. LNL-X2210 Reference 147

17.1 General 147
17.2 LNL-X2210 Hardware 148
17.3 LNL-X2210 Wiring 148
17.4 Bulk Erase Configuration Memory 151
17.5 Input Power 151
17.6 Communication Wiring 151
17.7 Reader/Serial I/O Device Wiring 151
17.8 Input Circuit Wiring 154
17.9 Relay Circuit Wiring 155
17.10 Memory Backup Battery 156
17.11 IT Security 156
17.12 Status LEDs 156
17.13 Specifications 158
17.14 Additional Mounting Information 160
17.15 Regulatory Information 162

LNL-X2220 Intelligent Controller 163

18. LNL-X2220 Installation 163

19. LNL-X2220 Reference 163

19.1 General 163
19.2 LNL-X2220 Hardware 164
19.3 LNL-X2220 Wiring 165
19.4 Bulk Erase Configuration Memory 167
19.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring 168
19.6 Communication Wiring 168
19.7 Reader Wiring 169
19.8 Input Circuit Wiring 170
19.9 Relay Circuit Wiring 171
19.10 Memory and Real Time Clock Backup Battery 171

19.11 IT Security 172
19.12 Status LEDs 172
19.13 Specifications 173
19.14 Regulatory Information 175

LNL-X3300 Intelligent System Controller 177

20. LNL-X3300 Installation 177

21. LNL-X3300 Reference 177
21.1 General 177
21.2 LNL-X3300 Hardware 178
21.3 LNL-X3300 Wiring and Setup 179
21.4 Bulk Erase Configuration Memory 181
21.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring 181
21.6 Communication Wiring 182
21.7 Memory and Real Time clock Backup Battery 182
21.8 IT Security 182
21.9 Status LEDs 183
21.10 Specifications 184
21.11 Regulatory Information 185

LNL-X4420 Intelligent Dual Reader Controller 187

22. LNL-X4420 Installation 187

23. LNL-X4420 Reference 187
23.1 General 187
23.2 LNL-X4420 Hardware 188
23.3 LNL-X4420 Wiring 189
23.4 Bulk Erase Configuration Memory 191
23.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring 192
23.6 Communication Wiring 192
23.7 Reader Wiring 193
23.8 Input Circuit Wiring 194
23.9 Relay Circuit Wiring 195
23.10 Memory and Real Time Clock Backup Battery 196
23.11 IT Security 196

23.12 Status LEDs 196
23.13 Specifications 197
23.14 Regulatory Information 199

LNL-2210 Intelligent Single Door Controller 201

24. Overview of the LNL-2210 201
24.1 LNL-2210 Board Components 201
24.2 Default Settings 203

25. Installation 203
25.1 Wiring and Setup 204
25.2 Memory Backup Battery 214
25.3 Dip Switches 215
25.4 Jumpers 215
25.5 Bulk Erase Configuration Memory 216
25.6 Embedded Web Server 216
25.7 Additional Mounting Information 216

26. Maintenance 218
26.1 Status LEDs 218

27. Specifications 219
27.1 UL Listed Installations 220
27.2 Firmware Revision 221

LNL-2220 Intelligent Dual Reader Controller 223

28. Overview of the LNL-2220 223
28.1 Interfaces 223
28.2 LNL-2220 IDRC Board Components 224
28.3 Default Settings 225

29. Installation 225
29.1 Wiring and Setup 226
29.2 Communication Wiring 227
29.3 Reader Wiring 228
29.4 Input Circuit Wiring 233
29.5 Relay Circuit Wiring 234

29.6 Memory Backup Battery 235
29.7 Dip Switches 236
29.8 Jumpers 236
29.9 Bulk Erase Configuration Memory 237
29.10 Embedded Web Server 237

30. Maintenance 238
30.1 Status LEDs 238
30.2 Replace Memory Backup Battery 239

31. Specifications 240

LNL-3300 Intelligent System Controller 243

32. Overview of the LNL-3300 243
32.1 Interfaces 243
32.2 LNL-3300 ISC Board Components 243
32.3 Default Settings 244

33. Installation 245
33.1 Communication Wiring 245
33.2 Power and Alarm Inputs 246
33.3 Memory Backup Battery 246
33.4 DIP Switches 247
33.5 Installing Jumpers 247
33.6 Bulk Erase Configuration Memory 248
33.7 Embedded Web Server 249

34. Maintenance 249
34.1 Status LEDs 249
34.2 Replace Memory Backup Battery 250

35. Specifications 251

LNL-4420 Intelligent Dual Reader Controller 253

36. Overview of the LNL-4420 253
36.1 Interfaces 253
36.2 LNL-4420 IDRC Board Components 254

36.3 Default Settings 255

37. Installation 255

37.1 Wiring and Setup 256

37.2 Communication Wiring 258

37.3 Reader Wiring 258

37.4 Input Circuit Wiring 260

37.5 Relay Circuit Wiring 260

37.6 Memory Backup Battery 262

37.7 Dip Switches 262

37.8 Jumpers 263

37.9 Bulk Erase Configuration Memory 263

37.10 Embedded Web Server 264

38. Maintenance 264

38.1 Status LEDs 264

38.2 Replace Memory Backup Battery 266

39. Specifications 266

Interface and Control Modules 269

General Control Module Configuration 271

40. Interfaces 271

41. Setting DIP Switches on Control Modules 272

41.1 Device Address 272

41.2 Communication Baud Rate 273

41.3 Bus Encryption 274

LNL-1100 Input Control Module 275

42. Overview of the LNL-1100 275

42.1 Interfaces 275

42.2 LNL-1100 Input Control Module (Series 3) Board Components 276

43. Installation 278

43.1 Wiring 278
43.2 Elevator Control 283

44. Configuration 283
44.1 DIP Switches 284
44.2 Jumper J3 for the LNL-1100 Series 3 284

45. Specifications for the LNL-1100 Series 3 285

46. Regulatory Information 286
46.1 Certifications 286

LNL-1200 Output Control Module 287

47. Overview of the LNL-1200 287
47.1 Interfaces 287
47.2 LNL-1200 Output Control Module (Series 3) Board Components 288

48. Installation 290
48.1 Wiring 290
48.2 Elevator Control 293

49. Configuration 294
49.1 DIP Switches 294
49.2 Jumper J1 for the LNL-1200 Series 3 294

50. Specifications for LNL-1200 Series 3 295

51. Regulatory Information 296
51.1 Certifications 296

LNL-1300 Single Reader Interface Module 297

52. Overview of the LNL-1300 297
52.1 Interfaces 297
52.2 The Single Reader Interface Module Board (Series 2) 298

53. Installation 299
53.1 Wiring 299
53.2 Elevator Control 307

54. Configuration 308
54.1 Installing Jumpers 309
55. Specifications 312
LNL-1300 Series 3 Single Reader Interface Module 315
56. LNL-1300 Series 3 Installation 315
57. LNL-1300 Series 3 Reference 315
57.1 General 315
57.2 LNL-1300 Series 3 Hardware 316
57.3 Supplying Power to the LNL-1300 Series 3 316
57.4 Reader Wiring 317
57.5 Door Strike Relay Wiring 318
57.6 Communication Wiring 319
57.7 Address, Baud Rate, and Encryption Configuration Switch 320
57.8 Status LEDs 321
57.9 Specifications 322
57.10 Regulatory Information 323
LNL-1300e Single Door IP Interface Module 325
58. Overview of the LNL-1300e 325
58.1 LNL-1300e IP Interface Board Components 325
59. Installation 326
59.1 Wiring and Setup 327
59.2 Recommended Settings for PoE 337
59.3 Install Jumpers 337
60. Configure Network Address to LNL- 1300e 337
60.1 Set DIP Switches to Addressing Mode 338
60.2 Using Public DHCP Addressing 338
60.3 Using Static IP Addressing 338
60.4 System Administration Configuration 340
61. Elevator Control 340
62. Additional Mounting Information 341

63. Maintenance 342
63.1 Status LEDs 342
64. Specifications 343
64.1 UL 294, 7th edition Performance Levels 344
64.2 UL Listed Installations 345
LNL-1320 Dual Reader Interface Module 347
65. Overview of the LNL-1320 347
65.1 Interfaces 348
65.2 LNL-1320 Dual Reader Interface Module (Series 3) Board Components 348
66. Installation 351
66.1 Wiring 351
66.2 Elevator Control 364
67. Configuration 365
67.1 DIP Switches 365
67.2 Jumpers for the LNL-1320 Series 3 366
68. Specifications for the LNL-1320 Series 3 366
69. Regulatory Information 367
69.1 Certifications 367
LNL-1320 Series 3B Dual Reader Interface Module 369
70. LNL-1320 Series 3B Installation 369
71. LNL-1320 Series 3B Reference 369
71.1 General 369
71.2 LNL-1320 Series 3B Hardware 370
71.3 Supplying Power to the LNL-1320 Series 3B 371
71.4 Communication Wiring (SIO Communication Port) 371
71.5 Reader Wiring 371
71.6 Alarm Contact Wiring 373
71.7 Inputs for Cabinet Tamper/Power Fault 374
71.8 Output Relay Wiring 374
71.9 Jumper and DIP Switch Usage 375

71.10 Status LEDs 377
71.11 Specifications 378
71.12 Regulatory Information 380

LNL-1324e OSDP Reader Interface Module 381

72. LNL-1324e Installation 381

73. LNL-1324e Reference 381
73.1 General 381
73.2 LNL-1324e Hardware 383
73.3 LNL-1324e Alarm Panel Wiring 384
73.4 Bulk Erase Configuration Memory 386
73.5 Input Power 386
73.6 Communication Wiring 386
73.7 OSDP Reader Wiring 387
73.8 Input Circuit Wiring 387
73.9 Reader Interface Wiring 389
73.10 Relay Circuit Wiring 390
73.11 IT Security 390
73.12 Status LEDs 391
73.13 Specifications 391
73.14 Additional Mounting Information 394

74. Web Page Configuration of the LNL-1324e OSDP Reader Interface Module 395
74.1 Secure Access to Controller Web Page Configuration 395
74.2 Open the Configuration Web Page and Log In 396
74.3 Configure Network Settings 397
74.4 Display Information 398
74.5 Configure User Accounts and Other Settings 398
74.6 Apply Settings 400
74.7 Log Out 401

LNL-8000 Star Multiplexer 403

LNL-8000 Star Multiplexer 405

75. Overview of the LNL-8000 Star Multiplexer 405
- 75.1 Interfaces 405
- 75.2 Star Multiplexer Board Components 406

76. Installation 407
- 76.1 Wiring 407
- 76.2 Wiring and Termination 409

77. Configuration 409
- 77.1 Setting DIP Switches 409
- 77.2 Installing Jumpers 411

78. Specifications 411

Readers and Keypads 413

BlueDiamond Mobile Readers 415

79. BlueDiamond Mobile Readers 415

LenelProx Readers 417

80. LenelProx Readers Overview 417
- 80.1 Read Range 417
- 80.2 Installation Guidelines 418
- 80.3 LenelProx LPMM-6800 419
- 80.4 LenelProx LPSP-6820 422
- 80.5 LenelProx LPKP-6840 425
- 80.6 LenelProx LPSR-2400 430
- 80.7 LenelProx LPRKP-4600 433
- 80.8 LenelProx LPMR-1824 and LPMR-1824 MC 437
- 80.9 LenelProx LPLR-911 443

Lenel OpenCard Readers 451

81. Wiring the Lenel OpenCard Readers 451
81.1 OpenCard ISO-X Readers 451
81.2 OpenCard XF1050-K 455
81.3 OpenCard XF1500 457

LNL-CK Command Keypad 459

82. LNL-CK Command Keypad Overview 459
82.1 Communication 459
82.2 Hardware Revision and Firmware 465
82.3 Wiring the Command Keypad 466
82.4 DIP Switches 468
82.5 Jumpers 469
82.6 Command Keypad Configuration 469
82.7 Status Display 470
82.8 OnGuard Configuration 470
82.9 Command Programming 471
82.10 Command Keypad Behavior 472
82.11 Specifications 474

Troubleshooting 475

Troubleshooting 477

83. System Issues 477

84. Intelligent System Controller Issues 478

85. Reader Interface Modules and Reader Issues 478

Index 481

HARDWARE INSTALLATION GUIDELINES

Hardware Installation Guidelines

General guidelines for hardware installation include the following:

- Inputs, Outputs and Interface Signals for power, alarms, and readers
- System Wiring, Security, and Other Considerations
- System Power-up Considerations
- Maintenance
- UL/ULC Certified Installations
- EN Certified Readers

1 Inputs, Outputs and Interface Signals

Hardware products operate from various power sources and communicate via a variety of I/O interfaces. Understanding the power requirements and interface signals, their characteristics, merits and limitations will insure successful installation and a reliable system.

1.1 Power Inputs

1.1.1 AC Power

Some OnGuard hardware products can use an AC power source.

The AC power wiring to power supplies consists of the AC LINE (L), AC NEUTRAL (N), and SAFETY GROUND (G). These lines from the AC power source to the power input terminals must not be interchanged.

Interchange of the AC LINE and AC NEUTRAL exposes components within the power supply to the hot side of the input power even if the AC line switch is turned off. This presents a safety hazard.

Interchange of the AC LINE and SAFETY GROUND places the supply chassis to an AC potential equal to the input voltage. This could result in a lethal shock hazard or equipment damage.

The interchange of the AC NEUTRAL and SAFETY GROUND may result in ground current flowing through the power supply chassis and other ground paths, causing unreliable/improper system operation.

The AC LINE input to Hardware power supplies is appropriately fused and switched. Local safety regulations may require an additional switch/fuse to be installed in the NEUTRAL input.

Do not apply greater than 12 VAC ± 15% to any hardware product.

1.1.2 DC Power

Many OnGuard hardware products can use a DC power source.

When using a DC power supply for a hardware product, the DC power must be isolated electrically from the AC input side and non-switching, regulated DC power. Typically readers require +5 or +12 VDC, and all other panels require either 12 VDC or 24 VDC (except the LNL-1300, LNL-1300e, and LNL-8000 which require 12 VDC, only).

DC power must be supplied through a diode for reverse polarity protection, and must be filtered and regulated for the electronics. Products intended to be powered from DC should never be powered with an AC transformer with rectifiers.

The Multiplexer requires a regulated, low ripple (under 20 mV P/P). The power input is fused and protected from polarity reversal, and a crowbar over-voltage circuit protects against application of wrong voltages.

Do not apply greater than 12 VDC ±15% to any hardware product.

To insure reliable operation of all components of the system, it is important that all power supplies used to power the devices are completely isolated from the AC power source.

1.2 Alarm Inputs

1.2.1 Unsupervised Alarms

Unsupervised alarm inputs sense simple contact closure. Open circuit results in an alarm condition. These inputs are protected by pull-ups, series limiting resistors, and clamp diodes against transients, like ElectroStatic Discharge. The signal is then buffered to reduce the effect of noise.

Open contacts should result in terminal voltages of 3.5 to 5 VDC. Closed contact terminal voltage should be between 0 and 0.8 VDC.

1.2.2 Supervised Alarms

Various OnGuard hardware products provide contact supervision. These inputs require an end-of-line (EOL, 1K±10%) terminator to be installed with the contact to be monitored. This can be configured within the software. Input protection is similar to that of the unsupervised input, however the input is also filtered to reject 50/60 Hz AC coupling.

The supervised input can sense contact conditions of SAFE, ALARM, and FAULT. It also accommodates normally closed (NC) and normally open (NO) contacts, which is configurable within the application.

1.3 Reader Inputs/Outputs

1.3.1 Reader Data Input

- **Wiegand**
  Reader data input is similar to unsupervised alarm input. Reader data input interfaces to reader DATA 1/ DATA 0 (WD1/WD0) open collector signals and produces a nominal signal swing of 0 to 5 volts.
- **Clock/Data**
  There are two data lines - one for clock and one for data. Each negative transition on the clock line marks the beginning of the data bit. The data line carries actual data. When the state of the data line is LOW, it is read as 1 data bit. When the data line is HIGH, it is read as 0 data bit.
  There is no standard clock/data timing and some devices, such as swipe magnetic card readers, output the data at variable speeds (depending on how fast the user actually swipes the card).
- **F/2F**
  The F/2F interface consists of a single twisted pair having a signal lead and a return lead. The signal is a logic signal having a zero level of 0.0 ± 0.5 volts and a one level of 12.0 ± 0.5 volts. The signal has a rise and fall time of less than 10 microseconds.
- **Supervised F/2F**
  A communications protocol utilizing the F/2F interface that allows keypad data, Door Contact state, and REX state information to be communicated across the F/2F interface. An ISC (Intelligent System Controller) also monitors reader for a heartbeat to detect reader communications failure or tampering.
- **OSDP**
  The OSDP (Open Supervised Device Protocol) physical interface is half-duplex RS-485 (one twisted pair, shield/signal ground). OSDP signaling is half duplex asynchronous serial, 8 data bits, 1 stop bit, no parity bits, 9600, 19200, 38400 or 115200 baud. OSDP protocol specification is maintained and extended by the Security Industry Association (SIA).
- **OSDP Secure Channel**
  A secure connection using OSDP-SC is referred to as a “secure session.” A secure session is established by a set of initialization messages which perform mutual authentication and establish a set of keys that shall be used for the remainder of the communication. The initialization messages are based on the Secure Channel Base Key.

1.3.2 Open Collector Output

Open collector output is used by readers to send reader data DATA1/DATA0 (WD1/WD0) and to control external LEDs. Pull-up resistors and diode clamps are provided for reader data outputs. This type of interface is limited to 500 feet.

1.4 Relay Outputs

Some LenelS2 hardware products provide form C relay contact outputs. These are dry contacts that are capable of switching signals as well as higher current loads. However, once they are used to switch current (for example, a door strike), they can not be used reliably to switch small signals (for example, dialer input.)

1.5 RS-485 Communication Overview

The EIA RS-485 standard defines an electrical interface for multi-point communication on bus transmission lines. It allows high-speed data transfer over extended distance (4000 feet/1219 m.) The RS-485 interface

uses a balanced differential transmitter/receiver to reject common mode noise. The following table is a comparison of interfaces commonly used in access/alarm systems.

	RS-485	RS-232C	Modem	20mA Loop
Mode of Operation:	Differential DC coupled	Single-ended DC coupled	Differential AC coupled	Single-ended current
DC Isolation:	No	No	Yes	Usually Isolated
Distance:	4000 feet	50 feet	Phone Line	1000 feet
No. of Devices on 1 Line:	32	2	2	Limited by Loop Voltages
Data Rate:	10M bps	20K bps	19.2K bps	2400 bps

Unlike the RS-232C or current loop interfaces, the RS-485 interface allows multiple devices to communicate at high data rates on a single cable, over long distance. Obviously, the RS-485 interface provides advantages in cost savings for installation and improved system performance, but it also brings about problems which would not commonly be seen on systems using RS-232C or current loop interfaces.

Using long communication cable with multiple devices often necessitates powering devices from different power sources. This can result in ground faults and ground loops, which can cause communication problems and possible equipment damage. Because the RS-485 interface communicates in the base band and provides no DC isolation, ground fault places devices at different electrical ground levels and causes large ground currents to flow. Possibilities of ground fault call for careful system planning and installation verification.

Communication cables exceeding 4000 feet can also create noise and signal reflection problems if proper cable is not used or if the cable is not correctly terminated.

Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/ km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/ km	2.2 ohms/M 7.2 ohms/K	120	12.8	42
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/ km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Cable Cross Reference Table

Purpose	Cable type	Gauge	Cond.	Description	Belden number	Tappan number	General Cable number	West Penn number
RS-485, 2-wire	Non-plenum	24	1P	Overall shield	9841	L19827	C0841A	D4851
RS-485, 2-wire	Plenum	24	1P	Overall shield	82841, 89841	M19899, T19984	n/a, C8117	n/a n/a
RS-485, 4-wire	Non-plenum	24	2P	Overall shield	9842	L19954	C0842A	D4852
RS-485, 4-wire	Plenum	24	2P	Overall shield	88102	K19970	C8118	n/a
RS-232	Non-plenum	24	5	Overall shield	9610	A10043	C0953A	n/a
	Plenum	24	6	Overall shield	83506	T10001	n/a	n/a
Reader drops	Non-plenum	24	2P	Overall shield	9502	R19756	C0601A	n/a
	Non-plenum	22/24	6	Overall shield	5504FE, 9536	R20076, R10024	E2006S, C0743A	3270, n/a
	Plenum	22/24	6	Overall shield	6504FE	P20019	E2106S	253270B
12 VDC power	Non-plenum	18	2	Overall shield	5300FE, 8760	R40013, L40008	E2032S, C2534A	293, 77293
	Plenum	18	2	Overall shield	6300FE, 88760	P40133, T40030	E2202S, C8101	25293B

1.5.1 RS-485 Cable

Field hardware products that are series 1 use 4-wire or 2-wire RS-485 full communication between devices. Only 2-wire RS-485 cable configuration can be used for series 2 and series 3. The main run RS-485 cable used must be shielded, low capacitance, stranded, two twisted pairs with 100-ohm characteristic impedance or better (Belden 9842 4-wire or 9841, 2-wire, plenum cabling Belden 88102, or equivalent; refer to *Cable Cross Reference Table* on page 27). Wire size is 24 AWG minimum. Total length of the communication cable must not exceed 4000 feet (1219 m) for 24 AWG wire size per leg of the communication tree.

Drops (down leads or stubs) to readers and other devices must be kept as short as possible (no longer than 10 feet). Use shielded 24 AWG cable (Belden 9502, or equivalent), when terminating to the 3-position for 2-wire RS-485 or the 5-position for 4-wire RS-485, insulation displacement connector.

1.5.2 Use of Signal Ground (SG)

The signal ground (SG) provides a common mode signal reference for the communicating devices. Each device must connect its SG to the cable shield drain wire. Failure to use the SG connection may cause communication errors. If the environment is known to be noisy, an additional wire may be used for the signal ground. The shield can then be grounded at one end only (to prevent ground loops) as a signal ground.

1.5.3 Device to Device Connection

Communication cables for RS-485 should be laid out in a daisy chain. Long stubs (T connection) should be avoided because they create discontinuities and degrade signals. DO NOT connect devices in STAR configuration unless using the LNL-8000 Star Multiplexer. STAR connection creates long stubs and causes difficulty in cable termination.

1.5.4 Cable Termination

RS-485 communications is designed for higher data transmission speeds and also simplifies installation by allowing each device to be multi-dropped from a single communication line or bus. With the increase data speeds and transmitting and receiving the data over a single communications line, there is higher risk of external noise. External noise could be in the form of line impedance, line ringing, or RF interference. When using the specified communications cabling the risk of noise is all but eliminated. To ensure that the data is sent and received without error, some End-of-Line termination of the RS-485 bus may be required.

- **RS-485 Cable termination from Host to Controller** The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved will indicate how termination should be configured for proper operation in its documentation. Refer to the specific device diagrams being used in the following sections of this hardware manual.

- **RS-485 Cable termination from controller to down stream modules (LNL-500X, LNL-1100, LNL-1200, LNL-1300, LNL-1320, LNL-4000, LNL-8000)** Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of OnGuard hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

- **RS-485 Cable termination from LNL-500X to Third-party hardware devices** Termination may be different for each RS-485 hardware device that is connected to the LNL-500X interface gateway module. Please refer to the gateway model being used for the hardware installation application.

1.6 RS-232 Interfaces

A number of products provide RS-232C interface for communication. This interface is intended for short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15.24 m.) If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables.

2 System Wiring, Security, and Other Considerations

Proper installation is essential to the safe and reliable operation of the OnGuard system. Improper or incorrect wiring will lead to unreliable operation or damage to system components. When system components are powered by different power sources, great care must be exercised in planning and wiring the system. The following paragraphs provide some guidelines for successful system interconnection.

2.1 General Wiring Considerations

There are different system wiring considerations for different groups of wiring, depending on the signal levels the wires are to carry. System wires can be generally separated into the following groups:

- Power distribution wires
- Data communication wires
- Sensor wires.

To avoid cross-talk, follow the wire requirements for each type of communication, or use different conduit for different signal groups.

Specific PoE related information meeting UL compliance is listed in this document. For more information, refer to PoE Specifications on page 55.

2.1.1 Device Placement

Observe the distance limitation of each type of signal when planning device placement. Modems and line extenders can be used for extended distance.

Do not run any wires near utility AC power wiring, lightning rod grounding wire, etc. to avoid externally generated transients. Grounding is required for ESD protection and safety.

2.1.2 Power Requirements

When planning a system, know the power requirement of each device. If multiple devices are to share a common power supply, care must be exercised to avoid excessive voltage loss on the wires. Voltage loss can lead to communication problems when devices are talking/listening on different grounds.

Voltage loss is directly proportional to wire resistance and the current the wire carries. Place the power supply as close to the equipment as possible. Select appropriate wire size for the load.

2.1.3 Current Overload

When designing any system, you must know the power requirement of each component being used within that system (refer to power chart below) as well as the actual output of the power supplies being used. If multiple devices are to share a common power supply, care must be taken to avoid excessive voltage loss through the power transmitting wires. Voltage loss can lead to intermittent communications problems when devices are consuming more power than the power supply is able to give. Other causes of voltage loss are directly proportional to wire resistance and current that the wire carries. When designing a system, place the power supply as close to the equipment as possible. The farther away the equipment is from the power supply, the larger the gauge of wire needed to ensure adequate current is being supplied at the device. Be sure to select the appropriate wire size for the distance between the power source and the equipment.

When choosing a power supply be sure never max out the current load of the supply. Always use a 25% overage factor when sizing your supply as a safety operation. Always use an isolated, non-switching, regulated power supply.

2.1.4 Power Requirements Table

Device	Power Required For UL installations: • Refer to the UL Listed Installation section in the chapter for each device. • PoE powered devices can be used if supply is UL 294 rated only.
ACCESS HARDWARE	
LNL-M2210 * LNL-X2210 LNL-2210	PoE (12.95 W), compliant to IEEE 802.3af or PoE+ (25 W), compliant to IEEE 802.3at 12 VDC ± 10%, 1.8 A maximum PoE power input 12.95W, compliant to IEEE 802.3af 12 VDC ± 10%, 200 mA minimum, 900 mA maximum
LNL-M2220 * LNL-X2220 LNL-2220 LNL-X4420 LNL-4420	12 to 24 VDC ±10%, 500 mA maximum (plus reader and USB port current) 12 VDC @ 250 mA (plus reader current) nominal 24 VDC @ 150 mA (plus reader current) nominal
LNL-M4420 *	12 to 24 VDC ±10%, 550 mA maximum (plus reader and USB port current)
LNL-X3300 LNL-3300	12 to 24 VDC ±10%, 300 mA maximum (plus USB port current) 12 VDC @ 240 mA (325mA with CoBox-Micro) nominal 24 VDC @ 135 mA (175mA with CoBox-Micro) nominal
LNL-M3300 *	12 to 24 VDC ±10%, 250 mA maximum (plus USB port current)
*Only 12 VDC input was evaluated by UL by connection to the separately UL Listed Power Supplies.	
LNL-500	12 VAC (10.2-13.8 V), 400 mA RMS or 12 VDC (10.8-13.2 V), 250 mA
LNL-1100	12 to 24 VDC ± 10%, 350mA maximum 12 VDC @ 300 mA nominal 24 VDC @ 220 mA nominal

Device	Power Required
	For UL installations: • Refer to the UL Listed Installation section in the chapter for each device. • PoE powered devices can be used if supply is UL 294 rated only.
LNL-1100-U	**Note:** For UL installations, refer to the Quick Reference document for this device. 12 to 24 VDC ± 10% 12 VDC @ 300 mA nominal 24 VDC @ 150 mA nominal
LNL-1200	12 to 24 VDC ± 10%, 1100mA maximum 12 VDC @ 850 mA nominal 24 VDC @ 450 mA nominal
LNL-1200-U	**Note:** For UL installations, refer to the Quick Reference document for this device. 12 to 24 VDC ± 10% 12 VDC @ 805 mA nominal 24 VDC @ 407 mA nominal
LNL-X1300 LNL-1300	12 to 24 VDC + 10%, 150mA maximum (plus reader current) 12 VDC @ 110mA (includes reader current) nominal 24 VDC @ 60 mA (includes reader current) nominal
LNL-1300e	**Note:** For UL installations: Refer to the UL Listed Installation section in the chapter for this device. **Note:** For UL installations, PoE powered devices can be used if supply is UL 294 rated only. 12 VDC ± 10%, 200 mA minimum, 900 mA maximum PoE power input 12.95W, compliant to IEEE 802.3af
LNL-1300-U	**Note:** For UL installations, refer to the Quick Reference document for this device. 12 to 24 VDC ± 10% 12 VDC @ 700 mA (includes reader current) nominal 24 VDC @ 350 mA (includes reader current) nominal

Device	Power Required For UL installations: • Refer to the UL Listed Installation section in the chapter for each device. • PoE powered devices can be used if supply is UL 294 rated only.
LNL-X1320-S3B LNL-X1320 LNL-1320	12 to 24 VDC ± 10%, 550mA maxiumum (plus reader current) 12 VDC @ 450 mA (plus reader current) nominal 24 VDC @ 270 mA (plus reader current) nominal
LNL-1324e	**Note:** For UL installations: Refer to the UL Listed Installation section in the chapter for this device. PoE (12.95 W), compliant to IEEE 802.3af or PoE+ (25 W), compliant to IEEE 802.3at or 12 VDC ± 10 %, 1.7 A maximum
LNL-1320-U	**Note:** For UL installations, refer to the Quick Reference document for this device. 12 to 24 VDC ± 10% 12 VDC @ 1200 mA (includes reader current) nominal 24 VDC @ 600 mA (includes reader current) nominal
LNL-2005W	12 VDC (10.2 to 13.8 VDC), 50 mA
LNL-2010W LNL-2020W	12 VDC (10.2 to 13.8 VDC), 80 mA
LNL-8000	12 VDC, 250 mA
Indala Proximity	
ASR-505	5-14 VDC, 45 mA
ASR-110	10.5-14 VDC, 180 mA
ASR-112	10.5-14 VDC, 180 mA
ASR-603 ASR-605	4 -16 VDC, 350 mA
ASR-610	4 -14 VDC, 500 mA
ASR-620	12 - 24 VDC, 900 mA-1.2 A
ASR-136	24 VDC, 400 mA
ASR-500	5-14 VDC, 45 mA
ARK-501	5-14 VDC, 50 mA

Device	Power Required For UL installations: • Refer to the UL Listed Installation section in the chapter for each device. • PoE powered devices can be used if supply is UL 294 rated only.
Essex Keypads	
KTP-16212SLI KTP-163SN	12 VDC, 15 or 85 mA
HID Proximity	
5365	5-16 VDC, 160 mA
5355	10-28 VDC, 160 mA
5395	4-16 VDC, 160 mA
5375	24 VDC, 1.7 A
5385	24 VDC, 50 mA
6000	24 VDC, 2.0 A
6030	10-28 VDC, 150 mA
HID Wiegand	
SRE-3100500 SRE-3100130	5-12 VDC, 40 mA
SRE-3102500	5-12 VDC, 60 mA
HID iCLASS	
6100, 6110, 6111	10-16 VDC, 80-300 mA @ 12 VDC
6120	10-16 VDC, 80-260 mA @ 12 VDC
6130, 6131	10-16 VDC, 72-244 mA @ 12 VDC
6121	10-16 VDC, 100-350 mA @ 12 VDC
6125A	5-12 VDC, 70-120 mA @ 12 VDC
Lenel OpenCard	
LNL-XF1100D LNL-XF2100D	6-16 VDC, 95-254 mA
LNL-XF2110D	8-16 VDC, 120-215 mA

Typical door strike power is estimated at 24 VDC, 300 mA, consult manufacturer specifications for actual values.

Note: Device power requirements are subject to change without notice. These tables are intended only as a guide.

FIELD HARDWARE POWER SUPPLIES AVAILABLE

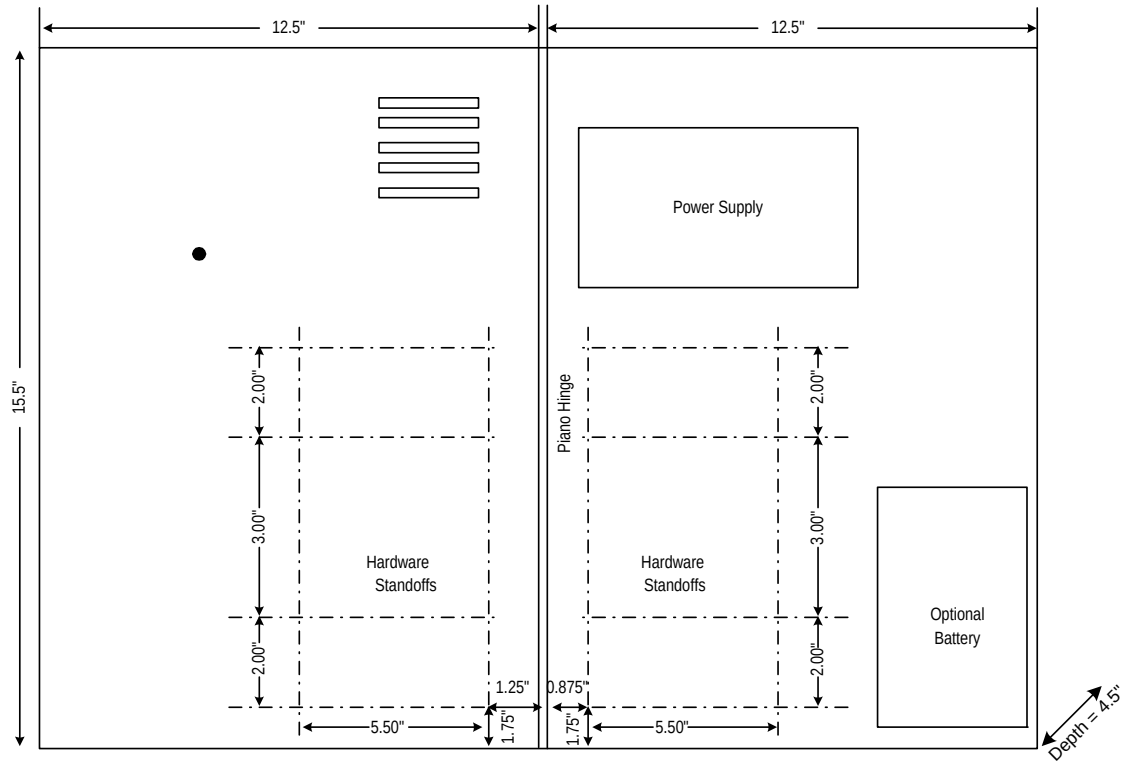
Part #	Description
LNL-AL400ULX	UL Listed power supply - 12 VDC (4A output, 9.7 - 13.5 VDC, 12 VDC nominal), 120 VAC input, continuous supply current with enclosure, lock, UPS capable (battery optional). Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 33 BTU.
LNL-400X-CE220	CE marked power supply - 12 VDC (4A output), 230 VAC input, continuous supply current with enclosure, lock, UPS capable (battery optional). Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 33 BTU.
LNL-AL600ULX-4CB6	UL Listed power supply - 12 VDC (6A output, 9.7 - 13.5 VDC, 12 VDC nominal), 120 VAC input, continuous supply current with enclosure, lock, UPS capable (battery optional). Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 49 BTU.
LNL-600X6-CE220	CE marked power supply - 12 VDC (6A output), 230 VAC input, continuous supply current with enclosure, lock, UPS capable (battery optional). Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 49 BTU.
LNL-CTX	Hardware enclosure (12 x 16 x 4.5 inches [304.8 x 406.4 x 114.3 mm]) with lock and tamper switch support up to two LenelS2 access hardware modules (UL approved).
LNL-CTX-6	Hardware enclosure (18 x 24 x 4.5 inches [457.2 x 609.6 x 114.3 mm]) with lock and tamper switch support up to six LenelS2 access hardware modules (UL approved).
ABT-12	Battery Kit, 12 VDC, 12AH Battery (PS-12120).

For a complete listing of our products, consult the Price Book.

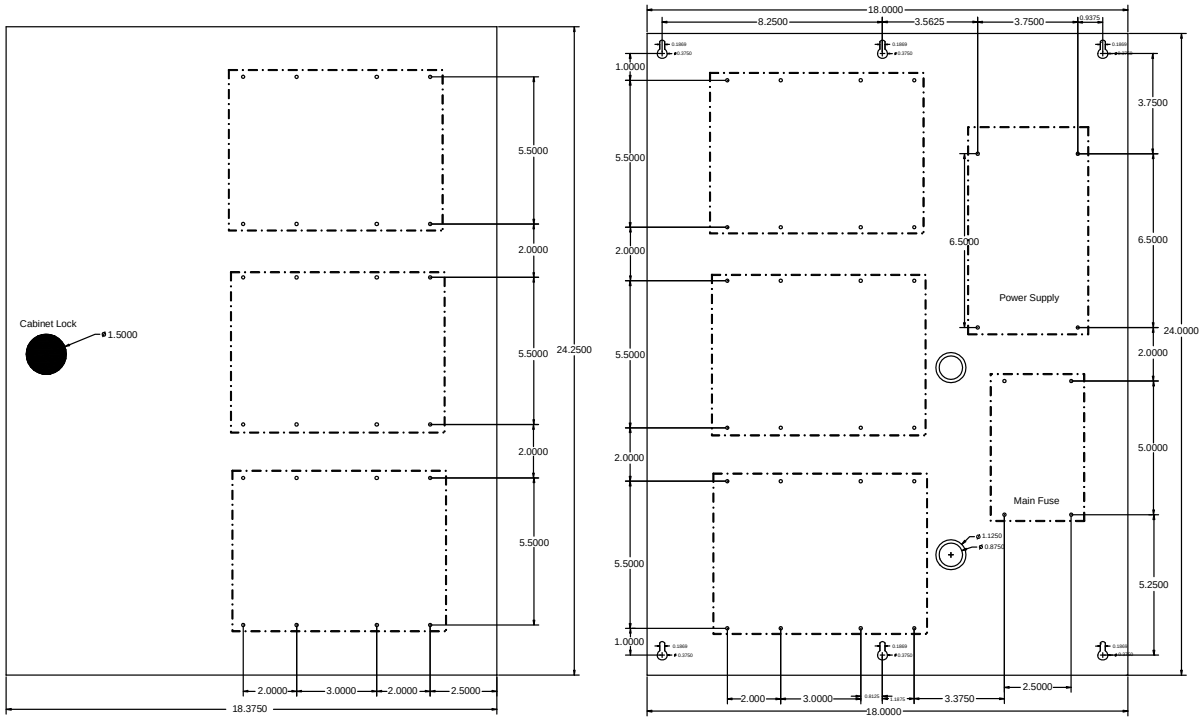
2.2 Mounting Boards in Enclosures

Most modules are 6 x 8 inches in size, with mounting holes along the long edge. Up to two (2) units can be mounted in a single LNL-CTX enclosure. The LNL-CTX-6 allows for up to six (6) modules.

LNL-CTX

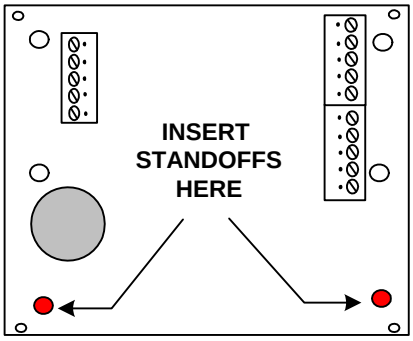


LNL-CTX-6



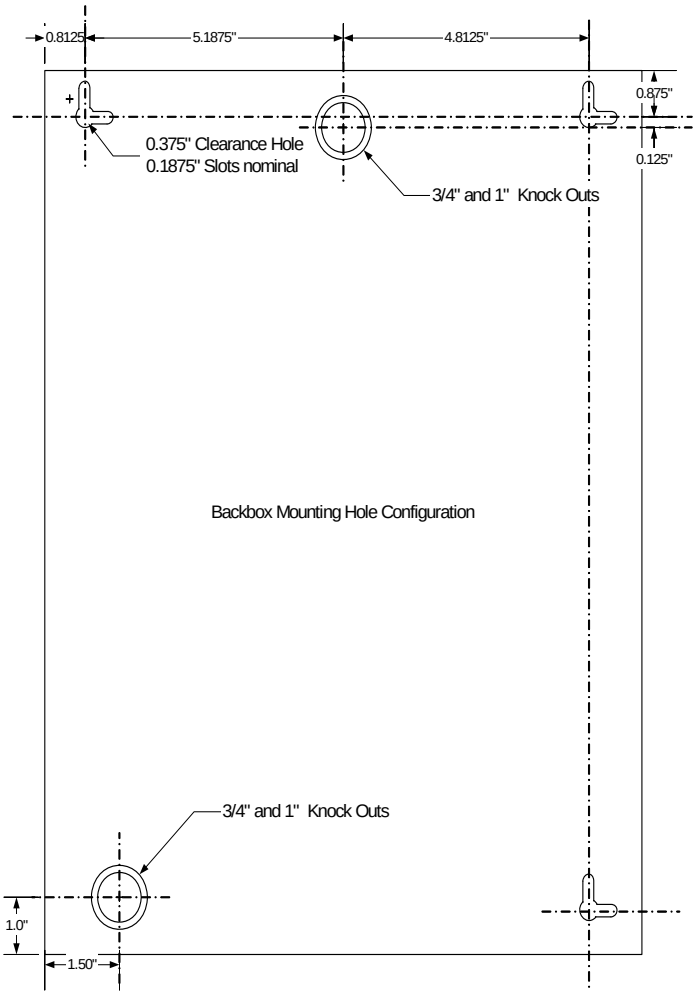
For smaller modules, only four of the mounting holes are used, the last two holes need support standoffs which come installed from the factory. The exception is the single reader interface module — up to eight (8) units can be mounted in any standard 2-gang or 3-gang junction enclosure.

The standoffs for the hardware come with the LNL-CTX and LNL-CTX-6 enclosures. The diagram below illustrates positioning.

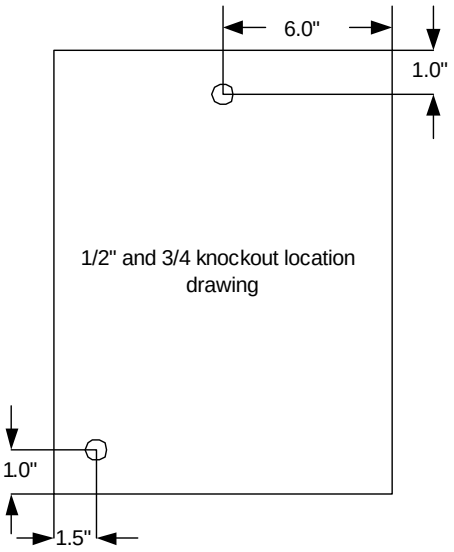


DO NOT DISPOSE
[QTY 2]

LNL-CTX knockout diagram



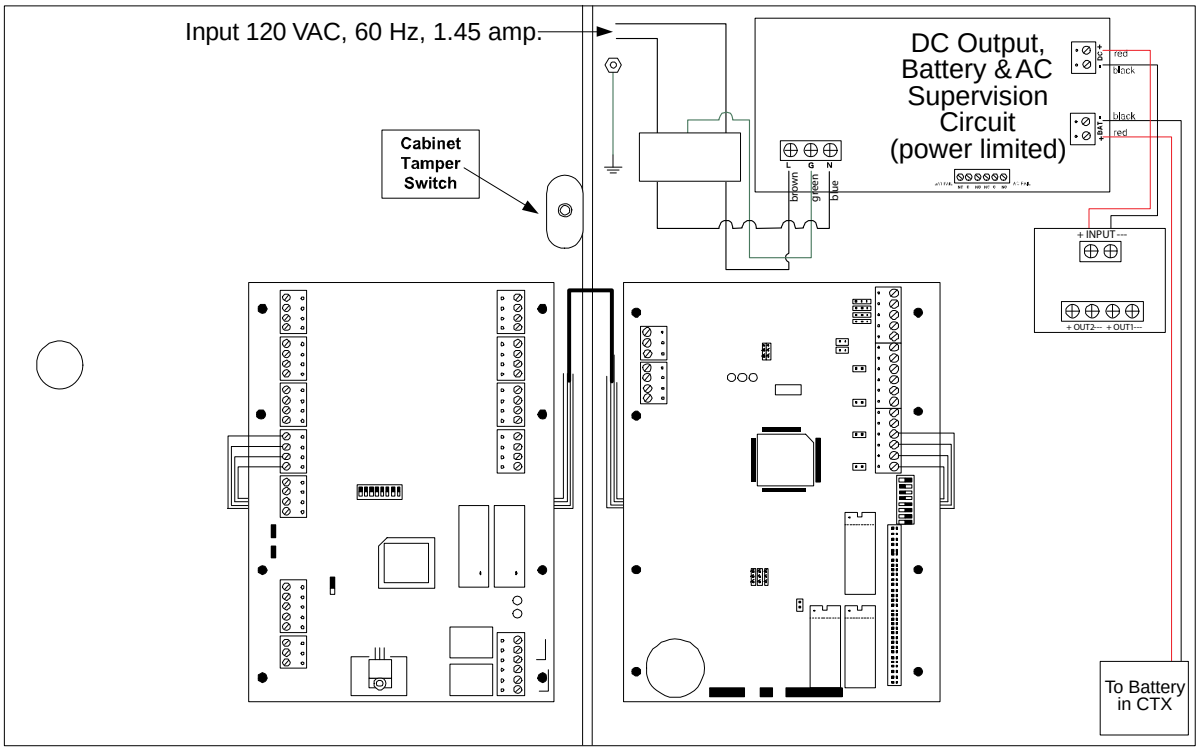
LNL-CTX knockout location drawing



2.2.1 LNL-AL400ULX Installation

The LNL-AL400ULX should be installed in accordance with article 760 of the National Electrical Code and NFPA70 as well as all applicable local codes.

1. Mount the enclosure in desired location.
2. Connect unswitched AC power (120 VAC/60 Hz) to terminals marked L, G, N, dedicated to the Burglar Alarm/Access Control Subsystem.



3. Secure the green wire lead to earth ground. Use 18 AWG or larger for all power connections (Battery, DC output).
4. Keep power limited wiring separate from non-power limited wiring (115 VAC/60 Hz Input, Battery wires). Minimum 0.25 inch spacing must be provided between power wires.
5. Connect devices to be powered to terminals marked -out1+; -out2+ on the two-output distribution board. Each output is rated to 2 A maximum.

> **Note:** It is important to measure output voltage before connecting devices. This helps avoid potential damage.

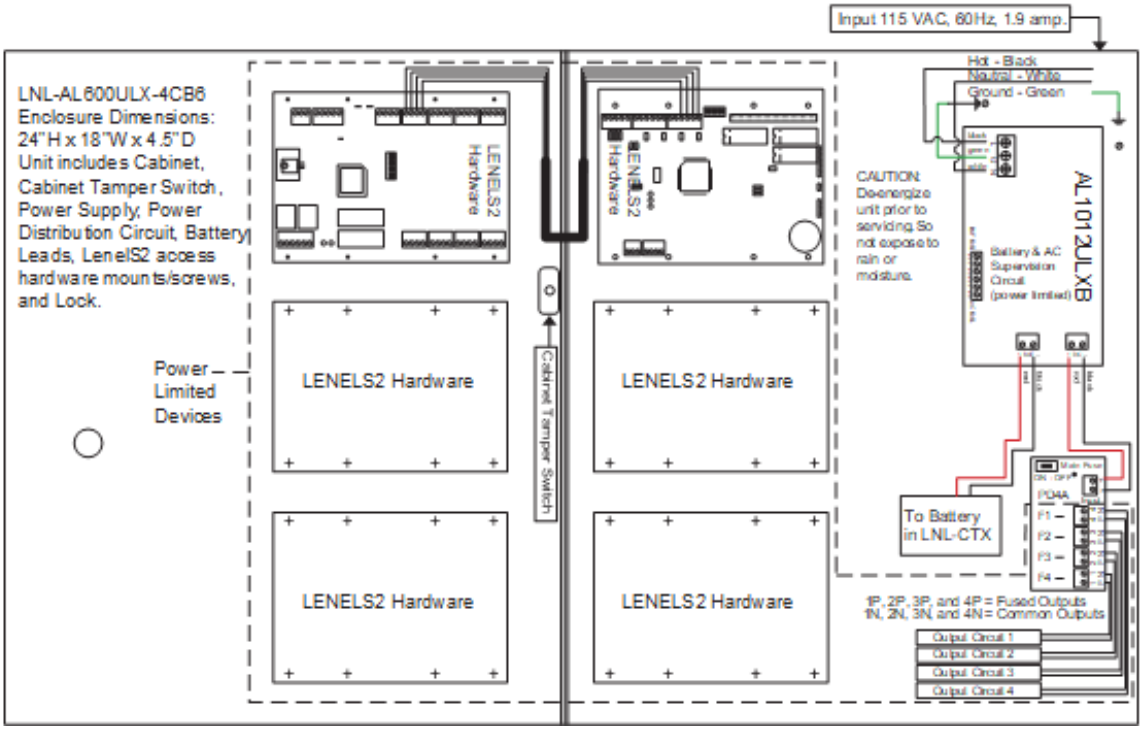
6. For UL Access Control applications, batteries are required. When batteries are not used, a loss of AC will result in the loss of output voltage. When using stand-by batteries, they must be lead acid or gel type. Connect battery to terminals marked + BAT – (battery leads included).
7. Connect appropriate trouble reporting devices to AC Fail and Low Battery supervisory relay outputs marked NC, C, NO. Use 22 AWG to 18 AWG for AC Fail and Low Battery reporting. AC Failure will will report in 2 minutes; 2 hours if jumper is cut. For a six-hour delay on reporting, cut resistor R1.
8. Wire routing note: UL two panel installation instructions for LNL-CTX enclosures
   To install multiple LenelS2 hardware panels into a single enclosure, the following guidelines must be used for certified UL installations.
   - All wire connections that cross over the hinge side of the door must be wire wrapped or tie wrapped together.
   - All wire must be routed behind the hardware panel so that the wires are secure from movement when opening and closing the door.
   - All connections for the lock side of the enclosure must come from behind the LenelS2 hardware devices.

2.2.2 LNL-AL600ULX-4CB6 Installation

The LNL-AL600ULX-4CB6 should be installed in accordance with article 760 of the National Electrical Code of NFPA70 as we as all applicable local codes. If you are located in Canada, refer to the Canadian Electrical Code.

1. Mount the enclosure in desired location.

2. The power supply is pre-wired to the ground (chassis). Connect main incoming ground to the provided green grounding conductor lead. Connect unswitched AC circuit (115 VAC/60 Hz) dedicated to the Burglar Alarm/Access Control Subsystem to terminals marked L, G, N.



3. Keep power limited wiring separate from non-power limited wiring (115 VAC/60 Hz Input, Battery wires). Minimum 0.25 inch spacing must be provided between power wires.

4. Connect devices to be powered to terminals marked (1P-1N, 2P-2N, 3P-3N, 4P-4N) and distribute evenly. Each output is rated at 1.5 amps max.

> **Note:** It is important to measure output voltage before connecting devices. This helps avoid potential damage. Use 18 AWG or larger wire for all power connections (battery, DC outputs).

   For UL Access Control applications, batteries are required. When batteries are not used, a loss of AC will result in the loss of output voltage. When the use of stand-by batteries is desired, they must be lead acid or gel type. Connect battery to terminals marked + BAT – (battery leads included).

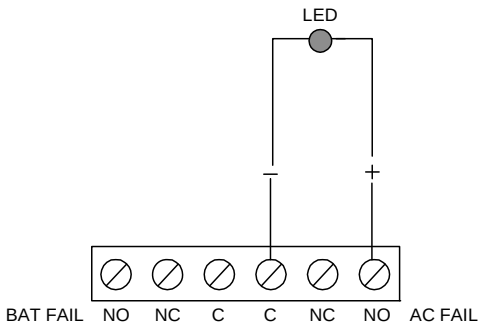
5. Connect appropriate trouble reporting device to the Battery Fail and AC Fail supervisory relay outputs marked NC, C, NO. Use 22 AWG or 18 AWG for AC Fail/Battery Fail reporting. AC Failure will report in 2 minutes; 2 hours if jumper is cut. For a six-hour delay on reporting, cut resistor RL1.
6. Connect cabinet tamper switch to cabinet tamper circuit on the LenelS2 access hardware.
7. Wire routing note: UL six panel installation instructions for LNL-CTX enclosures
   To install multiple LenelS2 hardware panels into a single enclosure, the following guidelines must be used for certified UL installations.
   - All wire connections that cross over the hinged side of the door must be wire wrapped or tie wrapped together.
   - All wire must be routed behind the hardware panels so that the wires are secured from movement when opening and closing the door.
   - All connections from the lock side of the enclosure must come from the LenelS2 hardware devices.

2.2.3 AC Indicator

UL 294 installations require an external AC indicator.

1. Locate the “AC FAIL” terminals.
2. Wire an LED indicator according to the following diagram.

AC indicator wiring



3. Install the indicator on the outside of the enclosure. It should be installed using the designated AC knockout.

2.2.4 Cabinet Tamper

Cabinet tamper for all enclosures must be connected and programmed for UL installations.

2.3 Ground Wiring

Each hardware product must be grounded to provide ESD protection, personnel safety, and signal reference for devices which communicate with each other. Grounding provides a good shield against external transients. See the installation manuals for the grounding point of each product.

There are three types of circuit grounds in systems using hardware products:

- DC negative
- RS-485 signal ground
- Safety ground

2.3.1 DC Negative

The DC ground provides signal reference for devices to communicate. It is the DC return from the power supply.

2.3.2 RS-485 Signal Ground (SG)

The RS-485 signal ground is connected to the DC ground internal to a device through a current limiting resistor. It provides a signal reference for the RS-485 interface.

2.3.3 Grounding System

A grounding system can be viewed as two subsystems: the DC system and the ground system. The DC system consists of all interconnected power supply returns, DC distribution wiring, and load devices. The principal function of the DC system is to provide signal reference for communication. The ground system consists of all chassis grounds for power supplies and other devices, safety grounds, and AC grounds. Ground connection should be made to avoid ground loop problems.

Ideally, there should be ONLY ONE ground return point in a power supply system.

2.3.4 Safety Ground

Safety ground (copper wire of 16 AWG minimum) is part of the AC power system. To avoid ground loop current, there must be NOT more than one point at which the safety ground connects to the DC ground.

The RS-485 signal ground must be isolated from the safety ground. This means that the RS-485 cable shield must be insulated so that it will NOT accidentally short circuit to the conduit in instances where the conduit is connected to the safety ground.

The National Electrical Code and other safety regulations require that all equipment chassis and or enclosures be grounded in order to prevent shock hazards. Each device must have a green wire safety ground. The function of the green wire safety ground is to provide a redundant path for fault currents and to insure that the circuit breaker will open in the event of a fault. In addition, grounding the enclosure provides a path for ESD dissipation, thus protecting sensitive electronic devices.

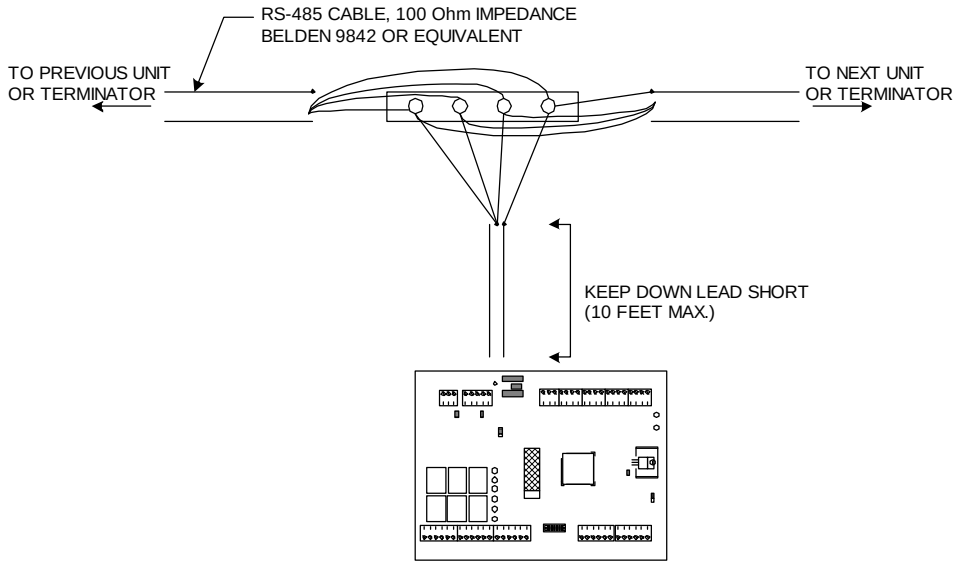
2.4 Alarm Input Wiring

All alarm inputs require twisted pair wires. An end-of-line (EOL) resistor terminator is required for each supervised alarm input. Both supervised and unsupervised alarm inputs can support single or multiple contacts per loop. Connect normally closed (NC) contacts in series and normally open (NO) contacts in parallel.

2.5 RS-485 Communication Wiring

Proper wiring for RS-485 communication interfaces is critical for successful system turn-up and operation. The following guidelines apply for all RS-485 wiring.

1. Use low capacitance shielded cable with 2 twisted pairs, characteristic impedance 120 ohms (Belden 9842 or equivalent) for the main RS-485 run.
2. Keep the main run maximum end-to-end distance below 4000 feet.
3. Use daisy chain configuration, NOT star configuration, to connect devices.
4. Use shielded 24 AWG cable with 2 twisted pair (Belden 9502 or equivalent.) for down leads (drops or stubs).
5. Keep down leads as short as possible (no longer than 10 feet).

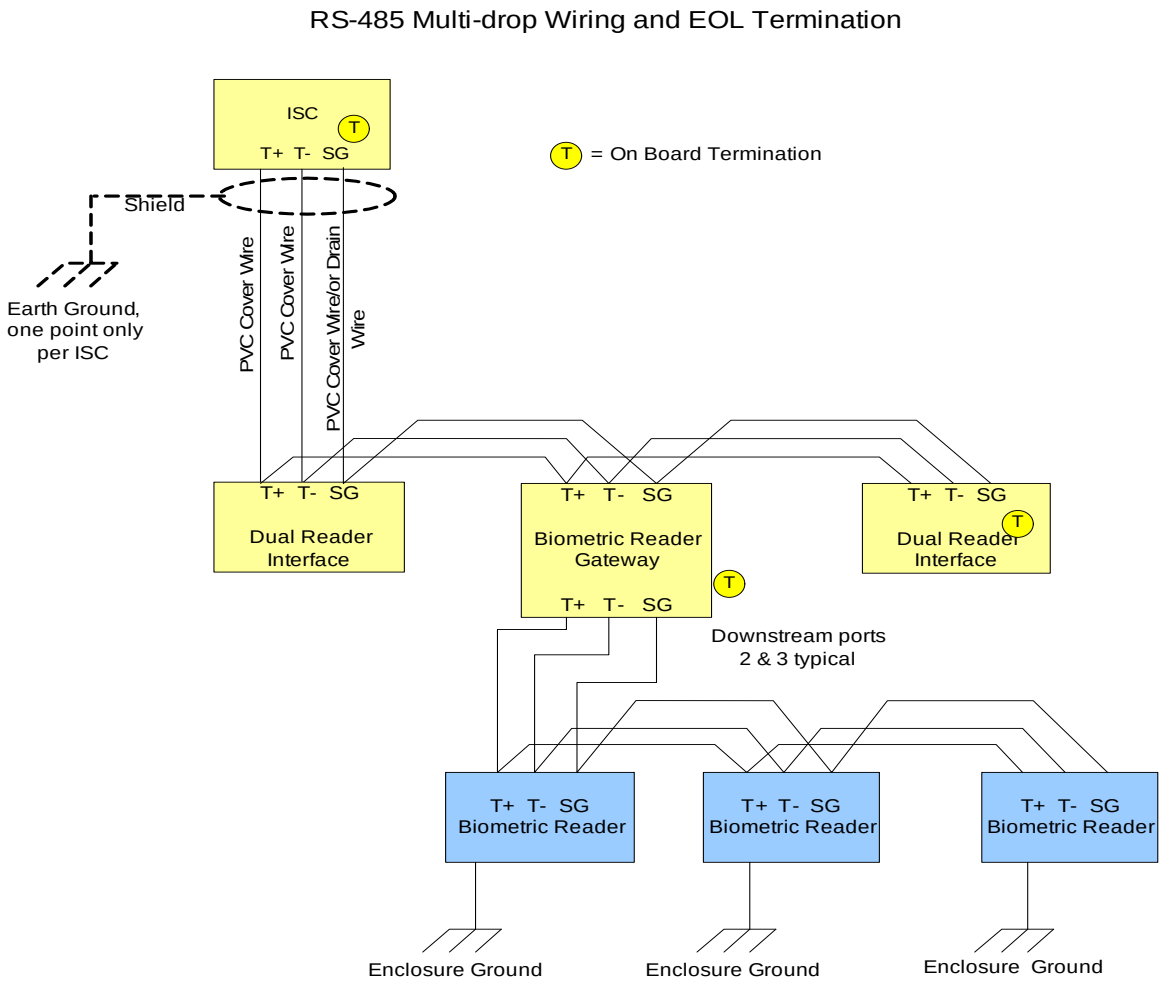


6. Terminate cables at both ends with RS-485 terminators (hardware has on-board terminators for RS-485 termination).
7. Always use the signal ground (SG) connection. Carefully insulate the SG wire for a reliable installation. Use 24 GA plastic sleeving over the SG wire when terminating the cable to the 5-position insulation displacement mating connector.

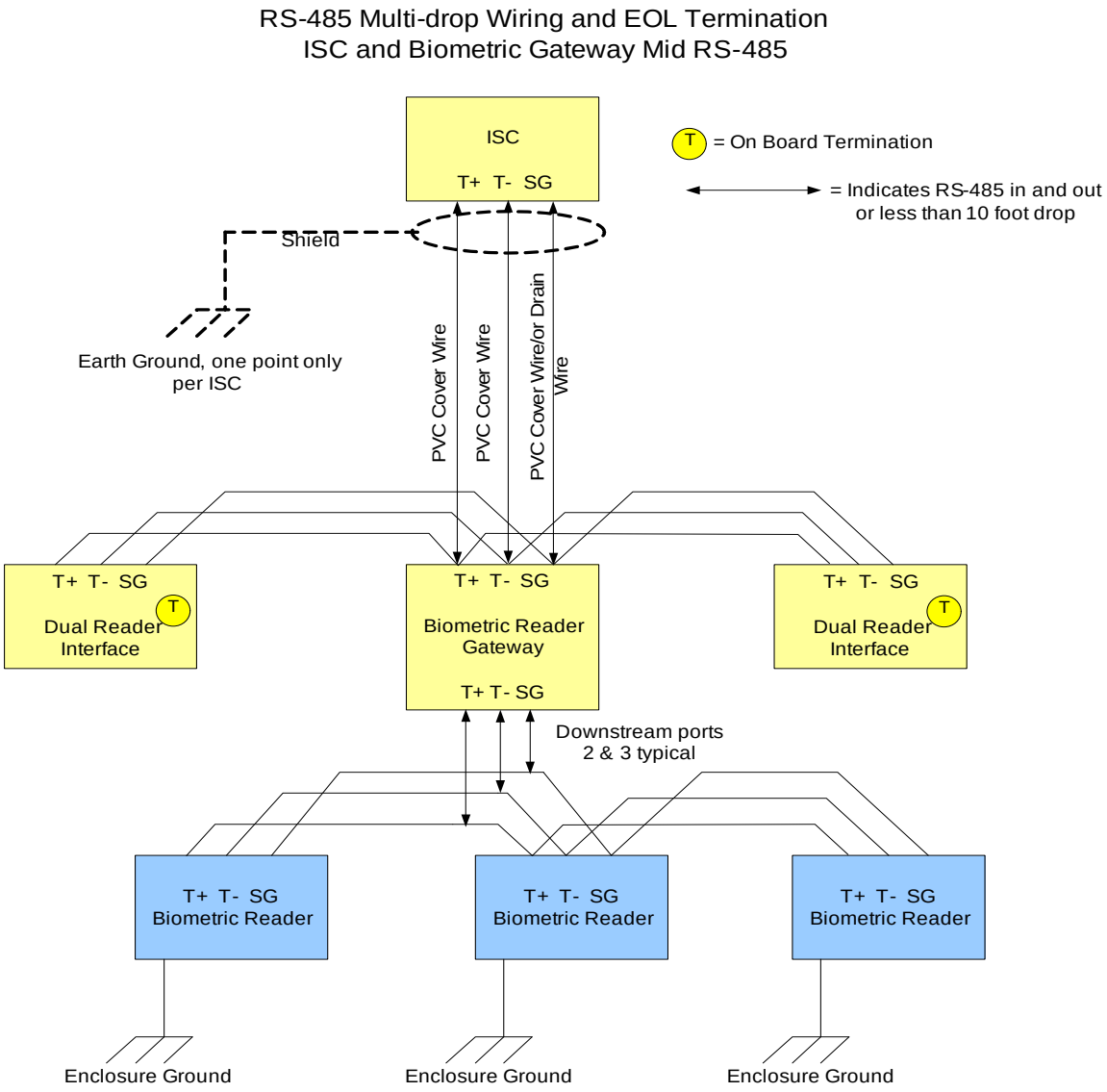
Each RS-485 communication line can have any number of DEPENDENT devices, but must have only one PRIMARY device. The transmit lines of the PRIMARY device are connected to the receive lines of the DEPENDENT devices and the receive lines of the PRIMARY device are connected to the transmit lines of the DEPENDENT devices. Observe the + and the - of each pair (NOTE: only applies to 4-wire RS-485 wiring).

Refer to the following diagrams for RS-485 Signal Ground and Termination.

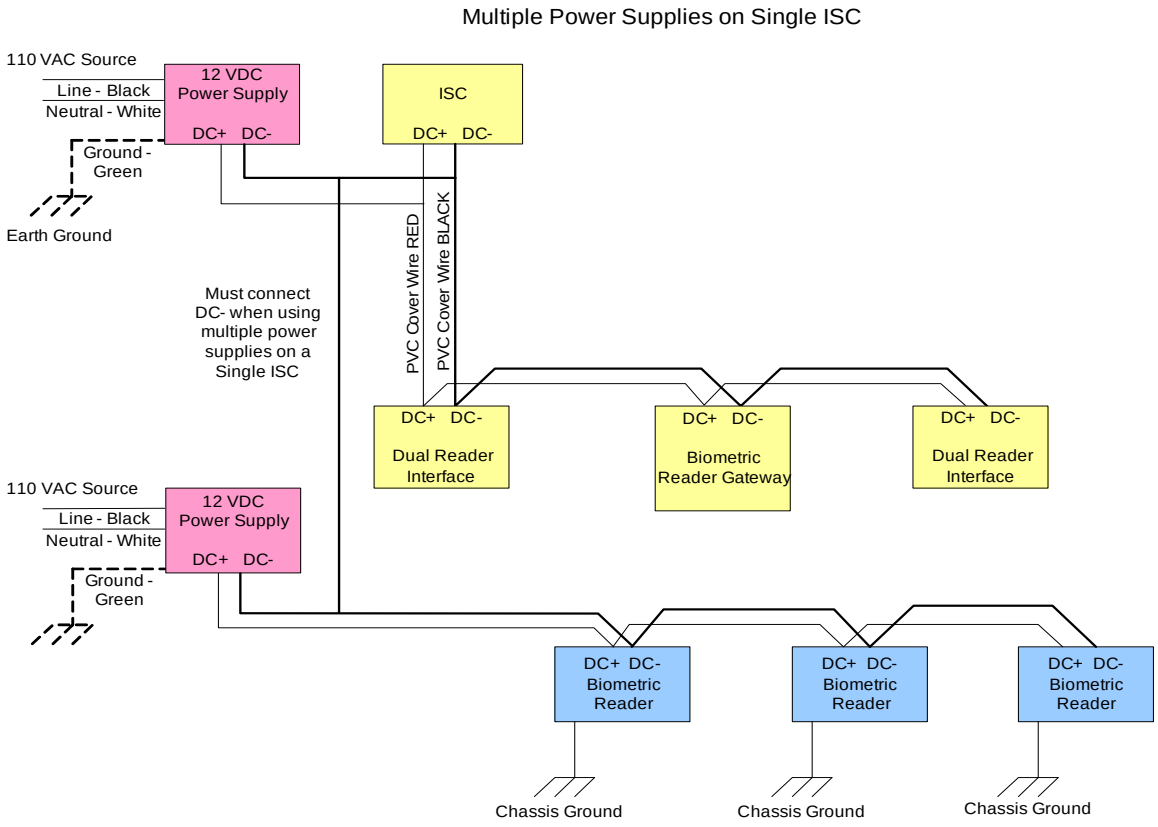
RS-485 Multi-drop Wiring and EOL Termination



RS-485 Multi-drop Wiring and EOL Termination: ISC and LNL-500B



Multiple Power Supplies on a Single ISC



2.6 RS-232 Communication Wiring

Observe the distance limitation or use suitable cable if the distance is greater than 50 feet. Remember to strap the control lines (RTS, CTS, etc.) if required.

2.7 Relay Contact Protection

The relays used by OnGuard hardware products have a contact life in excess of 500,000 operations at full rating. Lighter loads, and appropriate contact protection, extend relay life.

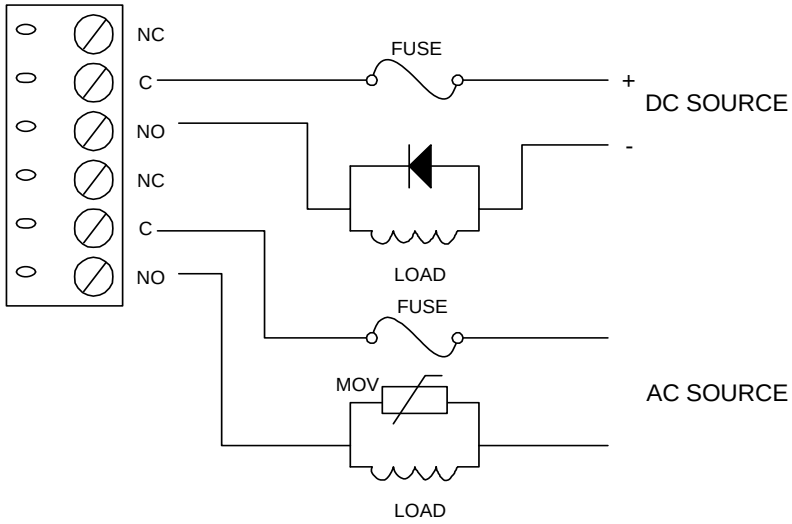
2.7.1 DC Inductive Load

Contacts for DC inductive loads can be effectively protected using clamp diodes. Select diodes with reverse breakdown voltage 10 times the circuit voltage.

2.7.2 AC Inductive Loads

Contacts for AC inductive loads can be protected using metal-oxide varistors (MOVs). MOVs are effective when the load voltage is 100V to 200V. (MOVs are also suitable for DC operation.)

MOVs must be installed as close to the load as possible (within a few inches) to be effective. Mounted in this fashion, MOVs can also reduce the effects of EMI on sensitive electronic circuits.



2.8 Weatherproofing Considerations for Magstripe Readers

The circuit board compartment of small readers should be sealed to protect from harsh environment.

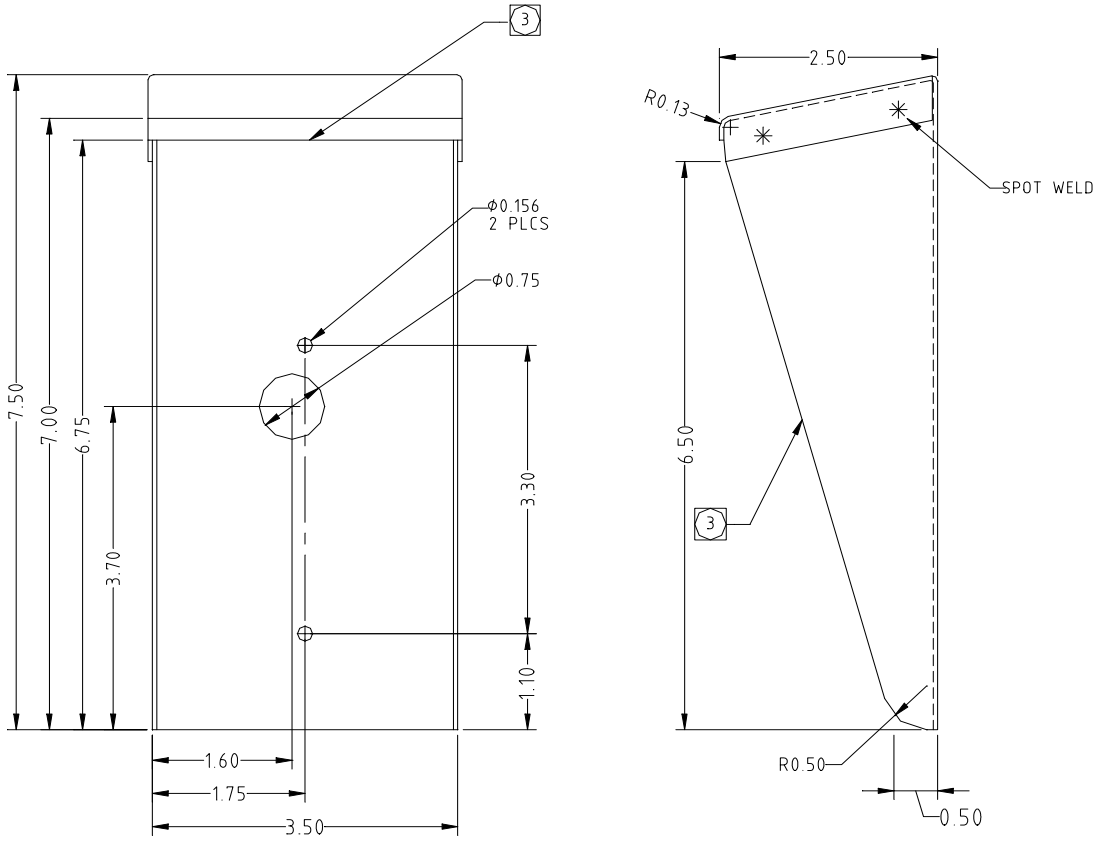
Be sure to clean the read head(s).

The leading cause of accelerated read head wear is contamination in the read head slot. To maximize the life of the read head, it is important to clean the reader periodically to remove any contamination. The frequency depends on the environment in which the reader is located. Indoor readers in controlled environments will need to be cleaned much less often than an outdoor reader exposed to airborne dirt and debris. Dirt and debris are also transferred from cardholder cards that have been contaminated with sticky substances. Read head cleaning cards are available to clean the readers.

For heavy traffic areas, extended life read heads are also available from the factory at the time of order which will extend the read head life up to 1 million card swipes. For heavy traffic, outdoor readers should be cleaned at least once per month. A good indication as to how often a reader needs to be cleaned is when using a cleaning card, if the card has no visible signs of contamination, the reader could be serviced less often. Another indication is if the card reader, starts to give invalid card reads, the reader may need to be serviced more often. A read head that is starting to fail due to exceeding the maximum number could cause this or card reads on the read head (std. 600,000 or extended 1 million).

- **Weather Shield Option** even though the Magnetic swipe card readers are fully weatherized, there are still times when the card reader may need more protection from the environment. If a reader has been installed at a remote parking lot or on a build with no overhang to prevent rain, ice or snow from building up in the reader throat, you may want to install the weather shield (LNL-WS10). This weather shield can be used with all LNL-2005W, LNL-2010W, and LNL-2020W readers.

Weather Shield – part #LNL-WS10



3 EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOTHED, RADIUS 0.015 TYP.

2. FINISH: CLEAN AND DEBUR. SAND TO BREAK ALL EDGES.
BRUSH FINISH TOP/SIDE SURFACES (200 GRIT). GRAIN VERTICAL.

1. MATERIAL: STAINLESS STEEL, TYPE 304-2B, 18GA

NOTES: UNLESS OTHERWISE SPECIFIED

3 System Power-up Considerations

A system should never be wired up and powered up all at once. For successful system turn-up, the following step-by-step procedures should be performed.

1. Make sure that no power is applied to any system device.
2. Check all wiring and device switch settings.
3. Disconnect all devices from the RS-485 communication line.
4. Power up the controller. (Check voltage requirement first.)
5. Configure the controller, and verify that it is working properly.
6. Connect one port of the RS-485 communication line to the multiplexer.

7. Power up a DEPENDENT device, and verify that it passes its own power-up self-test. (Check voltage requirement first.)
8. Check for ground fault between the DEPENDENT device and the RS-485 communication line. If applicable, find the fault and clear it.
9. Connect the DEPENDENT device to the RS-485 line and bring in on-line.
10. Verify all functions of the DEPENDENT device.
11. Verify the RS-485 line voltage in reference to the signal ground (SG.)
12. For each additional DEPENDENT device, repeat steps 7 through 11.
13. Verify the RS-485 line voltage for the controller, and mark the readings on the inside of the controller panel for future reference.

System Testing

For UL 1076 compliance, a general system test should be performed at least once per year.

3.1 Device Configuration Checks

Common device configuration problems include mismatched baud rates and incorrect device addresses. No two devices on the same RS-485 line should have the same device address. Check all switch settings before attempting to bring the device on-line.

System programming must include the order of priority signals described below:

1. Hold-up or panic alarm or duress.
2. Burglar alarm.
3. Burglar-alarm supervision.
4. Industrial supervision where a risk of injury to persons, or damage or destruction of property will not be involved.
5. Other supervisory services.

Items (1) and (2) may have equal priority. Items (4) and (5) may have equal priority.

3.2 Ground Potential Difference Checks Before Connecting

Before a device can be connected to the RS-485 communication line, it must be checked for ground fault. Uncorrected ground fault can damage all devices connected to the RS-485 communication line.

To check if there is ground fault for a new unit, follow the steps below.

1. Apply power to all devices already successfully connected to the RS-485 line.
2. Power up the new unit, but DO NOT connect it to the RS-485 line.
3. Connect the signal ground (SG) of the RS-485 line through a 10K limiting resistor.

4. Measure the AC and DC voltage across the resistor. There should NOT be more than 1 volt across the resistor. Otherwise find and clear the fault.
5. Connect the new unit to the RS-485 line if no ground fault is found.

4 Maintenance

Firmware download is only supported for models and versions of LenelS2 hardware.

Firmware Download Capabilities (for *current* version of OnGuard)

Module	Is firmware download supported?	Requirements
Controller (LNL-500)	Yes	Firmware version 3.1xx or later is recommended
Controller (LNL-M4420, LNL-M3300, LNL-M2220, LNL-M2210)	Yes	Firmware version 2.x
Controller (LNL-X4420, LNL-X3300, LNL-X2220, LNL-X2210)	Yes	Firmware version 1.26x or later
Controller (LNL-4420, LNL-3300, LNL-2220, LNL-2210)	Yes	Firmware version is 1.2xx or later.
Input Control Module (LNL-1100) Series 3	Yes	Firmware version is 3.20.00 or later.
Input Control Module (LNL-1100) Series 2	Yes	Firmware version is 1.3xx or later.
Output Control Module (LNL-1200) Series 3	Yes	Firmware version is 3.20.00 or later.
Output Control Module (LNL-1200) Series 2	Yes	Firmware version is 1.3xx or later.
Single Reader Interface Module (LNL-1300) Series 3	Yes	Firmware version is 3.20.00 or later.
Single Reader Interface Module (LNL-1300) Series 2	Yes	Currently, firmware version 1.5xx or later.
Single Door IP Interface Module (LNL-1300e)	Yes	Firmware version 1.6xx or later is recommended.
Dual Reader Interface Module (LNL-1320) Series 3	Yes	Firmware version is 3.20.00 or later.
Dual Reader Interface Module (LNL-1320) Series 2	Yes	Firmware version is 1.5xx or later, and the board is rev. B.
OSDP Reader Interface Module (LNL-1324e)	Yes	Firmware version 3.21.3 or later.
Command Keypad (LNL-CK)	No	Firmware version 1.6x (factory firmware upgrades only). This firmware cannot be upgraded in the field.

The most current version of the firmware is shipped with your OnGuard software and was installed during the initial software installation. Each subsequent software release you receive will also include the most current version of the firmware.

4.1 Firmware Updates

Not evaluated by UL.

Do the following to update the firmware on your system. You must have the “ADMIN” permission level.

1. Install the new version of the OnGuard software.
2. In the Main Alarm Monitor window of the Alarm Monitoring module, right-click on the name of an access panel.
3. Select the **Download Firmware** choice from the popup menu
4. OnGuard will initiate the firmware update then perform a full download to the access panel and to all devices connected to it.

You must update each access panel in the system. Although it is not necessary to shutdown the application to perform the updates, note that the selected access panel is placed in a degraded off-line mode during the process. During this process, the readers connected to the panel are put into their off-line mode (“facility code only,” “locked,” etc.), which is configured on the Reader form of the System Administration module. It is strongly recommended that you perform the update on the panel during a time when no one will be accessing it.

Firmware can be simultaneously downloaded to multiple panels at once. However, it is recommended to do so one at a time to prevent any problems from occurring until you become familiar with the impact on system performance.

5 UL/ULC Certified Installations

The system is to be installed within a protected premise. In a subassembly, the operating temperature range must be 0° to 49°C; the humidity range must be 0 to 85% RH.

This system must be installed in accordance with the National Electrical Code (NFPA 70), and the local authority having jurisdiction. If you are located in Canada, please refer to the Canadian Electrical Code.

For UL Installations, the central supervisory station equipment must be UL Listed to:

- Information Technology Equipment, UL/CSA 60950

For **UL Installations,** use UL Listed information technology equipment. The computer minimum platform requirements include the following:

- The communication medium between protected property and communications service provider shall be for the exclusive use of the protected property and is not to be shared with other communications service provider subscribers.
- CPU: Intel Core i3 @ 2.5 GHz
- RAM: 16 GB

- Hard Drive: 10 GB available disk space (excluding the operating system). If hosting the database locally, take database growth into account when projecting future disk space.
- Monitor: 1920 x 1080
- Media: USB 2.0 or higher
- Network: 100/1000 Mbps Ethernet card
- Operating systems:
  - Windows Server 2022 (64-bit)
  - Windows Server 2019 (64 bit)
  - Windows Server 2016 (64 bit)
  - Windows 11
  - Windows 10
- Database systems:
  - Microsoft SQL Server 2019 (64-bit)*
  - Microsoft SQL Server 2017 (64-bit)*
  - Microsoft SQL Server 2016 SP2 (64-bit)*
  - Oracle 19c (64-bit)

  * For each version of Microsoft SQL Server, the Standard, Enterprise, and Express versions are supported.
- NEC ExpressCluster X R3 Fault Tolerant software (not evaluated by UL)
  NEC ExpressCluster X 4.1/4.2 Fault Tolerant software (not evaluated by UL)
- Environment
  - Cloud installations (not evaluated by UL)
  - Mobile installations (not evaluated by UL)
  - NEC ExpressCluster X R5 Fault Tolerant software (not evaluated by UL)
- Access control/proprietary burglary systems:
  - OnGuard 7.0 (7.0.xxx) using Hardware Installation Guide revision 4.0.###
  - OnGuard 7.1 (7.1.xxx) using Hardware Installation Guide revision 5.0.###
  - OnGuard 7.2 (7.2.xxx) using Hardware Installation Guide revision 6.0.###
  - OnGuard 7.3 (7.3.xxx) using Hardware Installation Guide revision 7.0.###
  - OnGuard 7.4 (7.4.xxx) using Hardware Installation Guide revision 8.0.###
  - OnGuard 7.5 (7.5.xxx) using Hardware Installation Guide revision 9.0.###
  - OnGuard 7.6 (7.6.xxx) using Hardware Installation Guide revision 10.0.###

The following devices must be incorporated into the system:

- Supply line transient protection complying with the Standard for Transient Voltage Surge Suppressors, UL 1449, with a maximum marked rating of 330 V.
- Signal line transient protection complying with the Standard for Protectors for Data Communications and Fire Alarm Circuits, UL 497B, with a maximum marked rating of 50 V.
- Signal line transient protection complying with the Standard for Protectors in Telecommunication Networks, CAN/CSA-C22.2 No. 226-92.
- Recorded signals shall be stored in accordance with the applicable time parameters noted in the Standard for Central-Station Alarm Services, UL 827 and UL 681, Installation and Classification of Burglar and Holdup Alarm Systems.

Equipment must be installed in a temperature controlled environment, maintained between 13 - 35°C (55 - 95°F) by the HVAC system. 24 hours of standby must be provided for the HVAC system.

A power conditioner used with the receiving equipment shall comply with the applicable requirements in the Standard for Power Units Other Than Class 2, UL 1012.

The installation instructions shall specify that no software other than the operating system software, monitoring software, and anti-virus/security protection software shall be installed on the primary and backup computers/servers.

HVAC rated modules were not evaluated by UL for OnGuard UL 1076 / UL2610 product Listing.

In addition to the main power supply and secondary power supply that are required to be provided at the central supervisory station, the system must be provided with an uninterruptable power supply (UPS) with sufficient capacity to operate the computer equipment for a minimum of 15 minutes. If more than 15 minutes is required for the secondary power supply to supply the UPS input power, the UPS must be capable of providing input power for at least that amount of time. A means for disconnecting the input to the UPS while maintaining continuity of power to the automation system must be provided, in order to perform maintenance and repair service.

The UPS must comply with the Standard for Uninterruptable Power Supply Equipment, UL 1778/ CSA-C22.2 No. 107.3, or the Standard for Fire Protective Signaling Devices, UL 1481/ULC-S527.

Be sure to use the recommended shielded wiring cabling required for use on all modules. Wiring minimum size is 22 AWG for low voltage and 18 AWG for line voltages.

Outputs are power limited/Class 2 when powered by external power limited/Class 2 power supply, model LNL-AL400ULX or LNL-AL600ULX-4CB6.

Communication circuits and network components connected to the telecommunications network shall be protected by secondary protectors for communication circuits. These protectors shall comply with the Standard for Secondary Protectors or Communications Circuits, UL 497A. These protectors shall be used only in the protected side of the telecommunications network.

A metal conduit must be used when connecting all UL enclosures. This is required for all UL installations.

Do not exceed 1000 receiver accounts for UL.

Network Compromise – As applicable, the system shall be provided with minimum network security ensuring authorization of access to data within a network, to guard against such threats as: Denial of Service (DoS), spoofing, sniffing, hijacking, Trojans, viruses/worms, and malware. Software/hardware, a firewall, and/or a network intrusion detection system (NIDS) shall be provided as applicable and maintained with the latest updates, as supplied by the manufacturer.

All receiving equipment shall be completely duplicated with provision for switchover to the backup system within 30 seconds. The backup system shall be fully operational within 6 minutes of the loss of the primary system. (This allows 30 seconds for the backup system to be fully energized and connected to the necessary communication lines and other devices, followed by 5-1/2 minutes for the system to boot up, conduct memory tests, file system check, security verifications, and prepare for full system operation). The backup computer must have the capabilities of the primary, such as memory, speed, and the like.

Failure of the main computer system, hard disk, and alarm monitor must be programmed to switchover to the backup system, and indicate an audible, or obvious visual indication.

The proprietary (monitoring) station equipment shall be designed and constructed so that any critical component can be replaced and the system restored to service within 30 minutes.

Neither panel nor receiver operating systems (software or firmware) shall be susceptible to known security breaches.

A fault tolerant system may be used in lieu of complete duplication of the system if every component in the fault tolerant system, including the software and power supply, is duplicated.

All OnGuard system solutions that are to be UL 1076 compliant systems must also meet the requirements specified in Section 25A of the UL 1076, Section 37 of the UL2610 (Proprietary Burglar Alarm Units and Systems Standard for Safety). This requirement outlines the need for host monitoring redundancy. Host monitoring redundancy can be accomplished in many ways, but the standard is clear as to receiving equipment methods, recovery time, surge suppression and system configurations. Contact LenelS2 OnGuard Technical Support if configuration assistance is required.

All inputs must be supervised for UL 1076 and UL 2610 installations.

Loss of communication with the monitoring station shall be treated as an alarm condition by monitoring station personnel when the burglar alarm system is in the armed state, and as a trouble condition while the system is disarmed.

Priority features (alarm, loss of line voltage, opens, shorts, etc.) must be programmed for an audio and a visual indication at the central supervisory station equipment, and to create a printout. The condition must be recorded. This indication shall not be silenced without acknowledgment.

Bypass of protective features, such as auto-bypass for forced arm, must not be programmed for UL.

If a modem or Ethernet is used as a method of communication, the connection must be maintained continuously.

Use Marking — Commercial, Proprietary, Multiplex, Encrypted Line Security Burglar Alarm System Control Unit and Access Control Unit.

AES Firmware v1.02 is “extended” firmware that is embedded (installed) in conjunction with Intelligent System Controllers (ISC), models LNL-500 (firmware version 3.085 or later), models LNL-2220, LNL-3300, LNL-4420 (firmware version 1.068 or later) for suitability as “Encrypted Line Security Equipment.”

Network addressing of devices shall not make use of public domain name servers.

Panic hardware must be UL 305/ULC-S132 Listed.

UL 294 Performance Levels

Model	Destructive Attack	Standard Line Security	Endurance	Standby Power
LNL-2210	I	I	IV	I
LNL-2220	I	I	IV	I
LNL-3300	I	I	IV	I
LNL-4420	I	II	IV	I
LNL-1300e	I	I	IV	I
LNL-4000	I	I	IV	I

UL 294 Performance Levels

Model	Destructive Attack	Standard Line Security	Endurance	Standby Power
LNL-8000	I	I	IV	I
LNL-1003MK	I	I	IV	I
LNL-1007MK	I	I	IV	I
LNL-500	I	I	IV	I
LNL-CK	I	I	IV	I
LNL-1100	I	I	IV	I
LNL-1200	I	I	IV	I
LNL-1300	I	I	IV	I
LNL-1320	I	I	IV	I
LNL-1324e	I	I	IV	I
LNL-X2210	I	I	IV	I
LNL-X2220	I	I	IV	I
LNL-X3330	I	I	IV	I
LNL-X4420	I	I	IV	I
LNL-M2210	I	I	IV	I
LNL-M2220	I	I	IV	I
LNL-M3330	I	I	IV	I
LNL-M4420	I	I	IV	I

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

A time delay used to prevent an alarm during egress shall not exceed 60 seconds.

A time delay used to prevent an alarm during entry shall not exceed the time of 60 seconds.

5.1 Power

The standby power system for the HVAC system may be supplied by an engine driven generator alone. Use of a standby battery is not required.

All external interconnecting power sources must be UL/ULC Listed access control/proprietary burglary power limited power supplies. AC supply lines shall not be routed in the same conduit or harness as low voltage lines.

5.1.1 PoE Specifications

Notes: PoE only for use with access control-only installations.

Evaluated for mode B only.

- Adhere to the following PoE Power restrictions:
  - Only an Access Control System Unit (ALVY) supply can provide PoE power.
  - PoE Power is power limited.
  - PoE injector (PSE) providing 44-57VDC and 15W for maximum output
  - PoE+ injector (PSE providing 42.5 - 57 VDC, 25.5W for maximum output.
- The equipment is intended to comply with the National Electrical Code, ANSI/NFPA 70:
  - Where the power supplied over a communications cable is less than, or equal to, 60 watts: Article 725.121, Power Sources for Class 2 and Class 3 Circuits.
- This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.
- Category 5e cabling is the minimum performance category recommended.
- The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG (0.13 mm^2) for patch cords; 24 AWG (0.21 mm^2) for horizontal or riser cable.
- Connected through standard eight-pin RJ-45 connectors.
- Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.

5.1.2 UL/ULC Certified Power Supplies

For the UL certification, the power supply that must be used is the LNL-AL400ULX or LNL-AL600ULX-4CB6 with additional hardware mounted in LNL-CTX or LNL-CTX-6 enclosures. Other power supplies will be certified for use at a future date.

For the ULC Certification, hardware must be mounted in LNL-CTX or LNL-CTX-6 enclosures. All power supplies must be UL, ULC, or cUL Listed for security applications, and power-limited.

	Output	**4 hr. of Stand-by & 5 minutes of Alarm**	**24 hr. of Stand-by & 5 Minutes of Alarm**	**60 hr. of Stand-by & 5 Minutes of Alarm**
LNL-AL400ULX	12 VDC/ 40 AH Battery	Stand-by = 4.0 amps Alarm = 4.0 amps	Stand-by = 1.0 amp Alarm = 4.0 amps	Stand-by = 300 mA Alarm = 4.0 amps
LNL-AL600ULX-4CB6	12 VDC/ 40 AH Battery	Stand-by = 6.0 amps Alarm = 6.0 amps	Stand-by = 1.0 amp Alarm = 6.0 amps	Stand-by = 300 mA Alarm = 6.0 amps

5.2 Typical Combinations for UL Installations

The following combinations must be used in a UL type installation with OnGuard software versions 8.0.xxx through 8.3.xxx, which are approved for use. For UL certification, a UL Listed power supply, either LNL-AL400ULX or LNL-AL600ULX-4CB6 with additional hardware mounted in LNL-CTX or LNL-CTX-6 enclosures, must be used.

For UL 2610 UL Installation, OnGuard 8.3.xxx is compatible with the following Models: LNL-1300-S3, LNL-1320-S3, LNL-1320-S3B, LNL-1200-S3, LNL-1100-S3, LNL-X2210, LNL-X2220, LNL-X3300, LNL-X4420, LNL-M2210, LNL-M2220, LNL-M3300, LNL-M4420, LNL-1324e and LNL-CK.

Multiple combinations of LenelS2 access hardware can be used within the UL approved power supply and enclosure.

Intelligent System Controller Combinations

Any individual board would be supported (LNL-500, LNL-3300, LNL-2210, LNL-2220, LNL-4420) as well as any combination of the following boards within a single enclosure.

1. LNL-500, LNL-3300, LNL-2210, LNL-2220 or LNL-4420 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK Memory Expansion Modules
   LNL-1100 Alarm Input Control Module
2. LNL-500, LNL-3300, LNL-2210, LNL-2220 or LNL-4420 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK Memory Expansion Modules
   LNL-1200 Alarm Output Control Module
3. LNL-500, LNL-3300, LNL-2210, LNL-2220 or LNL-4420 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK Memory Expansion Modules
   LNL-1300 Single Reader Interface Module (Up to four (4) units)
4. LNL-500, LNL-3300, LNL-2210, LNL-2220 or LNL-4420 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK Memory Expansion Modules
   LNL-1320 Dual Reader Interface Module
5. LNL-500, LNL-3300, LNL-2210, LNL-2220 or LNL-4420 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK Memory Expansion Modules
   LNL-8000 Star Multiplexer
6. LNL-500, LNL-3300, LNL-2210, LNL-2220 or LNL-4420 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK Memory Expansion Modules
   LNL-4000 Multiplexer (Up to two (2) units)
7. LNL-500, LNL-3300, LNL-2210, LNL-2220 or LNL-4420 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK Memory Expansion Modules
   LNL-500B or BI Biometric Reader Interface Gateway

Reader Interface Modules and Gateways Combinations

Any individual board would be supported (LNL-1300 or LNL-1320) as well as any combination of the following boards within a single LNL-CTX enclosure.

1. LNL-1320 Dual Reader Interface Module (up to two (2) units)
2. LNL-1300 Single Reader Interface Module (up to eight (8) units)

3. LNL-500B or BI Biometric Reader Interface Gateway (up to two (2) units)
4. LNL-2210 Intelligent Single Door Controller (up to two (2) Units)
5. LNL-1300e Single Door IP Interface Module (up to two (2) Units)
6. LNL-1320-U Dual Door Controller (up to two (2) units)
7. LNL-1300-U Single Door Controller (up to eight (8) units)

Any individual board would be supported (LNL-1300 or LNL-1320) as well as any combination of the following boards within a single LNL-CTX-6 enclosure.

8. LNL-1320 Dual Reader Interface Module (up to six (6) units)
9. LNL-1300 Single Reader Interface Module (up to twenty-four (24) units)
10. LNL-500B or BI Biometric Reader Interface Gateway (up to six (6) units)
11. LNL-2210 Intelligent Single Door Controller (up to six (6) units)
12. LNL-1320-U Dual Door Controller (up to six (6) units)
13. LNL-1300-U Single Door Controller (up to twenty-four (24) units)

Input/Output Modules Combinations

Any individual board would be supported (LNL-1100 or LNL-1200) as well as any combination of the following boards within a single LNL-CTX enclosure.

1. LNL-1100 Alarm Input Control Module (up to two (2) units per enclosure)
2. LNL-1200 Alarm Output Control Module (up to two (2) units per enclosure)
3. LNL-1100 Alarm Input Control Module
   LNL-1200 Alarm Output Control Module
4. LNL-1100 Alarm Input Control Module
   LNL-1320 Dual Reader Interface Module
5. LNL-1200 Alarm Output Control Module
   LNL-1320 Dual Reader Interface Module
6. LNL-1100-U Input Control Module
   LNL-1200-U Output Control Module
7. LNL-8000 Star Multiplexer

Any individual board would be supported (LNL-1100 or LNL-1200) as well as any combination of the following boards within a single LNL-CTX-6 enclosure.

8. LNL-1100 Alarm Input Control Module (up to six (6) units per enclosure)
9. LNL-1200 Alarm Output Control Module (up to six (6) units per enclosure)
10. LNL-1100 Alarm Input Control Module (up to three (3) units per enclosure)
    LNL-1200 Alarm Output Control Module (up to three (3) units per enclosure)
11. LNL-1100 Alarm Input Control Module (up to three (3) units per enclosure)
    LNL-1320 Dual Reader Interface Module (up to three (3) units per enclosure)
12. LNL-1200 Alarm Output Control Module (up to three (3) units per enclosure)
    LNL-1320 Dual Reader Interface Module (up to three (3) units per enclosure)

13. LNL-1100-U Input Control Module (up to three (3) units per enclosure)
    LNL-1200-U Output Control Module (up to three (3) units per enclosure)
14. LNL-8000 Star Multiplexer

The LNL-2210 Intelligent Single Door Controller can by remotely powered by either the LNL-AL400ULX, LNL-AL600ULX-4CB6 or any other UL 294 or UL 603 approved power limited power supplies. The LNL-2210 must be installed in accordance with the National Electrical Code in a triple gang electrical box. For UL installations, you must have a tamper switch connected from the electrical box cover to LNL-2210 tamper circuit.

UL Evaluated Readers and Card Formats

The following readers have been evaluated by UL for use with the OnGuard system.

- LNL-2005W Magnetic Card Access Reader - up to 128-bit format
- LNL-2010W Magnetic Card Access Reader - up to 128-bit format
- LNL-2020W Magnetic Card Access Reader - up to 128-bit format
- LPKP-6840 LenelProx with Keypad
- HID ProxPro 5355 - up to 128-bit format
- HID ThinLine II 5395 - up to 128-bit format
- HID 6125 (iCLASS RP40) - up to 128-bit format
- HID 6130 (iCLASS RK40) - up to 128-bit format
- HID 6136 (iCLASS RKP40) - up to 128-bit format
- HID 6145 (multiCLASS RP15) - up to 128-bit format
- HID Indala FP2513A (FlexPass) - up to 128-bit format
- HID 6170 (iCLASS RKL55) - up to 128-bit format (UL 1076 - suitable for remote arming). This device is compatible with the LNL-2220/LNL-3300/LNL-4420 controllers only.
- HID RWKL550 LCD Keypad Reader
- Lenel OpenCard XF1050D, XF1500, XF2100D, XF2110D
- LNL-CK (UL 1076 - suitable for remote arming). This device is compatible with the LNL-2220/ LNL-3300 controllers only. External readers connected to the LNL-CK keypad have not been evaluated by UL.
- LNL-R11330-05TB: BlueDiamond Mobile mini-mullion reader for LenelS2 BlueDiamond Mobile smartphone credential
- LNL-R11320-05TB: BlueDiamond Mobile US single gang reader for LenelS2 BlueDiamond Mobile smartphone credential
- LNL-R11325-05TB: BlueDiamond Mobile US single gang reader for LenelS2 BlueDiamond Mobile smartphone credential
- LNL-R11030-85TB: BlueDiamond Mobile Bluetooth in-line add-on reader adds BlueDiamond Mobile smartphone credential support to an existing reader, Wiegand
- Magnetic, proximity, MIFARE, and iCLASS card formats
- Card formats 26 to 200 bits
- UL evaluated readers and card formats for models LNL-1300-U and LNL-1320-U

- Carrier Fire & Security Americas Corporation (GE Security, Inc.), models T-500W, T-520W (for Wiegand only; up to 26 bits).
- Single Door Controller (SDC), model LNL-1300-U and Dual Door Controller (DDC), model LNL-1320-U have been evaluated for use with Intelligent System Controllers, models LNL-2220, LNL-4420 and LNL-3300 only.

5.2.1 Acknowledgment Signal

For remote arming (or switching the protection mode at the protected area), the system must be programmed to provide a visual and/or audible signal at the keypad to indicate to the attendant at the protected area that the confirmation closing signal has been received by the central supervising station.

In System Administration, configure (program) the system to verify the host connection during arming and disarming operations at the remote keypads.

1. From the ***Access Control*** menu, select ***Readers and Doors***.
2. On the Aux Inputs form, add one (1) Auxiliary Input.
3. From the ***Access Control*** menu, select ***Groups***.
4. On the Mask Groups form, create an Alarm Mask Group using the input created in step 2.
5. From the ***Access Control*** menu, select ***Local I/O***.
6. On the Local I/O Function Lists form, create a Local I/O function for the Alarm Mask Group Mask/Unmask group created in step 4.
7. From the ***Access Control*** menu, select ***Groups***.
8. On the Mask Groups form, create an Intrusion Mask group for the desired alarm points.
9. Link the Local I/O function for the Alarm Mask Group Mask/Unmask created in step 6 to the Intrusion Mask group created in step 8 via the **Configure Actions** option on the Intrusion Mask group form.
    a. For the Disarmed selection, set the Local Function created in step 6 to "Set True for Enter" and "Do Nothing for Exit".
    b. For Arming selections, set the local function created in step 6 to "Set False for Enter" and "Do Nothing for Exit".
10. From the ***Access Control*** menu, select ***Readers and Doors***.
11. On the Aux Outputs form, add one (1) Auxiliary Output that will be wired to the local notification chosen.
12. From the ***Access Control*** menu, select ***Global I/O***. Create two (2) Global I/Os.
    a. Configure the first Global I/O with Timezone set to "Always" and the Input Event device for the input added in step 2 with an event of "Input Masked". The Output Action will be "Device Output", selected for the relay added in step 11, and then set the **Operation** drop-down to "Activate".
    b. The second Global I/O will have Timezone of "Always" and the Input Event device for the input added in step 2 with an event of "Input Unmasked". The Output Action will be "Device Output", selected for the relay added in step 11, and then set the **Operation** drop-down to "Deactivate".

Note: The LS Linkage Server Service is required to verify the host connection as configured above. This allows you to route a configuration through the host to change the state of the chosen local notification each time the Intrusion Mask group is armed or disarmed.

Note: The reader aux inputs and outputs can also be added (as detailed in steps 1, 2, 10, and 11) from the Alarm Panels configuration based on what the type of hardware is available. (From the ***Access Control*** menu, select ***Alarm Panels***.)

5.3 UL/ULC Requirements

- The LNL-500 must be connected directly, through dial-up (a dedicated phone line must be used), or through Ethernet to the computer.
- The LNL-2210 must be connected through Ethernet only using a dedicated LAN.
- The LNL-2220 and LNL-3300 must be connected through serial, dial-up, or Ethernet using a dedicated LAN. The secondary path must be connected through dial-up using a dedicated phone line or dedicated LAN for back up (dual signal line transmission).
- When using dial-up connection, a dedicated phone line must be used. The modem connection must be maintained continuously.
- When using the Securecomm Uniflex DC336 modem, it must be in a secured box and powered by a power supply UL/ULC Listed for Access Control/Proprietary Burglar Alarm Systems, and power-limited.
- The relays on the LNL-1300 can only be used for access control applications.
- For the LNL-1300, field wiring for relay K2 should not extend beyond the room of installation.

The following devices/methods of communication have NOT been evaluated by UL:

- CoBox Token Ring Serial Server
- Lantronix CoBox-DR
- LNL-IC108A/IC109A
- LNL-838A converter
- Cypress Timer

5.4 CAN/ULC-S319-05 Requirements

- Only OnGuard 7.0 (7.0.xxx), OnGuard 7.1 (7.1.xxx), OnGuard 7.2 (7.2.xxx), OnGuard 7.3 (7.3.xxx), and OnGuard 7.4 (7.4.xxx) Monitoring Software was evaluated for use.
- Portal locking devices must be ULC or cUL Listed, and be constructed so that they do not interfere with egress, with their locking action capable of being released when emergency egress is required. Compliance with this requirement will be determined by demonstrating operability with ULC-S533, Standard for Egress Door Securing and Releasing Devices, compliant devices. If the application requires fire resistance, devices will be both ULC-S533 and ULC-CAN4-S104, Standard Method for Fire Tests of Door Assemblies, compliant.
- Installation must be in accordance with CSA 22.1, National Electrical Code.
- RS-485 cable must be shielded.

- Pass codes used with keypads will be system generated or generated by a system administrator, and the maximum number of users shall not exceed 500 (for Class II).
- An electronic access control system operated from commercial power shall be provided with standby power with capacity of 7 Ah or 18 Ah to support a full load for a period of 30 minutes (Class II), in the event of primary power loss.
- Front and rear tampers must be used. A visual and/or audible alarm shall be annunciated if the enclosure is tampered.
- All card readers must be evaluated by UL, must be ULC or cUL Listed, and be Wiegand compatible.
- This Class B digital apparatus complies with Canadian ICES-003.

5.5 CAN/ULC 60839-11-1 Requirements

Note: No products have been certified by UL to CAN/ULC 60839-11-1.

- Only the following subassembly boards were evaluated for CAN/ULC 60839-11-1.
  - LNL-X2210
  - LNL-X2220
  - LNL-X3300
  - LNL-X4420
  - LNL-1324e

CAUTION There is a risk of explosion if a battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

PRÉCAUTION Il y a un risque d'explosion si une batterie/pile est remplacer par une batterie/pile incorrecte. Jeter les batteries/piles usagées selon les instructions.

- Security Grade 3 approved (Environmental Class III).
- OnGuard 7.5 and OnGuard 7.6 were evaluated.
- Indoor use only.
- All grade 3 and grade 4 mandatory/optional requirements verified except:
  - Locking device abnormal status.
  - Maximum delay time for displaying text, image, or graphics.
  - Synchronize the master clock of the system to the official time.
  - System should be capable of assigning access rights to a group of credentials or in response to emergency conditions.
  - System-wide free access granting, until further system command, single portal or group of portals, Scheduled/timed free access granting, single portal or group of portals instructions following alert reaching the monitoring.
  - Power supplies and accessories are required to be combined when creating a CAN/ULC 60839-11-1 compliant system.
  - OnGuard Access Control cannot interfere when granting access to exits during emergency systems including fire and environmental evacuations.
- Pass codes

  - All installation pass codes created from a combination of previously known digits along with either digits from a token, or biometrics digits, must equal a minimum of four digits total. It can contain more than four, but no less than four digits.
  - A minimum of six alphanumeric characters are required for OnGuard.
  - When creating a pass code,you cannot use the same digit more than twice, and the pass code cannot be a listing of numbers is sequential order (neither ascending nor descending order).

- Installation instructions containing details for communication lines between readers and access control units shall be provided with mechanical protection is available.
- The system is to be installed within a protected premise. In a subassembly, the operating temperature range must be 0° to 49°C; the humidity range must be 0 to 93% RH.
- The end to end communication verification (timing) shall be conducted as part of the final installation and it shall be less than 45 seconds.
- Mount inside the protected area.

6 EN Certified Readers

Not evaluated by UL.

The following readers are EN Security Grade 3 approved (Environmental Class III, EN50131-1, -3, EN50133-1) for use with the OnGuard system:

- AWID Sentinel Prox KP-6840GRMP
- Barantec Keypad LNL-826S121NN
- Guardall G-Prox II 111-8267P
- Guardall G-Prox II 111-8289P
- HID iCLASS 6100BKT0000L
- HID iCLASS 6120BGN0000L
- HID iCLASS 6125BKN0007-G3.0
- HID iCLASS 6130BKT000709GL
- HID iCLASS 6136AKN000709G3L
- HID ProxPro 5355AGK00
- HID ProxPro 5355AGK09
- HID ThinLine II 5395CG100
- XceedID LenelProx LNL-XF2110D-P2

For information on reader wiring, refer to the *Alternative Reader Wiring Guide*.

INTELLIGENT CONTROLLERS

Controller Web Page Configuration

Instead of using DIP switches or jumpers to define communication and addressing, the following controllers can be configured through the web interface:

- LNL-M4420, LNL-M3300, LNL-M2220, and LNL-M2210
- LNL-X4420, LNL-X3300, LNL-X2220, and LNL-X2210
- LNL-4420, LNL-3330, LNL-2220, and LNL-2210

7 Using a Web Browser to Configure LenelS2 Intelligent Controllers

The web browser interface is a secure connection that is used to configure the LenelS2 intelligent controllers by providing the ability to:

- Select the connection method of the Host computer to the controller
- Configure the IP address (Host Communication address or DHCP name)
- Create and manage user logins
- Configure Auto-save settings
- Reload or reset settings back to default
- Manage certificates
- View status
- Configure security options
- View device information
- Restore settings to factory default.

7.1 Secure Access to Controller Web Page Configuration

Upon installation, the user accounts to the web configuration page should be created with secure passwords and the DIP switches set in the off position for the normal operating mode. The intelligent controllers are shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before an intelligent controller is commissioned. It is also highly recommended not to configure the controller with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to enable support for ASSA ABLOY Aperio Hub legacy support, and disable SNMP, Zeroconf discovery, or the web configuration module itself. For more information, refer to Configure Other Settings on page 77.

Additionally, data encryption can be enabled over the host communication port. For more information, refer to Configure the Host Communication Settings on page 69.

7.1.1 Default User

There is one pre-defined user always available by turning DIP switch SW1 ON after power up (SW800 or SW1400 on LNL-M series). When logging in for the first time, since no other users are defined yet, the default user name and password are required for configuring this board.

If the user name and password for the controller are unknown, configure the DIP switches as follows:

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. This switch is also used to re-enable the Web Server. For more information, refer to Configure Other Settings on page 77.
OFF	ON	X	OFF	Use factory default communication parameters. (Address: 192.168.0.251 Port: 3001)
ON	ON	X	OFF	Use LenelS2 default communication parameters. Refer to the Bulk Erase section in an Intelligent Controller chapter.
ON	ON	X	OFF	Bulk Erase prompt mode at power up. Refer to the Bulk Erase section in an Intelligent Controller chapter.
X	X	ON	X	Disables the TLS secure link. The switch is read when logging on only. (Not used on the LNL-4420, LNL-X series, or the LNL-M series controllers because TLS is always enabled.)
X	X	X	ON	For use in situations where the host software has not been updated to support the LNL-M series product line to make the LNL-M series report and function like a standard LNL-X board or to support the LNL-X series product line to make the LNL-X series report and function like a standard LNL- board.

The DIP switches configure the operating mode of the processor. DIP switches are read on power-up except where noted. Press switch S2 (SW400 on LNL-M series) to reset the board.

Notes:

The default username (admin) & password (password) will work for 5 minutes after switch 1 is set to ON. Before disabling the default username & password, ensure at least one user has been created and then set Switch 1 to off.

After configuring ports and users, be sure to turn SW1 (SW800 or SW1400 on LNL-M series) OFF to enable the updated settings.

7.2 Open the Configuration Web Page and Log In

The Configuration Web Page can be launched from within System Administration (if an IP address or host name is specified) or by using a browser to access the programmed IP address. Depending on your proxy settings, you may have to allow this web page. For more information, consult your browser's online help or system administrator for assistance.

1. Use one of three (3) ways to access the Configuration Web page:
   - In System Administration > Access Panels folder > Location sub-tab, click the **Configuration Web Page** button.
   - In the browser-based OnGuard Hardware client > Mercury Panel Management page, select the **Open Configuration Web Page** option from the menu at the end of the panel's row.
   - In a browser, navigate to the device using the IP address.
2. All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website's security certificate. Although it is not recommended, proceed to the website.
3. Click the link to go to the login page.

Note: The factory default does not have a security certificate. Depending on the browser and security settings, a certificate error may be displayed. Continue anyway.

4. Log in using your user name and password.

Notes: Only three (3) users may be logged in at the same time and only one Level 1 user may be logged in at any time.

If a third user closes the browser without logging out, another user attempting to log in will see a Server Busy error and need to wait until someone logs out or the inactivity timer is reached for the one who closed the browser without logging out.

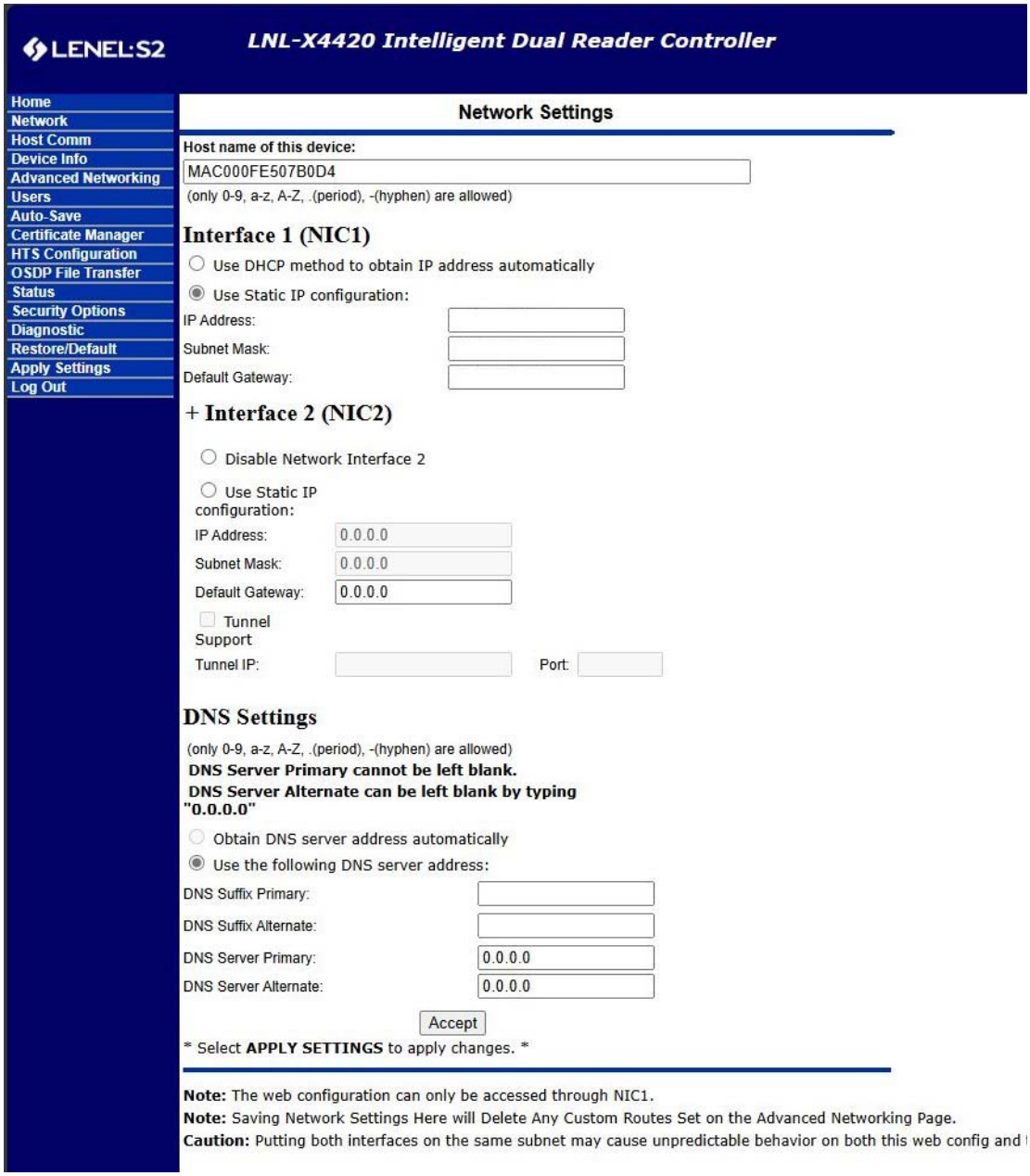
The Home page is displayed. It indicates the type of device, provides links to other setup pages, and has a Notes field for identifying information within the controller or indicating contact information.

5. (Optional) Type up to 250 characters in the Notes field and click **Save Notes**.

7.3 Configure Network Settings

The Network Settings page specifies the addressing mode and address for the intelligent controllers.

1. Select **Network** from the left-hand menu. The Network Settings page is displayed.



2. Select the appropriate option to connect to the controller on the network:
   - **Use DHCP**
     With DHCP, IP settings will be configured automatically. The default DHCP name uses the MAC address of the controller.
   - **Use Static IP**
     Specify the IP address, subnet mask, default gateway, and an optional DNS suffix for the controller.
3. If using DHCP, specify the host name.
4. Configure an optional USB to Ethernet adapter (LNL-X series and LNL-M series controllers only): Select the plus sign (+) next to Interface 2 (NIC2) and repeat Step 2.
5. Specify a DNS suffix (LNL-X series and LNL-M series controllers only): Specify a suffix for both the primary and alternate connections.

Note: The DNS suffix is required for an LNL-1300e using Public DHCP. Select the automatic option or specify DNS server address.

6. Select a DNS server address option and specify a DNS server if applicable.
7. Click **Accept**.
8. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

7.4 Configure the Host Communication Settings

The Host Communication page configures parameters for communication from the host system to the intelligent controllers. Parameters vary by controller.

LNL-X series and LNL-M series controllers can be configured for either an IP Server connection or an IP Client connection to the OnGuard Communications Server. The IP Server configuration (standard option for OnGuard), sets the OnGuard Communications Server to initiate communications to the controller. The IP Client configuration (convenient for cloud-deployed OnGuard systems) sets the panel to initiate communication with the Communications Server located in the Cloud. An IP Client connection requires a port number be assigned in the OnGuard System Administration > General System Options form for the IP Client connection to the Communications Server. For an IP Client configuration, the following settings are recommended:

- Set Data Security be set to TLS Required in the Controller Web Page > Host Communication page
- Configure the OnGuard System to communicate only to a specific controller MAC address identified in the System Administration > Access Panel configuration form, Primary Connection sub-tab.
  Make a note of the controller MAC address information while working with the controller to enter later in OnGuard System Administration.

Some controllers have two physical port connectors: an Ethernet port and a serial port. Some also support two Ethernet connections.

The LNL-3300 controller offers the additional communication options of RS-485 and a serial adapter option to utilize adapters such as the Lantronix Micro 100 Cobox.

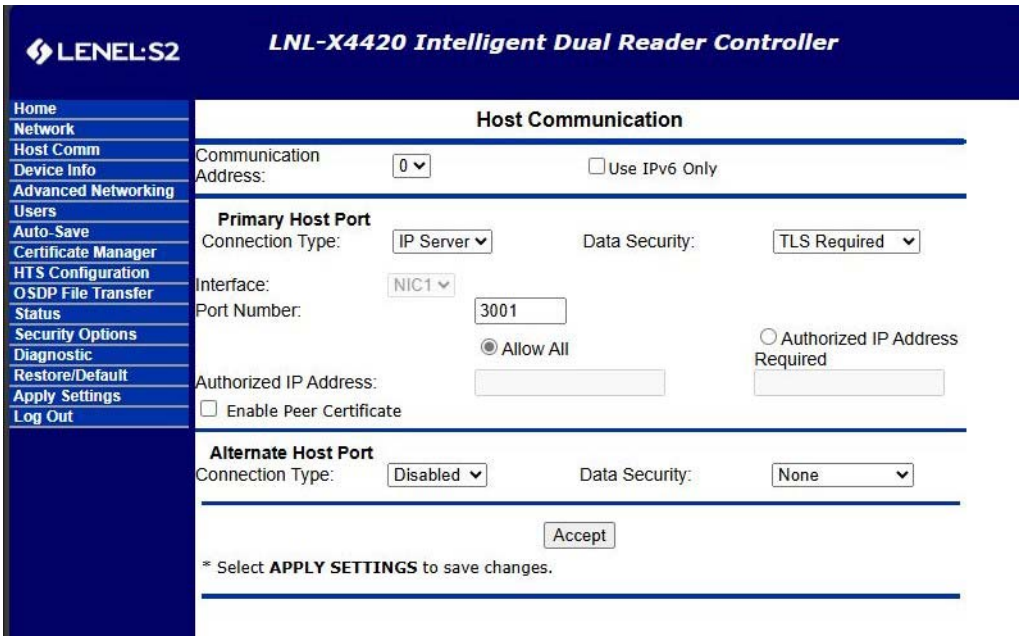
The table that follows details the valid combinations of Primary and Alternate Host Port settings.

Primary Port	Alternate Port					
	Disabled	**IP Server** (LNL-2210, LNL-2220, LNL-3300, LNL-4420, LNL-X series, and LNL-M series)	**Serial RS-232** (LNL-2220, LNL-3300)	**Serial Modem** (LNL-2220, LNL-3300)	**Serial RS-485** (LNL-3300)	**Serial Adapter** (LNL-3300)
IP Server (LNL-2210, LNL-2220, LNL-3300, LNL-4420, LNL-X series, and LNL-M series)	**x**	**x**	**x**	**x**	**x**	**x**
IP Client (LNL-X series, and LNL-M series)	**x**	n/a	n/a	n/a	n/a	n/a
Serial RS-232 (LNL-2220, LNL-3300)	**x**	**x**	n/a	n/a	n/a	n/a
Serial Modem (LNL-2220, LNL-3300)	**x**	**x**	n/a	n/a	n/a	n/a
Serial RS-485 (LNL-3300)	**x**	**x**	n/a	n/a	n/a	n/a
Serial Adapter (LNL-3300)	**x**	**x**	n/a	n/a	n/a	n/a

Note: For an Auxiliary Authentication Module configured in OnGuard (LNL-4420, LNL-X4420, and LNL-M4420 only), additional configuration is required.
(See LNL-4420, LNL-X4420, and LNL-M4420: Auxiliary Authentication Module Web Configuration for more information.)

7.4.1 Configure Host Communication for an IP Server

1. Select **Host Comm** from the left-hand menu. The Host Communication page is displayed.



   a. Select 0 to 7 for the controller's communication address.
   The address is used for RS-485 (LNL-2220, LNL-3330 only) and must match the setting in the access control software, even for IP communications.

   b. Select the check box to use IPv6 only, if desired.

2. Configure the **Primary Host Port** and, if applicable, the **Alternate Host Port**.

Notes: Connection Type options vary based on the controller.

When using an IP Server connection, the controller may be configured to allow all IP addresses or only authorized IP addresses.

---

   a. **Connection Type**: IP Server

      – **Data Security**: The controller is capable of Password/AES or TLS encryption. Available options are **TLS Required** (default), **TLS if Available**, or **Password/AES**.

Note: If Data Security is set to **TLS Required** (available for LAN connections only), then the **TLS encryption** option must be selected on the Options sub-tab in ***System Administration > Access Control > Access Panels > LNL-nnnn*** tab, and a TLS certificate matching the one on the panel must be installed on the Communication Server. When adding new LNL-X Series or LNL-M Series access panels in System Administration, the **TLS encryption** option is enabled by default. For more information on TLS certificates, including replacing the default certificate on the panel, refer to the *Encryption for Controllers User Guide*.

- **Interface**: Select NIC1 or NIC2, if applicable.
- **Port Number**: (default 3001) This communication port number must match setting in the access control software.
- **Allow All**: Select to allow any connection to the specified host port.
- **Authorized IP Address Required**: Select to restrict the connection to the specified IP addresses in the Authorized IP Address fields.
- **Authorized IP Address**: If **Authorized IP Address Required** is selected, enter the authorized IP addresses for connection.
- **Enable Peer Certificate**: (primary host port only) Do ***not*** select this check box - this feature is not implemented at this time.

b. **Connection Type**: RS-232
- **Data Security**: The controller is capable of Password/AES.
- **Baud Rate**: 9600
- **Flow Control**

c. **Connection Type**: Serial Modem
- **Data Security**: The controller is capable of Password/AES.
- **Baud Rate**: 9600, 19200, 38400, 57600, 115200
- **Flow Control**: None, CTS/RTS

d. **Connection Type**: Serial RS-485
- **Data Security**: The controller is capable of Password/AES.
- **Baud Rate**: 9600, 19200, 38400, 57600, 115200
- **Flow Control**: RTS Toggle

e. **Connection Type**: Serial Adapter
- **Baud Rate**: 9600, 19200, 38400, 57600, 115200
- **Flow Control**: RTS/CTS

3. Click **Accept**.
4. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

7.4.2 Configure Host Communication for an IP Client

For LNL-X series and LNL-M series controllers only.

1. Select **Host Comm** from the left-hand menu. The Host Communication page is displayed.
2. Configure the **Primary Host Port**.

Note: Connection Type options vary based on the controller.

a. **Connection Type**: IP Client

- **Data Security**: **TLS Required**

Note: The **TLS encryption** option must be selected on the Options sub-tab in ***System Administration > Access Control > Access Panels > LNL-nnnn*** tab, and a TLS certificate matching the one on the panel must be installed on the Communication Server. When adding new X-Series or M-Series access panels in System Administration, the **TLS encryption** option is enabled by default. For more information on TLS certificates, including replacing the default certificate on the panel, refer to the *Encryption for Controllers User Guide*.

- **Interface**: Select NIC1.
- **Port Number**: (default 3001) This communication port number must match setting in the access control software.
- **Allow All**: Select to allow any connection to the specified host port.
- **Authorized IP Address Required**: Select to restrict the connection to the specified IP addresses in the Authorized IP Address fields.
- **Authorized IP Address**: If **Authorized IP Address Required** is selected, enter the authorized IP addresses for connection.
- **Enable Peer Certificate**: (primary host port only) Do ***not*** select this check box - this feature is not implemented at this time.

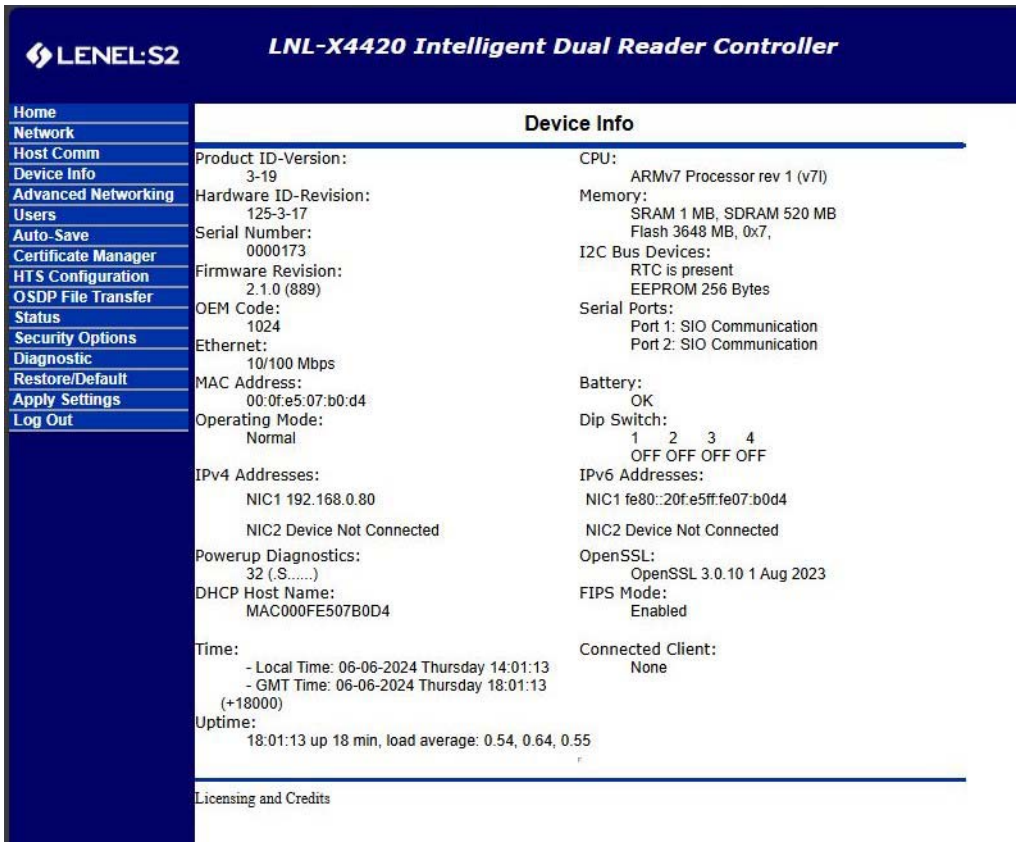
Note: An Alternate Host Port is not available with IP Client as the Primary Host Port Connection Type.

3. Click **Accept**.
4. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

7.5 Display Controller Information

The **Device Info** page displays hardware and configuration settings on the controller. This page is refreshed every minute.

Select **Device Info** from the left-hand menu. The **Device Info** page is displayed.



7.6 Configure User Accounts and Other Settings

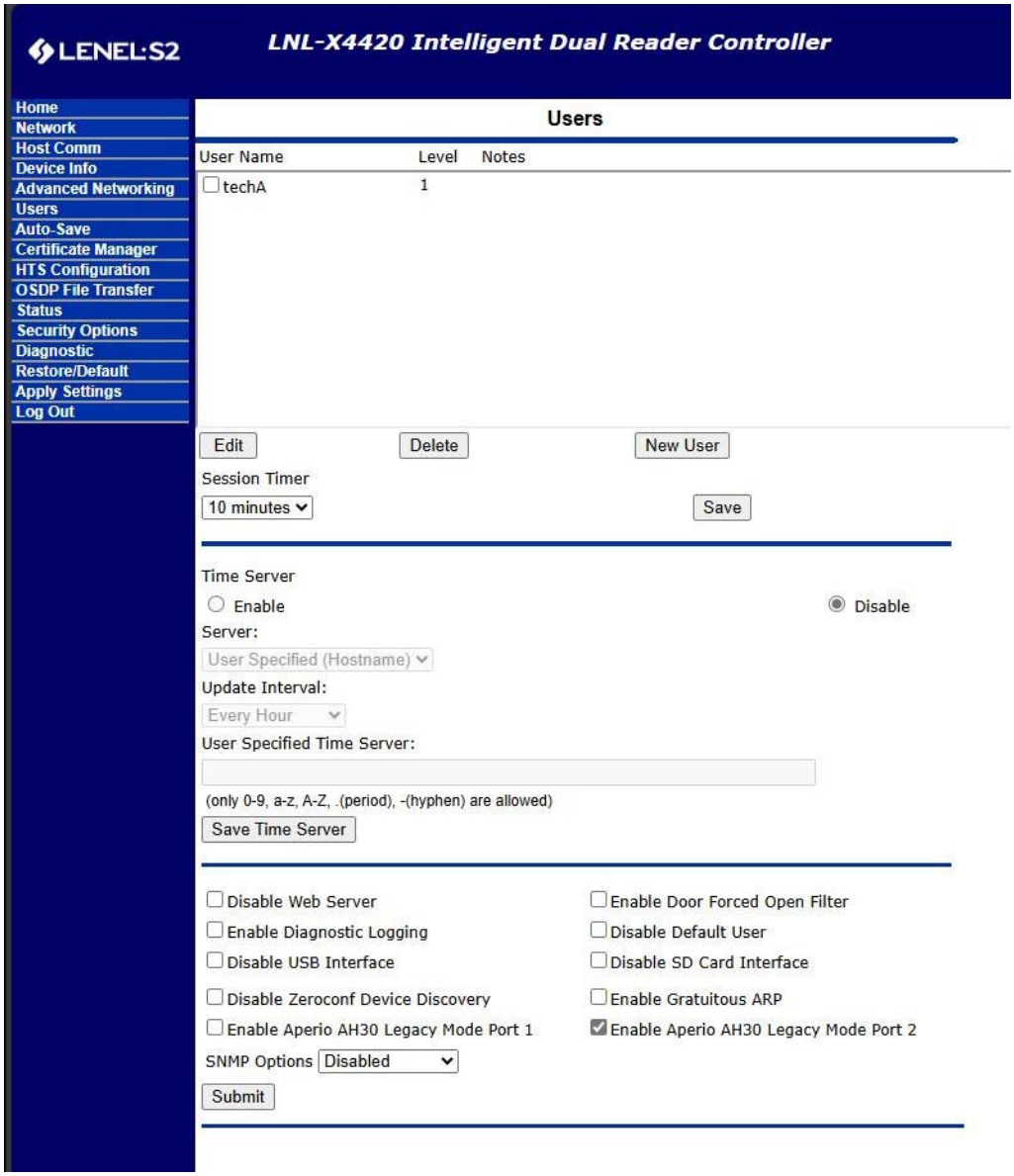
User accounts for the Web Configuration Manager may be created, edited or deleted. Up to 10 users may be defined.

Other settings include:

- *(For LNL-2210, LNL-4420, LNL-X series, and LNL-M series only)* Configuring a time server.
- *(For LNL-X series and LNL-M series only)* Enable Aperio AH30 Legacy Mode on an RS-485 port
- Enabling diagnostic logging and the door forced open filter.
- Disabling the web server, USB interface, default user, or SD card interface.
- Disabling SNMP options.

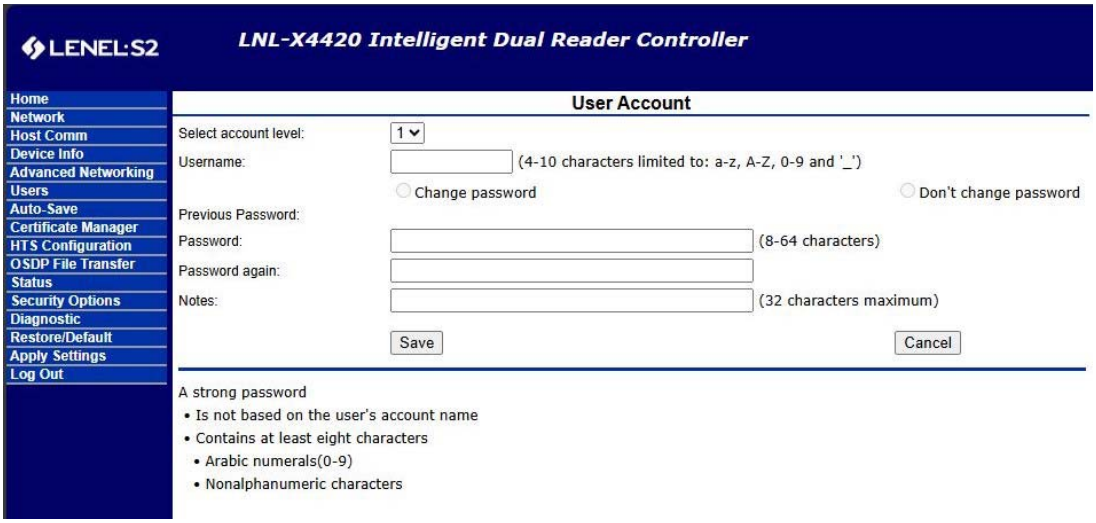
7.6.1 Create or Edit a User Account

1. Select **Users** from the left-hand menu. The Users page is displayed.



2. To edit a user account, select a user from the list and then select **Edit**.

   To create a new user account, select **New User**.
   The User Account page is displayed.



3. Select an **account level** to allow or restrict web page access.
   - Level 1 has full control.
   - Level 2 has view permission for: Home, Network, Host Comm, Device Info, Status, and Log Out pages.
   - Level 3 has view permission for: Home, Device Info, and Log Out pages.
4. Enter a **Username** of 4-10 characters.
5. Select Change password, if desired for an existing user.
6. Enter a **Password** of 6-10 characters using the guidelines for a strong password listed below Save.
7. Enter the **Password again** to verify the entry.
8. Enter a note of up to 32 characters, if desired. Example: Level 2 user.
9. Select **Save**. The Users page is displayed with the new user added to the list.
10. Select a value for the **Session Timer** from the drop-down menu to specify the period of inactivity allowed before the user is automatically logged out. The inactivity timer can be between 5 and 60 minutes.
11. Select **Save**.

7.6.2 Delete a User Account

1. Select **User** from the left-hand menu. The users page is displayed.
2. Select a user from the listing and then **Delete**.
3. Select **Save.**

7.6.3 Configure an External Time Server

1. Select **User** from the left-hand menu. The users page is displayed.
2. Select Enable for the **Time Server** and set options. The current time is requested from the external server at power up.
   - **Server**
     Select the appropriate server from the drop-down menu. Options include User-Specified (Hostname), User-Specified (IP), pool.ntp.org - port 123, time.nist.gov - port 123.
   - **Port**
     Enter a port number. NIST servers listen for NTP requests of port 123.
   - **Update Interval**
     Select the how often to update the time from the server. Options include Every: Hour, 3 Hours, 6 Hours, 12 Hours, Day.
   - **User Specified Time Server**
     If *User Specified (Hostname)* was selected for **Server**, enter the hostname of the time server to use.
3. Select **Save Time Server.**

7.6.4 Configure Other Settings

1. Select **User** from the left-hand menu. The users page is displayed.
2. Select the check boxes at the bottom of the page to enable or disable the following options (options vary by controller type):

Note: Some options are only available for selection when DIP switch 1 is set to ON.

   - **Disable Web Server**
     Select this option to disable web access to the controller. (To re-enable the web interface, turn Switch 1 to ON and login.)
   - **Enable Diagnostic Logging**
     Select this option to log additional diagnostic information to the debug file. This option should only be used for diagnostic purposes and normally should remain disabled.
   - **Disable USB Interface**
     Select this opeiont to disable the USB interface communication.
   - **Disable Zeroconf Device Discovery**
     Zeroconf is used to advertise supported services for discovery. Select this option to disable discovery of the controller using Zeroconf.
   - **Enable Aperio AH30 Legacy Mode Port 1**
     To support AH30RN6, with legacy configuration parameters from OnGuard, enable this option. If this option is enabled, only AH30RN6 devices will be supported on this RS-485 bus.
   - **Enable Door Forced Open Filter**
     Select this option to prevent a door forced open alarm from being generated if the door is opened within three seconds of being closed. This setting applies to all of the controller's readers and overrides the individual filter set on each reader.
   - **Disable Default User**
     Select this option to disable the default username and password that can be used to log into the controller web page using DIP Switch 1.

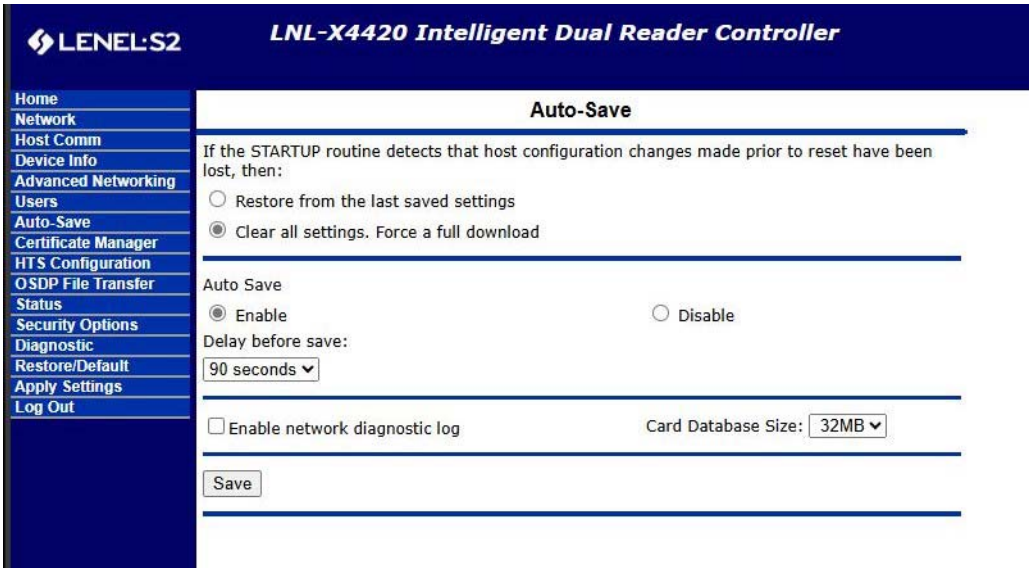
- **Disable SD Card Interface**
  Select this option to disable all use of the SD card interface.
- **Enable Gratuitous ARP**
  In some customer networks, support for Gratuitous ARP is needed. If so, enable this option.
- **Enable Aperio AH30 Legacy Mode Port 2**
  To support AH30RN6, with legacy configuration parameters from OnGuard, enable this option. If this option is enabled only AH30RN6 devices will be supported on this RS-485 bus.

3. (Optional) Select one of the following **SNMP Options**: Disabled, v2c/v3 Support, v3 Support, or v2c Support.
4. Select **Submit**.
5. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

7.7 Configure Auto-Save Options

The Auto Save page configures the Auto-save behavior and determines how the controller reacts on startup if host configuration changes have been lost.

1. Select **Auto-Save** from the left-hand menu. The Auto-Save page is displayed.



2. Select the desired behavior if the startup routine detects that the host configuration changes made prior to reset have been lost: **Restore from the last saved settings** or **Clear all settings. Force a full download**.
3. Select Enable **Auto Save**.
   If Auto Save is Disabled, configuration changes are not automatically saved. Configuration can be manually saved.
4. Select a value for the **Delay before save** option from the drop-down menu. Options include: 30, 60, or 90 seconds and 2, 5, 10, 20, or 30 minutes.

5. Select **Enable network diagnostic log** to write diagnostic information to the debug file every 15 minutes when debug is enabled.
6. (LNL-4420, LNL-X4420, and LNL-M4420 only) The card database size for LNL-4420, LNL-X4420, and LNL-M4420 will be set in the OnGuard software.
7. Select **Save Settings**.
8. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

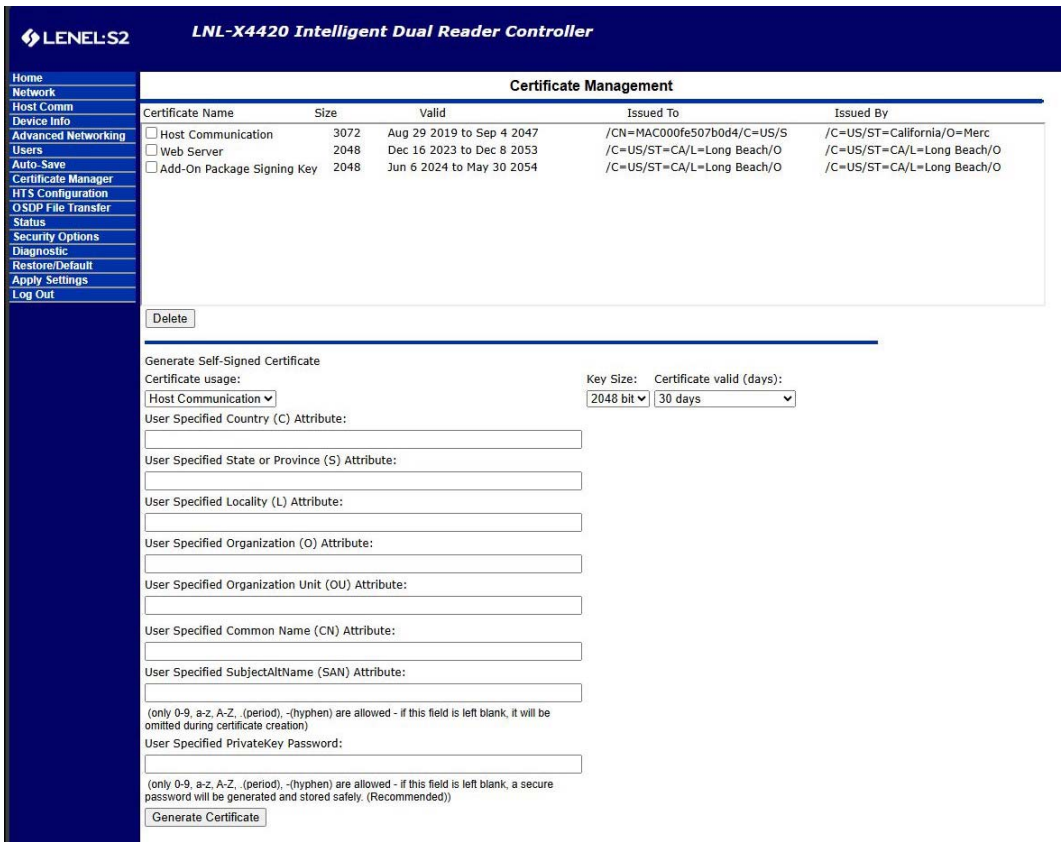
7.8 Manage Certificates

The **Certificate Management** page (or the Load Certificate page for older controllers) allows the certificates loaded at the factory to be replaced by unique, custom certificates.

7.8.1 Certificate Management Page for LNL-X Series, Version 2 and LNL-M Series Controllers

The **Certificate Management** page lists current certificates and allows you to upload PEM certificate chain files or delete existing certificates.

1. Select **Certificate Manager** from the left-hand menu. The Certificate Management page is displayed.



2. To delete an existing certificate:
   a. Select the check box next to the certificate name.
   b. Select the **Delete** button.
   c. Select **Yes** to confirm.
3. To Load a PEM certificate chain file:

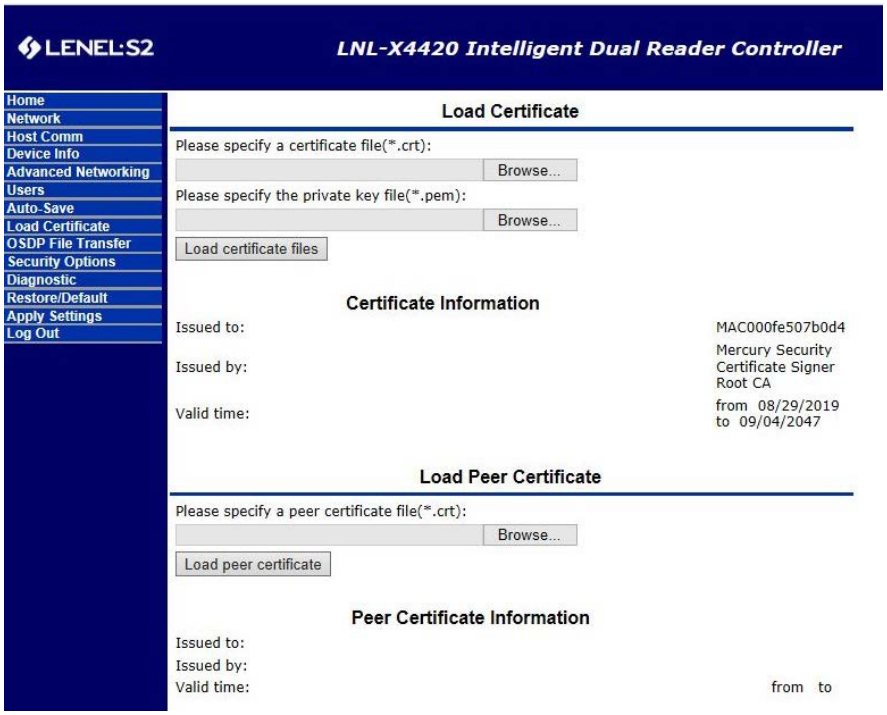


   a. Select the **Choose File** button and browse for a custom chain certificate (.pem) file.
   b. Select **Load PEM Certificate Chain**.
   The file is added to the list at the top of this page.
4. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

7.8.2 Load Certificate Page for LNL-X Series, Version 1.x Firmware and Lower

The **Load Certificate** page allows you to upload TLS and Peer certificate files for the LNL-X Series controllers with firmware version earlier than 2.0 and other older controllers.

1. Select **Load Certificate** from the left-hand menu. The Load Certificate page is displayed. Certificates that are already loaded are identified in the Certificate Information section of the page.



2. Use the **Choose File** buttons to browse for a custom certificate (.crt) and a private key file (.pem).

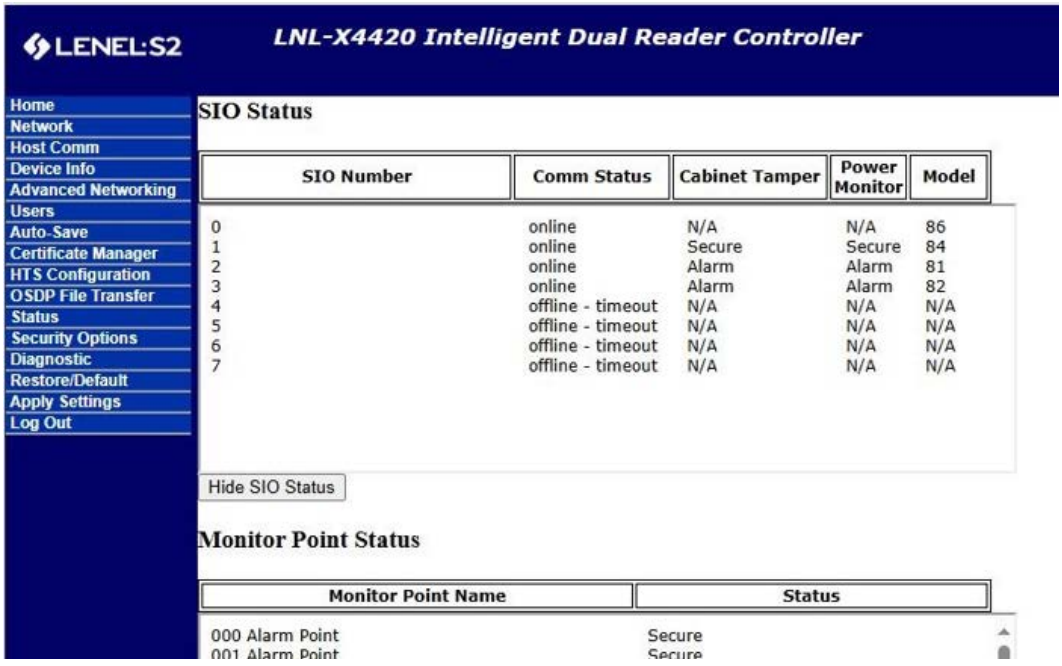
Notes: The LNL-X series (firmware earlier than 2.0) uses up to 4096-bit RSA keys and SHA-384.
The LNL-4420 uses 2048-bit RSA keys and SHA-256.
The LNL-2210, LNL-2220, and LNL-3300 use 1024-bit RSA keys and SHA-1.
For TLS certificate set up information, refer to the Encryption for Controllers User Guide.

3. Select **Load certificate files** and/or **Load peer certificate**.
4. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

7.9 View Status

LNL-X Series (firmware version 1.8 and later) and LNL-M series controllers only. The Status page lists the state of the Access Control Readers, Monitor Points, and Control Points as well as a transaction log.

1. Select **Status** from the left-hand menu. The SIO Status page is displayed (partial page shown below).



7.10 Configure Security Options

The Security Options page configures security for the Ethernet interface (disabled by default). Authentication EAP configuration options include TLS, MD5, and PEAP/MSCHAPv2.

1. Select **Security Options** from the left-hand menu. The Security Options page is displayed.
2. Select **Enable 802.1x Authentication**.
3. Select the **Authenticated EAP Configuration** from the drop-down menu.
4. Enter the **EAP Identity**. This is a required field.
5. Enter a **Password** for the EAP identity.
6. Enter the password again to **Confirm Password**.
7. Select **Enable Encrypted Partition**, if desired. (Must align with 802.1x configuration.)
8. Click **Save Configuration**.
9. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

7.11 Diagnostic

Only use this page under guidance of LenelS2 OnGuard Technical Support.

7.12 Restore Settings

The **Restore Settings** page restores the settings to either the factory default or the current operating settings (before the start of this session). These settings apply only to the Network and Host Comm settings.

1. Select **Restore Settings** from the left-hand menu. The Restore Settings page is displayed.

Note: If the IP address has changed, log in with the new IP address to continue.

2. Select one of the following options to restore Network and Host Communication settings:

- To reload the factory settings, select **Restore Default**.
- To reload the current operating settings, select **Restore Current**.

7.13 Apply Settings

The **Apply Settings** page is used to save the changes made to the network, certificate, and host communication settings. These settings are not applied and saved to the controller until **Apply Settings, Reboot** is selected.

1. Select **Apply Settings** from the left-hand menu. The Apply Settings page is displayed.
2. Select **Apply Settings, Reboot**.

7.14 Log Out

Note: Remember to select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

Select **Log Out** from the left-hand menu.

7.15 LNL-4420, LNL-X4420, and LNL-M4420: Auxiliary Authentication Module Web Configuration

Not certified by UL.

This feature requires firmware version 1.229 or later.

After you configure the Auxiliary Authentication Module in OnGuard, this configuration requires additional panel configuration on the panel web page.

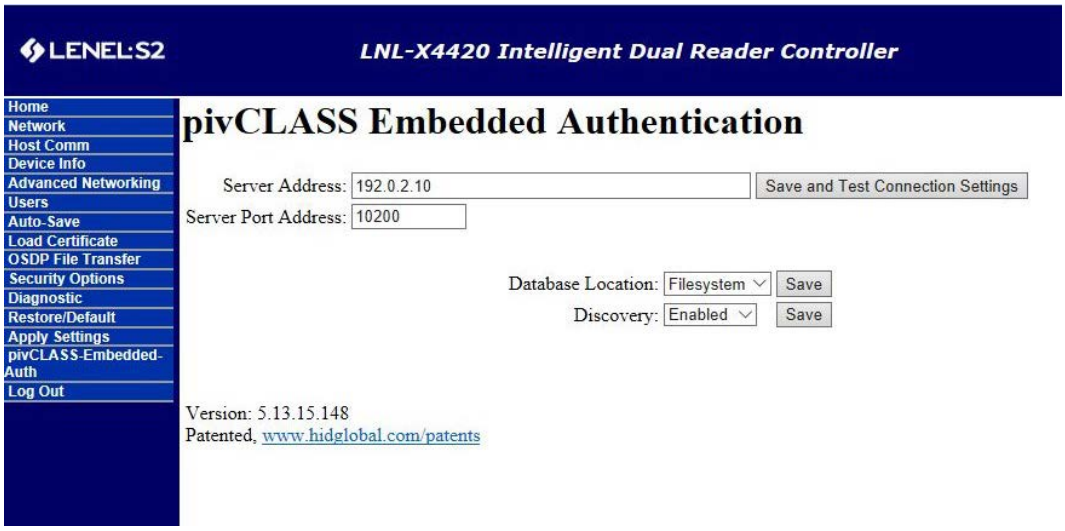
HID pivCLASS Embedded Authentication

Prerequisites

- Copy the HID auxiliary mode firmware file (**LNLAUXMOD_AAM.bin**) to the C:\Program Files (x86)\OnGuard directory.
- Copy the HID auxiliary remove firmware file (**LNLAUXMOD_REMOVE_AAM.bin**) to the C:\Program Files (x86)\OnGuard directory.
- From System Administration, configure an LNL-4420/X and bring it online.
- Enable panel-based authentication in System Administration:
  - From the **Access Control** menu, select **Access Panels**, and then the LNL-4420 tab.
  - On the LNL-4420 Options sub-tab, select "HID auxiliary authentication" as the **Auxiliary module type**, and then click [OK].
- From Alarm Monitoring, download the **Auxiliary Module Firmware** to the panel.

1. In System Administration, on the LNL-4420 panel you configured, click [Configuration Web Page] from the **Location** form. This page will launch in a browser. (You may also access this page by going to the device IP address from within the browser.)
2. Click the link to go to the login page. Log in using your user name and password. For more information, refer to Secure Access to Controller Web Page Configuration on page 65.
3. (Optional) On the panel's webpage, open the **Host Comm** menu option, and then select "TLS if Available" from the **Data Security** drop-down.

4. To configure the connection settings for the pivCLASS PACS service, open the **pivCLASS-Embedded-Auth** menu option.



   a. Configure **Server Address**: Enter the IP address of the computer where the PACS service is running.

   b. Configure the **Server Port Address**, and enable encryption communication, if required. For more information, refer to the "FIPS 201 Credentials Folder" in the System Administration User Guide.

   c. Specify the location of the database as either on the file system or on the SD *Secure Digital* card. Use the SD card if you need more room for the database.

   d. Click [Test Connection]. If a panel with a MAC address of this LNL-4420 was not yet added on the **PACS Service** > **Reader Services** tab, you will receive a message reporting the connection is successful, but the panel with MAC address does not exist.

   e. If this is the case, add this panel in the PACS service, and then click [Test Connection] again. You should see this message: "Settings updated successfully".

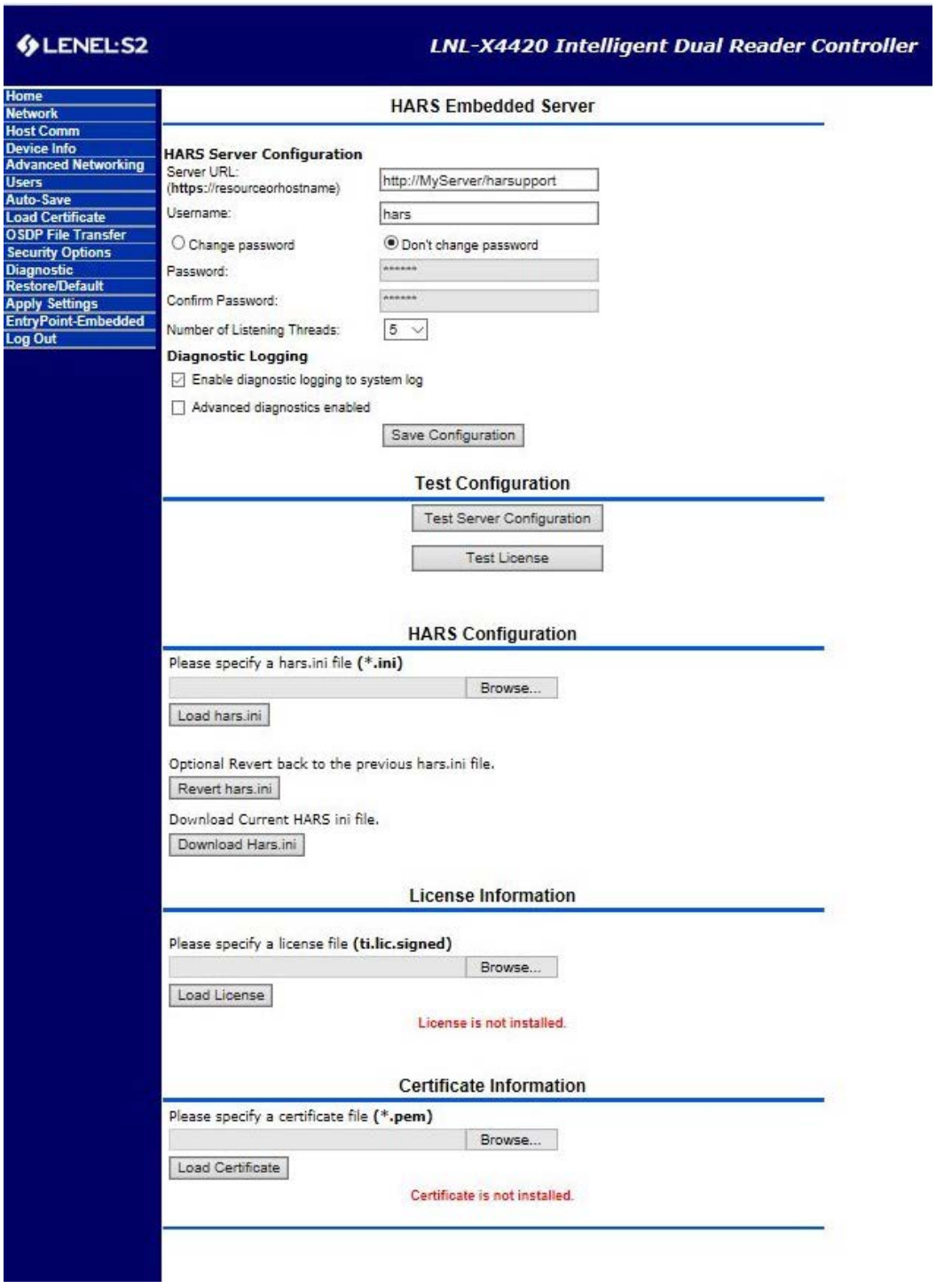
5. When you are done configuring the connection, log off the panel webpage.

TI EntryPoint Embedded Authentication

Prerequisites:

- Copy the EntryPoint auxiliary mode firmware file (**LNLAUXMOD_ENTRYPOINT_AAM.bin**) to the C:\Program Files (x86)\OnGuard directory.
- Copy the EntryPoint auxiliary remove firmware file (**LNLAUXMOD_REMOVE_AAM.bin**) to the C:\Program Files (x86)\OnGuard directory.
- From System Administration, configure an LNL-4420/X and bring it online.
- Enable panel-based authentication in System Administration:
  - From the **Access Control** menu, select **Access Panels**, and then the LNL-4420 tab.
  - On the LNL-4420 Options sub-tab, select "EntryPoint" as the **Auxiliary module type**, and then click [OK].
- From Alarm Monitoring, download the **Auxiliary Module Firmware** to the panel.

1. In System Administration, on the LNL-4420 panel you configured, click [Configuration Web Page] from the **Location** form. This page will launch in a browser. (You may also access this page by going to the device IP address from within the browser.)
2. Click the link to go to the login page. Log in using your user name and password. For more information, refer to Secure Access to Controller Web Page Configuration on page 65.
3. (Optional) On the panel's webpage, open the **Host Comm** menu, and then select "TLS if Available" from the **Data Security** drop-down.
4. To configure the connection settings for the EntryPoint service, open the **EntryPoint-Embedded** menu option.



a. Enter the IP Address of the host EntryPoint server.

b. Keep the **Username** "hars"

c. If you want to change the password, select **Change password**. (**Password** must be synced with the EntryPoint server if changed.)

d. (Optional) Under Diagnostic Logging: Select **Enable diagnostic logging to system log** and **Advanced diagnostics enabled**.

e. Click [Save Configuration].

f. Under License Information:

- Click [Choose File] to navigate to the license file.
- Click [Open] in the file browser, and then click [Load License]. When the license is loaded, the license ID, License Start Date, and End Date are displayed.

g. (Optional) Under Certification Information:

- Click [Choose File] to navigate to the certificate file.
- Click [Open] in the file browser) and [Load Certificate].

5. On the panel's webpage, open the **Apply Settings** page, and then click **Apply Settings, Reboot**. This will save the configuration and reboot the panel.
6. When you are done configuring the connection, log off the panel webpage.

Additional applications may be added in the future with their own setup and configuration.

LNL-M2210 Intelligent Controller

8 LNL-M2210 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-M2210 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.

Note: For PoE or 12VDC, set jumper J3 in accordance with the power source.

7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.
9. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

9 LNL-M2210 Reference

9.1 General

The LNL-M2210 intelligent controller provides decision making, event reporting and database storage for the LenelS2 hardware platform. Two reader interfaces configured as paired or alternate readers provide control for one physical barrier.

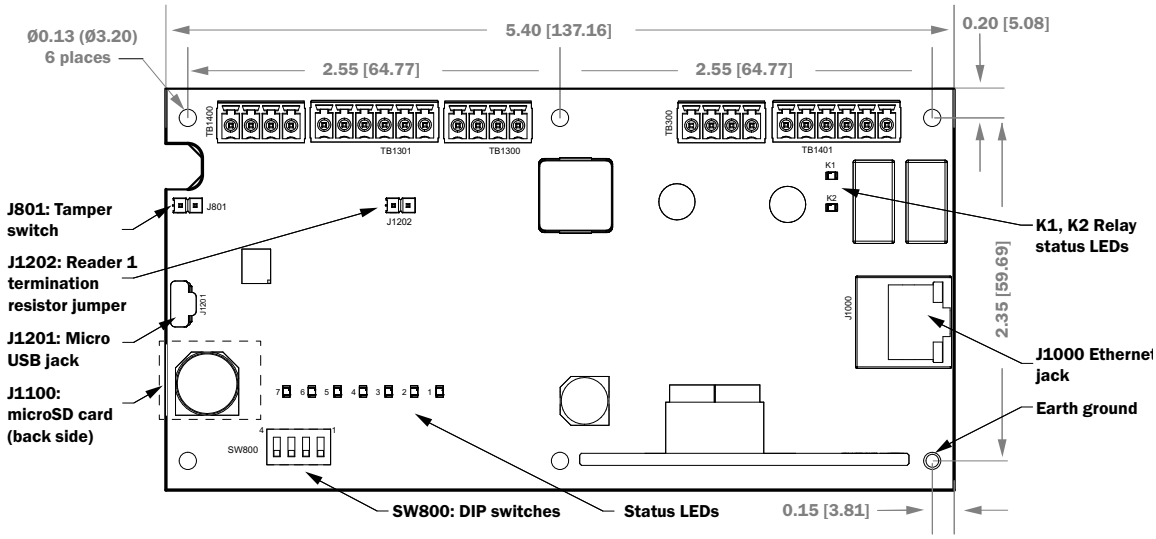
Host communication is via the on-board 10Base-T/100Base-TX Ethernet port.

Reader port 1 (TB1301) can accommodate a reader that uses TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 device signaling (for example an OSDP reader) and provides tri-state LED control and buzzer control (one wire LED mode only). This port can also use multiple 2-wire RS-485 multi-dropped devices, such as up to two OSDP readers or up to eight remote serial I/O devices.

Reader port 2 (TB1300 and TB300) can accommodate a reader that uses TTL (D1/D0, Clock/Data), or F/2F signaling. Reader port 2 also provides tri-state LED control and buzzer control (one wire LED mode only). Two Form-C contact relay outputs may be used for door strike control or alarm signaling. The relay contacts are rated at 2 A @ 30 VDC, dry contact configuration. Two inputs are provided that may be used for monitoring the door contact, exit push button or alarm contact. Input circuits can be configured as unsupervised or supervised.

The LNL-M2210 requires Power over Ethernet (PoE or PoE+) or 12 VDC for power. For PoE, UL compatibility was verified and tested with Phihong, Model POE29U-1AT (Primary Rated: 100-240 V AC, 0.8 A, 50/60 Hz; Secondary rated: 56 V DC, 0.536 A, 30 W). Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies. The LNL-M2210 can be mounted in a 3-gang switch box; a mounting plate is supplied with the unit, or the LNL-M2210 may be mounted in an enclosure; the supplied mounting plate has mounting holes that match the LNL-M2210 mounting footprint.

9.2 LNL-M2210 Hardware



9.3 LNL-M2210 Wiring

Terminal Block Connections		
TB1400-1	IN1	Input 1 - Inputs used for Access Control only, not Burglar Alarm inputs
TB1400-2	IN1	
TB1400-3	IN2	Input 2 - Inputs used for Access Control only, not Burglar Alarm inputs
TB1400-4	IN2	
TB1301-1	VO	Reader 1 Power Output – 12 VDC
TB1301-2	LED	Reader 1 LED Output
TB1301-3	BZR	Reader 1 Buzzer Output
TB1301-4	CLK	Reader 1 CLK/Data 1/TR+ (A) *
TB1301-5	DAT	Reader 1 DAT/Data 0/TR- (B) *
TB1301-6	GND	Reader 1 Ground
TB1300-1	LED	Reader 2 LED Output
TB1300-2	BZR	Reader 2 Buzzer Output
TB1300-3	CLK	Reader 2 CLK/Data 1 Input
TB1300-4	DAT	Reader 2 DAT/Data 0 Input
TB300-1	VO	Auxiliary Power Output – 12 VDC
TB300-2	GND	Auxiliary Power Output Ground
TB300-3	VIN	Input Power – 12 VDC (from local power supply)
TB300-4	GND	Input Power Ground
TB1401-1	NO	Relay K1 – Normally Open Contact
TB1401-2	1-C	Relay K1 – Common Contact
TB1401-3	NC	Relay K1 – Normally Closed Contact
TB1401-4	NO	Relay K2 – Normally Open Contact
TB1401-5	2-C	Relay K2 – Common Contact
TB1401-6	NC	Relay K2 – Normally Closed Contact

*Terms A & B are from the RS-485 standard.

9.3.1 Jumpers

Jumper	Set	Description
J801		Cabinet Tamper Switch Input: short = tamper secure
J1000	N/A	10Base-T/100Base-TX Ethernet connection
J1100	N/A	microSD card
J1201	N/A	Micro USB port (2.0)
J1202	Open	Reader 1 RS-485 termination jumper. Link jumper to enable termination resistor.

9.3.2 DIP Switches

The four switches on SW800 DIP switch configure the operating mode of the LNL-M2210 processor. DIP switches are read on power-up except where noted.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information, refer to IT Security on page 98.
OFF	ON	X	OFF	Use factory default communication parameters.
ON	ON	X	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See “Bulk Erase Configuration Memory” on page 93.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See “Bulk Erase Configuration Memory” on page 93.
X	X	X	ON	Makes the LNL-M2210 report and function like an LNL-X2210. To be used in situations where the host software has not been updated to support the LNL-M series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0
- Alternate Host Port: Disabled

9.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-M2210 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

9.4.1 Bulk Erase Steps

Important: Do not remove power during steps 1-5.

1. Set DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-M2210 board. LED 1 will flash during boot up.
3. After the LNL-M2210 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate. Within 10 seconds after the above pattern starts, change switch 1 to "OFF."
4. When complete, only LEDs 1 and 4 will flash for about three (3) seconds.
5. The LNL-M2210 reboots and will be available at the default IP address (192.168.0.251).

9.5 Input Power

The LNL-M2210 is powered by one of two ways:

- Power is supplied via the Ethernet connection using PoE or PoE+
- Or local 12 VDC power supply, TB300-3 (VIN), TB300-4 (GND)

Note: For UL compliance, only 12 VDC was evaluated.

9.6 Communication Wiring

The LNL-M2210 controller communicates to the host via the on-board 10Base-T/100Base-TX Ethernet interface.

9.7 Reader/Serial I/O Device Wiring

Reader port 1 supports TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 device(s). Reader port 2 supports TTL (D1/D0, Clock/Data), or F/2F. Power to reader port 1 is 12 VDC at 600 mA maximum per port. The reader connected to reader port 2 may be powered from the 12 VDC auxiliary power supply output; TB1301-1 and TB1301-2. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacturer’s specifications for cabling requirements. In the 2-wire

LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

Reader port 1 can support up to eight 2-wire RS-485 remote serial I/O devices using MSP1 protocol or up to two OSDP devices. If two OSDP devices are used, reader port 2 will not support a third reader. If only one OSDP device is configured, then reader port 2 is available for a second reader. The maximum cable length is 2000 ft (610 m). Do not terminate any RS-485 devices connected to reader port 1.

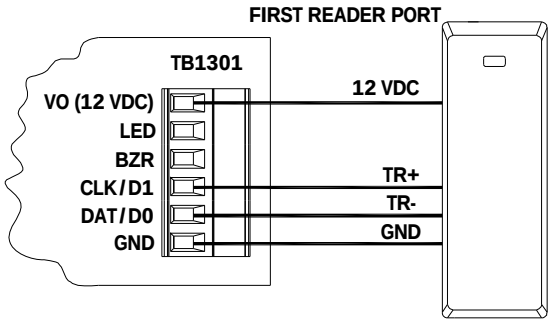
Note: Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

Important: Failure to correctly set the OSDP jumper settings can cause communication issues.

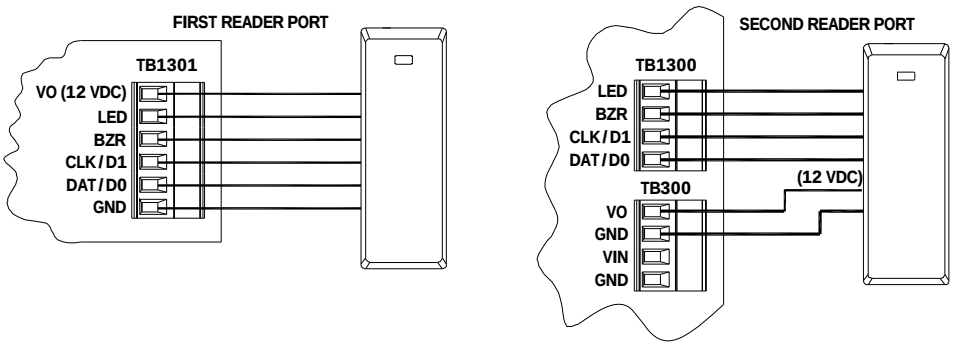
Important: When powering remote device(s) from the LNL-M2210, be cautious not to exceed the maximum current limit. Cable gauge must also be evaluated. See "Specifications" on page 100 for details.

9.7.1 Reader Wiring Diagrams

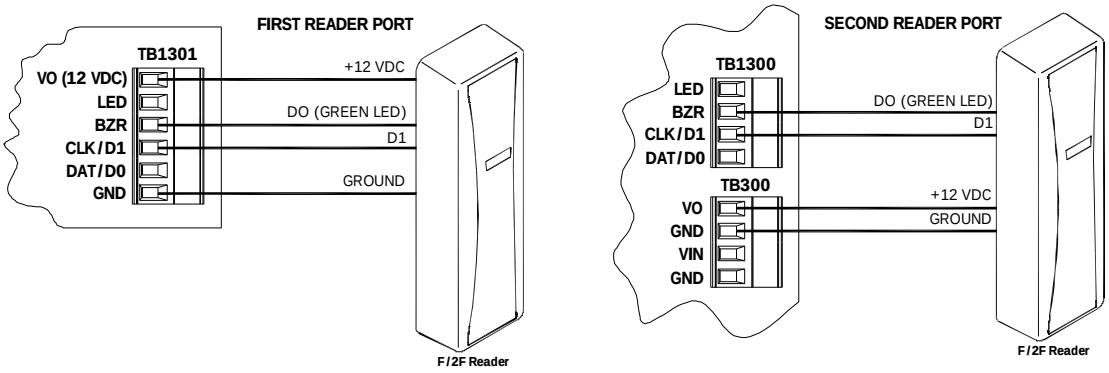
Typical Reader 1 (OSDP Installation)



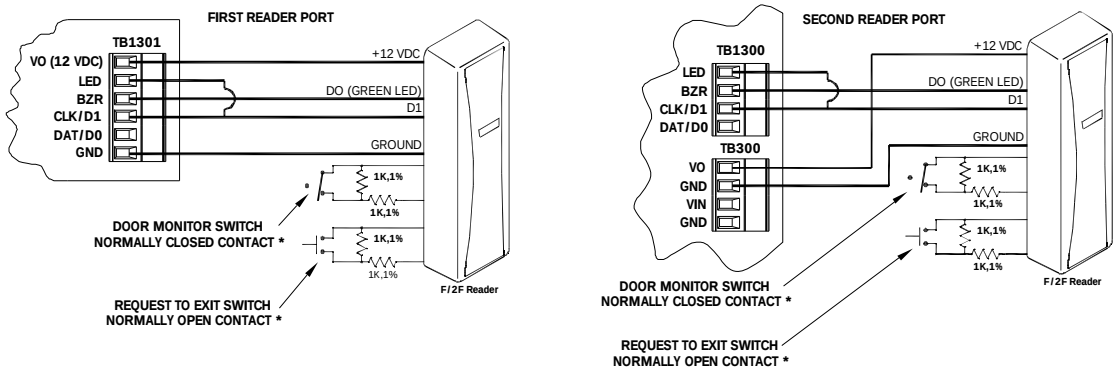
Typical D1/D0 or Clock/Data Reader Ports 1 and 2



Typical Unsupervised F/2F Reader Ports 1 and 2



Typical Supervised F/2F Reader Ports 1 and 2

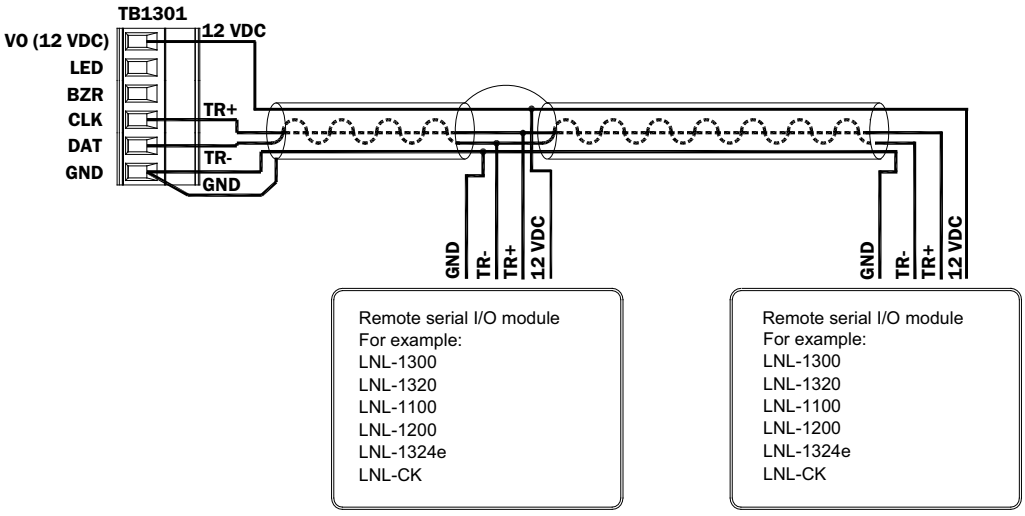


* Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).

Note: Jumper: Connect D1 and LED on supervised F/2F reader.

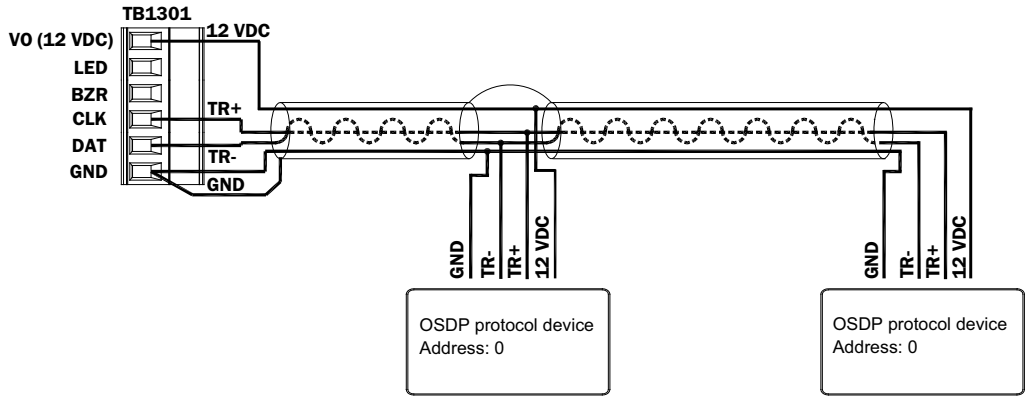
Reader Port 1 Remote Serial I/O Devices using MSP1 Protocol (2-Wire RS-485)

Refer to the appropriate remote serial I/O device installation manual for address and baud rate settings. 120 ohm end-of-line termination should only be added at each end of the RS-485 bus. If an LNL-M2210 is at one end of the RS-485 bus, jumper J1201 can be installed to enable the termination resistor. Each remote serial I/O device must be configured with a unique communication address. A maximum of eight (8) remote serial I/O devices can be connected to reader port 1. **Cable shield**: only ground one end.



Reader Port 1 OSDP Protocol Devices (2-Wire RS-485)

Refer to the appropriate remote serial I/O device installation manual for address and baud rate settings. 120 ohm end-of-line termination should only be added at each end of the RS-485 bus. If an LNL-M2210 is at one end of the RS-485 bus, jumper J1201 can be installed to enable the termination resistor. Each OSDP device must be configured with a unique communication address. A maximum of two OSDP devices can be connected to reader port 1. **Cable shield**: only ground one end.



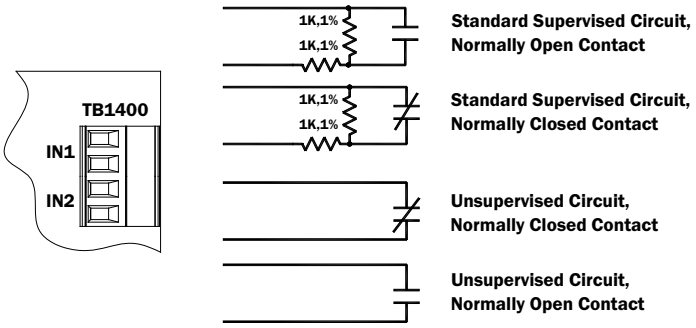
9.8 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states.

When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded*, and foreign voltage*. A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical:



9.9 Relay Circuit Wiring

Two Form-C contact relays are provided for controlling door lock mechanisms or alarm signaling devices. The relay contacts are rated at 2 A @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When momentarily removing power to unlock the door, as with a magnetic lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

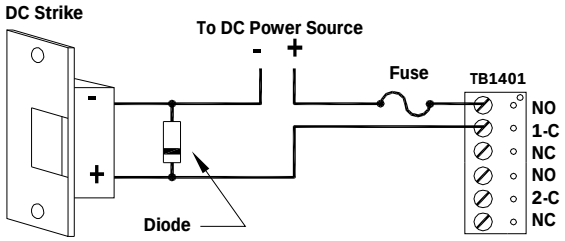
Door lock mechanisms can generate EMF feedback to the relay circuit that can cause damage and premature failure of the relay plus affect the operation of the LNL-M2210. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

CAUTION From the Auxiliary output, the LNL-M2210 can provide 12 VDC power for external devices provided that the maximum current is not exceeded. See "Specifications" on page 100 for details. If a local power supply is used, it must be UL Listed Class 2 rated.

PRÉCAUTION Depuis la sortie auxiliaire, le LNL-M2210 peut fournir une alimentation 12 Vcc aux équipements externe pourvu que le courant maximum n'est pas dépassé. Se référer à la section sur les spécifications pour plus de détails. Si une alimentation locale est utilisée, elle doit être homologué UL de classe 2.

9.9.1 Diode Selection

Diode current rating: 1x strike current. Diode breakdown voltage: 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



9.10 Memory Backup Battery

The real time clock is backed up by a super capacitor when power is interrupted. All other data is stored in non-volatile memory.

Note: Data is stored in flash memory to prevent loss of data in the case of power interruption.

9.11 IT Security

When installing the LNL-M2210, it is important to ensure that it is done in a secure manner.

Create user accounts to the web configuration page using secure passwords.

Ensure all DIP switches are in the OFF position for the normal operating mode.

The LNL-M2210 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name (admin) and password (password) will be available for five minutes once the DIP switch is toggled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-M2210 is commissioned. It is also highly recommended not to configure the LNL-M2210 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

9.12 Status LEDs

9.12.1 Power-up

NIC LED blinks and all other LEDs are off.

9.12.2 Initialization

The initialization process has several stages, each stage is represented by a different LED pattern in the following
sequence:

- LED 1 is on for about 10 seconds.
- LED 2 is on for 25 seconds.
- LED 3 flashes slowly for 15 seconds.
- LED 3 flashes quickly for 1 second. LED 3 may continue flashing for an additional 60 seconds if the controller firmware is being updated.
- LED 1, LED 2, and LED 3 are off as the application starts.
- LED 4 is then on for 15 seconds indicating a successful initialization.

When LEDs 1 through 4 flash at the same time, data is being read from or written to flash memory, do not cycle power when in this state. If the sequence stops or repeats, perform "Bulk Erase Steps" on page 93. If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

9.12.3 Running

After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-Line / On-Line: Off-Line = 20% ON, On-Line = 80% ON
2	Host Communication Activity
3	Readers (combined): Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data F/2F Mode = Flashes when Data/Acknowledgment is Received
4	Input IN1 Status: OFF = Inactive, ON = Active, Flash = Fault *
5	Input IN2 Status: OFF = Inactive, ON = Active, Flash = Fault *
6	Cabinet Tamper
7	Reserved for Future Use
K1	Relay K1: ON = Energized
K2	Relay K2: ON = Energized
YEL	Ethernet Speed: OFF = 10 Mb/S, ON = 100 Mb/S
GR	OFF = No Link, ON = Good Link, Flashing = Ethernet Activity

*If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds, otherwise, the LED is Off.

9.13 Specifications

The interface is for use in low voltage, Class 2 circuits only. All output circuits (except POE, which was not evaluated by UL) are Class2/Power Limited.

The installation of this device must comply with all local fire and electrical codes. Units are to be installed in accordance with NFPA 70. The unit is to be powered with a UL-listed UL 294 approved power supply with a class 2 power limited output.

Note: Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.

Primary Power:	PoE (12.95 W), compliant to IEEE 802.3af or PoE+ (25 W), compliant to IEEE 802.3at or 12 VDC ± 10%, 1.8 A maximum
Power Output:	PoE: Powered via PoE max = 625 mA including reader and auxiliary power output * PoE+ or external 12 VDC: 12 VDC @ 1.25 A including reader and Auxiliary Power output *
	* Excluding Micro USB port
CAUTION	PoE power is to be supplied by a Listed ITE or Access Control System Unit (ALVY), power limited, PoE+ injector or PoE+ Ethernet switch providing 42.5 – 57 VDC, 25.5W for maximum output.
PRÉCAUTION	L'alimentation PoE doit être fournie par un équipement de technologie de l'information (ITE) listé ou une unité de système de contrôle d'accès (ALVY), limitée en puissance, interrupteur injecteur PoE+ ou PoE+ Ethernet fournissant une sortie maximale entre 42,5 et 57 Vcc, 25,5 W.
Micro USB Port:	5 VDC maximum (deduct 270 mA from reader and Auxiliary Power output) Not Evaluated by UL
RTC Back up	Super capacitor
microSD Card	Format: microSD or microSDHC; 2GB to 8GB.
Host Communication:	Ethernet: 10Base-T/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Inputs:	Two unsupervised/supervised, Programmable End of Line resistors, 1k/1k ohm, 1%, ¼ watt standard One unsupervised input dedicated for cabinet tamper

Outputs:	Two relays: Form-C contacts: 2 A @ 30 VDC, resistive
Reader Interface:	
Power:	12 VDC ± 10%: PoE, PoE+ or local power supply, 600 mA maximum per port
Data Inputs:	Reader port 1: TTL compatible, F/2F or 2-wire RS-485 Reader port 2: TTL compatible or F/2F
LED Output:	TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
Cable Requirements:	
Power:	1 twisted pair, 18 AWG (when using local 12 VDC power supply)
Ethernet:	CAT-5, minimum
Reader data (TTL):	6-conductor, 18 AWG, 500 ft. (152 m) maximum
Reader data (F/2F):	4-conductor, 18 AWG, 500 ft. (152 m) maximum
Reader data (RS-485):	1 twisted pair, shielded, 24 AWG, 120 ohm impedance, 2000 ft. (610 m) maximum
Alarm Input:	1 twisted pair per input, 30 ohm maximum
Outputs:	As required for the load
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	5.5 in. (140 mm) W x 2.75 in. (70 mm) L x 0.96 in. (24 mm) H without bracket 5.5 in. (140 mm) W x 3.63 in. (92 mm) L x 1.33 in. (34 mm) H with bracket
Weight:	3.6 oz. (103 g) without bracket 4.43 oz. (125.5 g) with bracket

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

These specifications are subject to change without notice.

UL 294 Performance Levels Indoor use:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

9.13.1 UL Listed Installations

- PoE is only for use with Access control-only installations and not for use with burglar installations.
- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.
- Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies. Testing with PoE not required.
- Reader Ports are Special Applications rated: 11.06 – 12 VDC (Reader 1) and 11.18 – 12 VDC (Reader 2)
- The following readers are to be connected:
  - BlueDiamond models: LNL-R11330-05TB, LNL-R11320-05TB, LNL-R11325-05TB
  - HID Signo models: 20, 20K, 40, 40K

For UL installations, the following must be observed:

- PoE power is to be supplied by an Access Control System Unit (ALVY), power limited, PoE injector (PSE) providing 44-57VDC and 15W for maximum output, and PoE+ injector (PSE) providing 42.5 – 57 VDC, 25.5W for maximum output).
- This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.
- Category 5e cabling is the minimum performance category recommended.
- The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG (0.13 mm^2) for patch cords; 24 AWG (0.21 mm^2) for horizontal or riser cable.
- Connected through standard eight-pin RJ-45 connectors.
- Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.
- Use inputs on downstream SIO device for cabinet tamper and UPS fault monitoring.

9.13.2 Firmware Revision

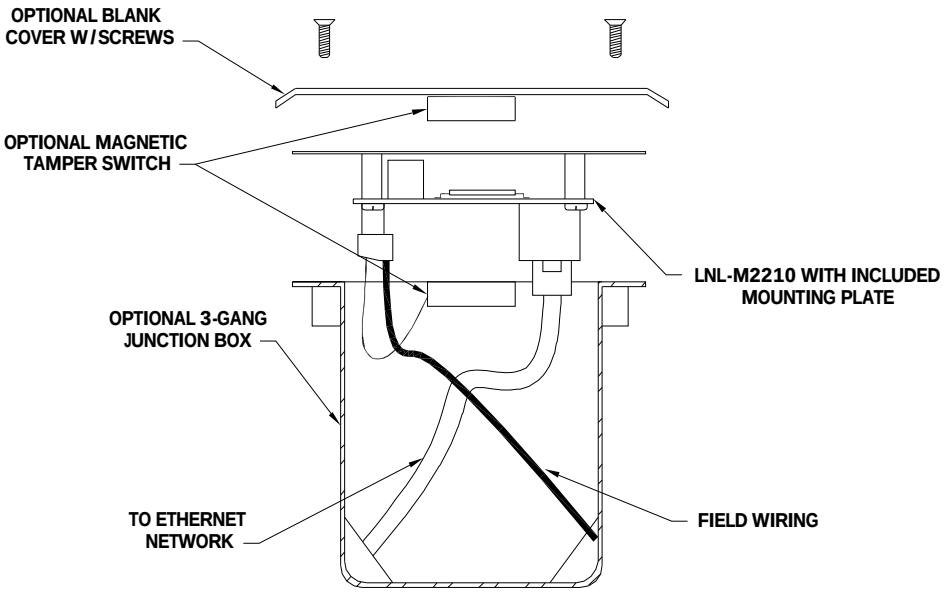
In Alarm Monitoring, the firmware revision can be displayed in the System Status Tree by selecting **Display Device Firmware Version** from the **Options** menu.

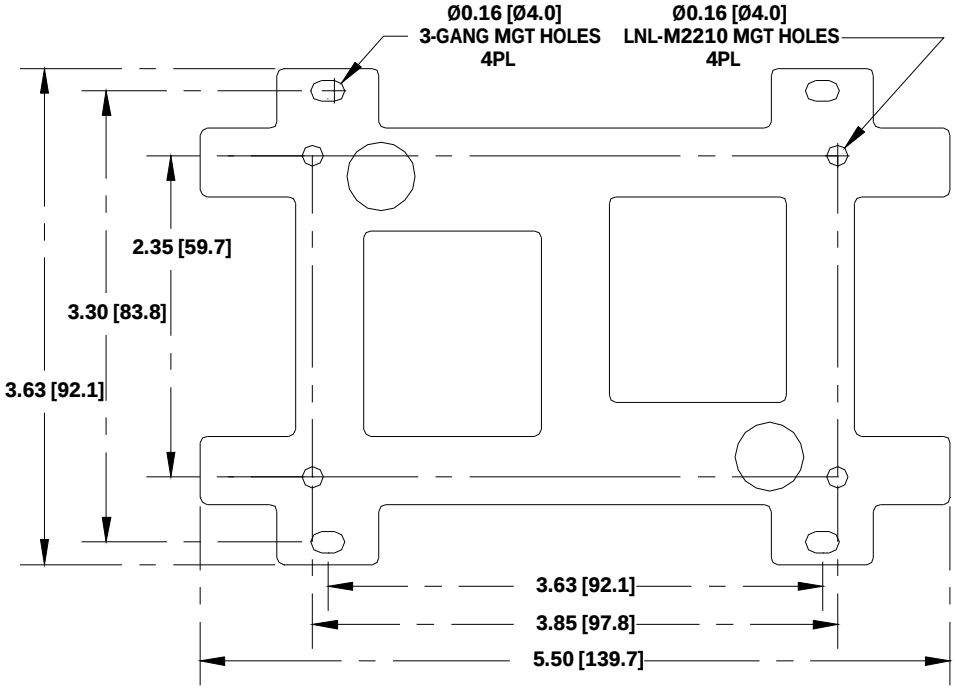
In the Controller Web Page, select **Device Info**. For more information, refer to the Controller Web Page Configuration chapter in the Hardware Installation Guide (DOC-600).

9.14 Additional Mounting Information

Sources for the optional items:

- 3-gang stainless steel blank cover. Available from:
  Leviton: part number 84033-40
  Graybar: part number 88158404
- Magnetic switch set: G.R.I. part number: 505





9.15 Regulatory Information

9.15.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 2610

LNL-M2220 Intelligent Controller

10 LNL-M2220 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-M2220 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.
7. Move jumper J19 to the ON position to enable Real Time Clock battery backup.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

11 LNL-M2220 Reference

11.1 General

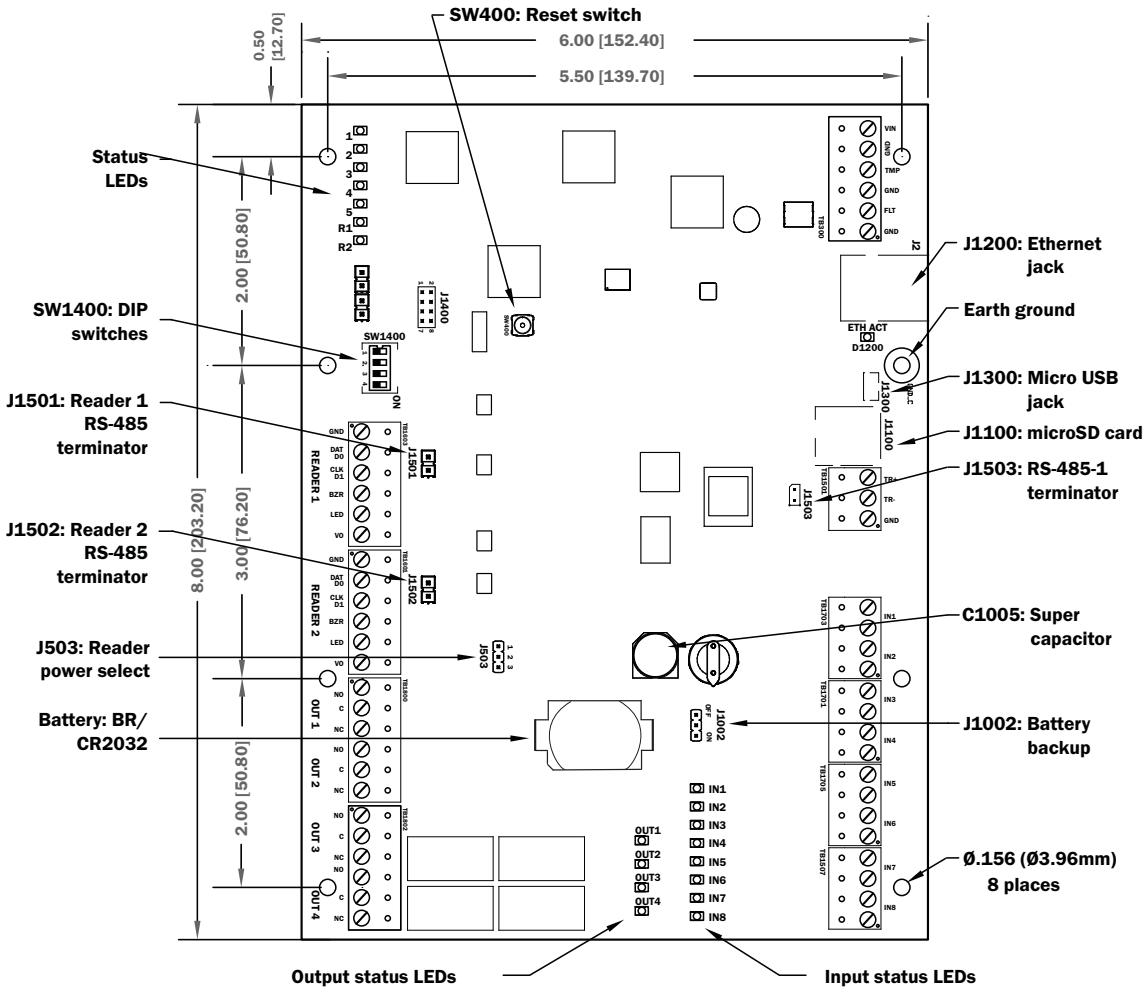
The LNL-M2220 intelligent controller provides decision making, event reporting, and database storage for the LenelS2 hardware platform. Two reader interfaces provide control for two physical barriers.

The LNL-M2220 communicates with the host via on-board 10Base-T/100Base-TX Ethernet port or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

Each reader port can accommodate a read-head that utilizes TTL (D1/D0, Clock/Data), F/2F (standard or supervised), or 2-wire RS-485 electrical signaling (OSDP reader for example) and also provides tri-state LED control and buzzer control (one wire LED mode only). Four Form-C relay outputs may be used for

door strike control or alarm signaling. Eight inputs are provided for monitoring the door contacts, exit push buttons, and alarm contacts. Input circuits can be configured as unsupervised or supervised. The LNL-M2220 requires 12 to 24 VDC for power.

11.2 LNL-M2220 Hardware



11.3 LNL-M2220 Wiring

Terminal Block Connections		
TB300-1	Power Fault Input	GND
TB300-2		FLT
TB300-3	Cabinet Tamper Input	GND
TB300-4		TMP
TB300-5	Power Input	GND
TB300-6		VIN: 12 to 24 VDC
TB1501-1	SIO Port (2-wire RS-485)	GND
TB1501-2		TR- (A) *
TB1501-3		TR+ (B) *
TB1500-1	N/A	not used
TB1703-1	Input 2	IN2
TB1703-2		IN2
TB1703-3	Input 1	IN1
TB1703-4		IN1
TB1701-1	Input 4	IN4
TB1701-2		IN4
TB1701-3	Input 3	IN3
TB1701-4		IN3
TB1705-1	Input 6	IN6
TB1705-2		IN6
TB1705-3	Input 5	IN5
TB1705-4		IN5
TB1707-1	Input 8	IN8
TB1707-2		IN8
TB1707-3	Input 7	IN7
TB1707-4		IN7

Terminal Block Connections		
TB1603-1	Reader 1	GND: Ground
TB1603-2		DAT/D0: Data/ Data 0/TR- (A) *
TB1603-3		CLK/D1: Clock/ Data 1/TR+ (B) *
TB1603-4		BZR: Reader Buzzer
TB1603-5		LED: Reader LED
TB1603-6		VO: Reader Power
TB1601-1	Reader 2	GND: Ground
TB1601-2		DAT/D0: Data/ Data 0/TR- (A) *
TB1601-3		CLK/D1: Clock/ Data 1/TR+ (B) *
TB1601-4		BZR: Reader Buzzer
TB1601-5		LED: Reader LED
TB1601-6		VO: Reader Power
TB1800-1	Out 1	NO: Normally Open Contact
TB1800-2		C: Common
TB1800-3		NC: Normally Closed Contact
TB1800-4	Out 2	NO: Normally Open Contact
TB1800-5		C: Common
TB1800-6		NC: Normally Closed Contact
TB1802-1	Out 3	NO: Normally Open Contact
TB1802-2		C: Common
TB1802-3		NC: Normally Closed Contact
TB1802-4	Out 4	NO: Normally Open Contact
TB1802-5		C: Common
TB1802-6		NC: Normally Closed Contact

* Terms A & B are from the RS-485 standard.

11.3.1 Jumpers and Jacks

The LNL-M2220 processor hardware interface is configured using jumpers to set up the reader port power and end of line termination.

Jumpers	Set at	Description
J1200	N/A	10Base-T/100Base-Tx Ethernet Connection (Port 0)
J1503	OFF	RS-485 EOL Terminator is Off
	ON	RS-485 EOL Terminator is On
J1501	OFF	Reader 1 RS-485 EOL Terminator is Off (Non-OSDP readers)
	ON	Reader 1 RS-485 EOL Terminator is On (OSDP readers)
J1502	OFF	Reader 2 RS-485 EOL Terminator is Off (Non-OSDP readers)
	ON	Reader 2 RS-485 EOL Terminator is On (OSDP readers)
J1300	N/A	Micro USB Port (2.0)
J503	Reader Power Select *	
	12V	12 VDC at Reader Ports
	PASS	VIN "Pass Through" to Reader Ports
J1100	N/A	microSD Card
J1400-1	N/A	Remote Status LED #1 **
J1400-2	N/A	Remote Status LED #2 **
J1400-3	N/A	Remote Status LED #3 **
J1400-4	N/A	Remote Status LED #4 **
J1002	Super capacitor or battery backup real time clock	
	OFF	Backup battery is OFF
	ON	Backup battery is ON. Default J1002 link 1 and 2 for super capacitor real time clock backup. Link 2 and 3 for battery backup. For more information, refer to Memory and Real Time Clock Backup Battery on page 114.

* For regulated reader output, install J503 jumper link in the 12V position (1 and 2) ONLY if the input voltage (VIN) is greater than 17 VDC. Failure to do so may damage the reader or LNL-M2220.

**Observe polarity connection to LED. External current limiting is not required.

11.3.2 DIP Switches

The four switches on SW1400 DIP switch configure the operating mode of the LNL-M2220 processor. DIP switches are read on power-up except where noted.

Pressing reset switch SW400 causes the LNL-M2220 to reboot.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 115.
OFF	ON	OFF	OFF	Use factory default communication parameters. *
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. * Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 109.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 109.
X	X	X	ON	Makes the LNL-M2220 report and function like an LNL-X2220. To be used in situations where the host software has not been updated to support the LNL-M series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.
* In the factory or LenelS2 default modes, downloaded configuration/database is not saved to flash memory.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0
- Alternate Host Port: Disabled

11.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board, less third party applications)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-M2220 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

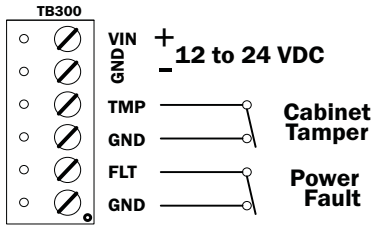
11.4.1 Bulk Erase Steps

Important: Do not remove power during steps 1-5.

1. Set SW1400 DIP switches: 1 & 2 "ON" and 3 & 4 "OFF."
2. Apply power to the LNL-M2220 board. LED 1 will flash during boot up.
3. After boot up, LEDs 1 & 2, and 3 & 4 start to alternately flashing at a 0.5 second rate. Within 10 seconds, change switch 1 to "OFF."
4. When complete, only LEDs 1 and 4 will flash for about three (3) seconds.
5. The LNL-M2220 reboots and will be available at the default IP address (192.168.0.251).

11.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring

The LNL-M2220 requires 12 to 24 VDC power. Locate power source as close to the unit as possible.



Connect power with minimum of 18 AWG wire. Connect the GND signal to earth ground in ONE LOCATION within the system. Multiple earth ground connections may cause ground loop problems and is not advised.

Observe POLARITY on 12 to 24 VDC input.

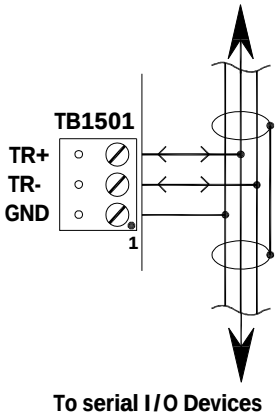
There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

Note: For UL compliance, only 12 VDC was evaluated.

11.6 Communication Wiring

The LNL-M2220 controller communicates to the host via the on-board Ethernet 10Base-T/100Base-TX port and/or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

The serial I/O device communication port (TB1501) is a 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair, shielded cable, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum for communication.



Important:	Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel.

11.7 Reader Wiring

Each reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F (standard or supervised) or 2-wire RS-485 signaling (OSDP reader for example). Power to the readers is selectable: 12 VDC (VIN must be greater than 18 VDC), or power is passed-through (PASS) from the input voltage of the LNL-M2220 (TB300-VIN), 600 mA maximum per reader port. Readers that require different voltage or have high current requirements must be powered separately. Refer to the reader manufacturer's specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

To fully utilize each reader port:

- TTL signaling requires a 6-conductor cable (18 AWG)
- F/2F signaling requires a 4-conductor cable
- RS-485 signaling requires two 2-conductor cables. Use one cable for power (18 AWG) and one cable for communication (24 AWG with drain wire and shield)

Note:	Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

Important:	Failure to correctly set the OSDP jumper settings can cause communication issues.

11.7.1 Reader Power Select (J503)

12V PASS	J503 Reader Power Select
	12 VDC is available on reader ports (VIN is greater than 17 VDC).
	VIN power is “passed through” (PASS) to reader ports (VIN is 24 VDC to 11 VDC).

Important: For 12 VDC regulated reader output, install J503 jumper link in the 12V position (1 and 2) ONLY if the input voltage (VIN) is greater than 17 VDC.

Notes: Install J503 jumper link 1 and 2 to regulate reader output or pass-through automatically depending on the input voltage:

- VIN 26.4 V to 17 V = 12 V Output
- VIN 17 V to 14.5 V = Output OFF
- VIN 14.5 V to 10.8 V = Pass-through

Install J503 jumper link 2 and 3 for pass-through from 26.4 V to 10.8 V.

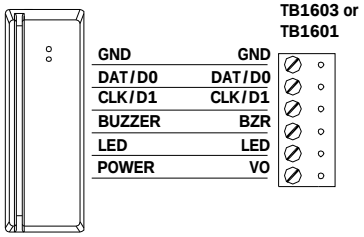
Ensure the pass-through voltage does not exceed the reader maximum operating voltage.

Input Power	Reader Power Select (Jumper J503)	Reader Output
24 VDC	Pass-through 	24 VDC
24 VDC	12 VDC PASS 	12 VDC
12 VDC	Pass-through 	12 VDC
12 VDC	12 VDC PASS* 	12 VDC

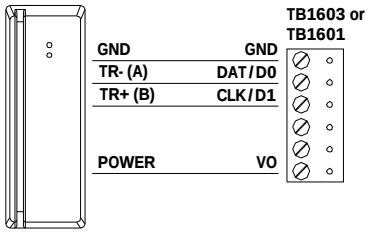
* For UL compliance, only 12 VDC was evaluated; pass-through was not evaluated.

11.7.2 Reader Wiring Diagrams

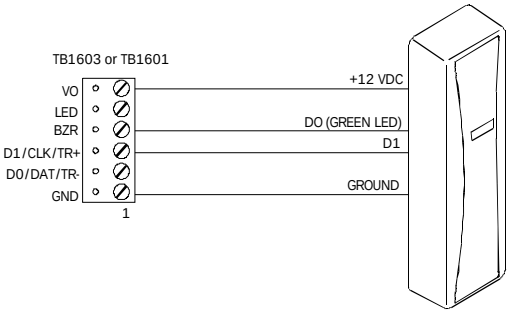
Typical D1/D0 or Clock/Data Reader



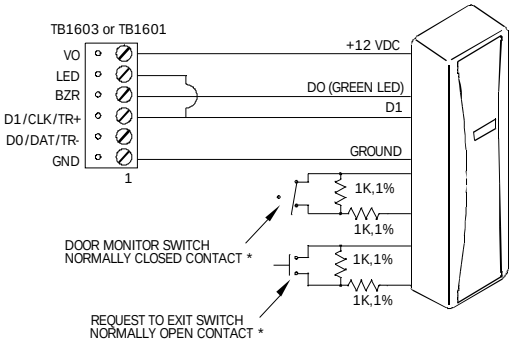
Typical 2-wire RS-485 Device (such as OSDP Reader)



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader



Jumper: Connect D1 and LED on supervised F/2F reader

* Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).

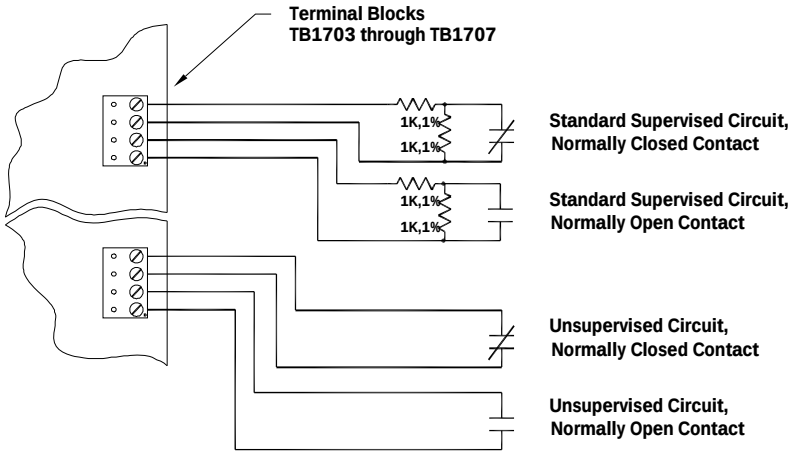
11.8 Input Circuit Wiring

There are eight (8) inputs that are typically used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded, and foreign voltage.

Note: Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

The input circuit wiring configurations shown are supported but may not be typical.



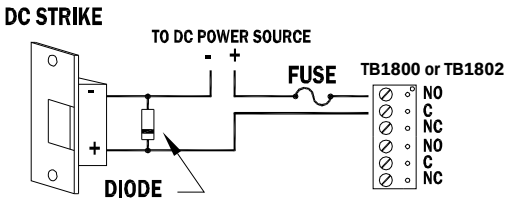
11.9 Relay Circuit Wiring

Four (4) relays with Form-C contacts (dry) are provided for controlling door lock mechanisms or alarm signaling. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When controlling the delivery of power to the door strike, the Normally Open and Common poles are typically used. When momentarily removing power to unlock the door, as with a magnetic lock, the Normally Closed and Common poles are typically used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay plus affect the operation of the LNL-M2220. For this reason, it is recommended that a diode be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

11.9.1 Diode Selection

- Diode current rating: 1x strike current.
- Diode breakdown voltage: 4x strike voltage.
- For 12 VDC or 24 VDC strike, diode 1N4002 (100V/ 1A) typical.



11.10 Memory and Real Time Clock Backup Battery

The real time clock is backed up by a super capacitor or optional lithium battery when input power is interrupted. All other data is stored in non-volatile flash memory.

Note: If using the optional lithium battery, replace it annually.

The super capacitor is selected by default (J1002 jumper link 1 and 2).

To change to battery back up, install jumper link 2 and 3 and install the lithium coin cell.

Battery type: Panasonic BR2032 or CR2032.

Note: Data is stored in flash memory to prevent loss of data in the case of power interruption.

11.11 IT Security

When installing the LNL-M2220, it is important to ensure that it is done in a secure manner. Create user accounts to the web configuration page using secure passwords.

Ensure all DIP switches are in the OFF position for the normal operating mode.

The LNL-M2220 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name (admin) and password (password) will be available for five minutes once the DIP switch is toggled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-M2220 is commissioned. It is also highly recommended **not** to configure the LNL-M2220 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

11.12 Status LEDs

11.12.1 Power-up

NIC LED blinks and all other LEDs are off.

11.12.2 Initialization

The initialization process has several stages, each stage is represented by a different LED pattern in the following sequence:

- LED 1 is on for about 10 seconds.
- LED 2 is on for 25 seconds.
- LED 3 flashes slowly for 15 seconds.
- LED 3 flashes quickly for 1 second. LED 3 may continue flashing for an additional 60 seconds if the controller firmware is being updated.
- LED 1, LED 2, and LED 3 are off as the application starts.
- LED 4 is then on for 15 seconds indicating a successful initialization.

When LEDs 1, 2, 3, and 4 flash at the same time, data is being read from or written to flash memory, do not cycle power when in this state. If the sequence stops or repeats, perform “Bulk Erase Steps” on page 110.

11.12.3 Running

After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-line / On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host communication activity (Ethernet or Micro USB port)
3	Internal SIO communication activity
4	External SIO communication activity
5	Unassigned
R1	Reader 1 Clock/Data or D1/D0 mode: Flashes when data is received, either input F/2F mode: Flashes when data/acknowledgment is received RS-485 mode: Flashes when transmitting data
R2	Reader 2 Clock/Data or D1/D0 mode: Flashes when data is received, either input F/2F mode: Flashes when data/acknowledgment is received RS-485 mode: Flashes when transmitting data
ETH ACT	D1200 flashes with Ethernet activity
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	OFF= No link, ON = Good link, Flashing = Ethernet activity
IN1 - IN8	OFF = Inactive, ON = Active, Flash = Fault *
OUT1 - OUT4	Relay K1 - K4: ON = Energized

* If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds; otherwise, the LED is OFF.

11.13 Specifications

The LNL-M2220 is for use in low voltage, Class 2 circuits only. All output circuits are Class2/Power Limited.

The installation of this device must comply with all local fire and electrical codes. Units are to be installed in accordance with NFPA 70. The unit is to be powered with a UL-listed UL 294 approved power supply with a class 2 power limited output.

Note: Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.

Primary Power:	12 to 24 VDC ± 10%, 550 mA maximum (reader and USB ports not included)
Reader Ports:	600 mA maximum per reader port (add 600 mA to primary power current)
Micro USB Port:	5 VDC, 500 mA maximum (add 270 mA to primary power current) Not evaluated by UL
Memory and Clock Backup Battery:	Super capacitor or optional 3 Volt Lithium, type Panasonic BR2032 or CR2032
microSD Card	Format: microSD or microSDHC; 2GB to 8GB
Host Communication:	Ethernet: 10Base-T/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Serial I/O Device	One 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:	Eight unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, ¼ watt Two unsupervised dedicated for cabinet tamper and UPS fault monitoring
Outputs:	Four relays, Form-C with dry contacts Normally open contact (NO) contact: 5 A @ 30 VDC resistive Normally closed contact (NC) contact: 3 A @ 30 VDC resistive
Reader Interface:	
Power: (jumper selectable)	12 VDC ± 10% regulated, 600 mA maximum each reader port (input voltage (VIN) must be greater than 17 VDC) or 12 to 24 VDC ± 10% (input voltage (VIN) passed through), 600 mA maximum each reader port
Data Inputs:	TTL compatible, F/2F or 2-wire RS-485
RS-485 Mode:	9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2000 ft. (609.6 m)

LED Output:	TTL levels, high>3 V, low<0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
Cable Requirements:	
Power:	1 twisted pair, 18 AWG (when using local 12 VDC power supply)
Ethernet:	CAT-5, minimum
Reader data (TTL):	6-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (F/2F):	4-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (RS-485):	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 2,000 ft. (610 m) maximum
Alarm Input:	1 twisted pair, 30 ohm maximum
Outputs	As required for the load
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	8 in. (203.2 mm) W x 6 in. (152.4 mm) L x 1 in. (25 mm) H
Weight:	9 oz. (255 g) nominal, board only

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

These specifications are subject to change without notice.

UL 294 Performance Levels Indoor use:

Feature	**Level**
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

11.13.1 UL Listed Installations

- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.

- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.
- Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.
- For UL installation, 12 VDC input with 12 VDC pass-through shall be used.
- Reader Ports are Special Applications rated: 10.95 – 12 VDC (Readers 1 and 2)
- The following readers are to be connected:
  - BlueDiamond models: LNL-R11330-05TB, LNL-R11320-05TB, LNL-R11325-05TB
  - HID Signo models: 20, 20K, 40, 40K

11.14 Regulatory Information

11.14.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 2610

LNL-M3300 Intelligent System Controller

12 LNL-M3300 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-M3300 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire the input circuit.
4. Wire the relay circuit.
5. Supply power to the controller.
6. Move jumper J1002 to the ON position to enable Real Time Clock battery backup.
7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.
9. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

13 LNL-M3300 Reference

13.1 General

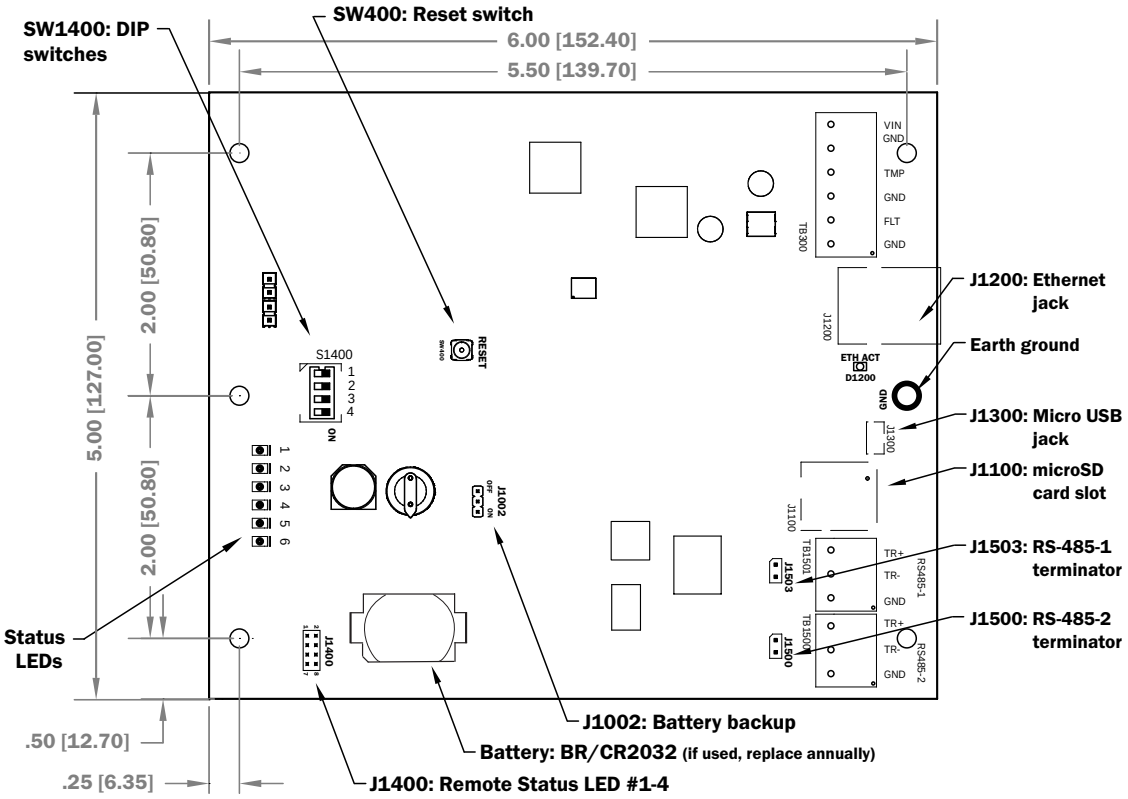
The LNL-M3300 intelligent controller provides decision-making, event reporting, and database storage for the LenelS2 hardware platform.

The LNL-M3300 communicates with the host via on-board 10Base-T/100Base-TX Ethernet port or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

Sub controllers are connected via ports 1 and 2 using 2-wire RS-485 multi-drop communication buses.

The LNL-M3300 requires 12 to 24 VDC for power.

13.2 LNL-M3300 Hardware



13.3 LNL-M3300 Wiring and Setup

Connection		
TB300-1	Power Fault Input	GND
TB300-2		FLT
TB300-3	Cabinet Tamper Input	GND
TB300-4		TMP
TB300-5	Power Input	GND
TB300-6		VIN: 12 to 24 VDC
TB1501-1	SIO Port 1 (2-wire RS-485)	GND
TB1501-2		TR- (B) *
TB1501-3		TR+ (A) *
TB1500-1	SIO Port 2 (2-wire RS-485)	GND
TB1500-2		TR- (B) *
TB1500-3		TR+ (A) *

* Terms A & B are from the RS-485 standard.

13.3.1 Jumpers and Jacks

The LNL-M3300 controller hardware interface is configured using jumpers to set up the port interface and end of line termination.

Jumpers	Set at	Description
J1200	N/A	10Base-T/100Base-Tx Ethernet port
J1503	OFF	Port 1 RS-485 EOL Terminator is Off
	ON	Port 1 RS-485 EOL Terminator is On
J1500	OFF	Port 2 RS-485 EOL Terminator is Off
	ON	Port 2 RS-485 EOL Terminator is On
J1100	N/A	microSD Card
J1300	N/A	USB Port (2.0)
J1400-1	N/A	Remote Status LED #1 *
J1400-2	N/A	Remote Status LED #2 *
J1400-3	N/A	Remote Status LED #3 *
J1400-4	N/A	Remote Status LED #4 *

Jumpers	Set at	Description
J1002	Super capacitor or battery backup real time clock	
	OFF	Backup battery is OFF
	ON	Backup battery is ON. Default J1002 link 1 and 2 for super capacitor real time clock backup. Link 2 and 3 for battery backup. For more information, refer to Memory and Real Time clock Backup Battery on page 126.

*Observe polarity connection to LED. External current limiting is not required.

13.3.2 DIP Switches

The four switches on SW1400 DIP switch configure the operating mode of the LNL-M3300 controller. DIP switches are read on power-up except where noted.

Pressing reset switch SW400 causes the LNL-M3300 to reboot.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 127.
OFF	ON	OFF	OFF	Use factory default communication parameters. *
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. * Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 125.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 125.
X	X	X	ON	Makes the LNL-M3300 report and function like an LNL-X3300. To be used in situations where the host software has not been updated to support the LNL-M series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.
* In the factory or LenelS2 default modes, downloaded configuration/database is not saved to flash memory.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0

- Alternate Host Port: Disabled

13.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board, less third party applications)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-M3300 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

13.4.1 Bulk Erase Steps

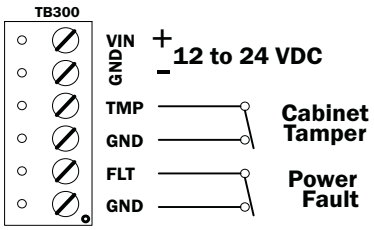
Important: Do not remove power during steps 1-5.

1. Set SW1400 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-M3300 board. LED 1 will flash during boot up.
3. After boot up, LEDs 1 & 2, and 3 & 4 start to alternately flashing at a 0.5 second rate. Within 10 seconds, change switch 1 to "OFF."
4. When complete, only LEDs 1 and 4 will flash for about three (3) seconds.
5. The LNL-M3300 reboots and will be available at the default IP address (192.168.0.251).

13.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring

The LNL-M3300 requires 12 to 24 VDC power. Locate power source as close to the unit as possible.

Connect power with minimum of 18 AWG wire. Connect the GND signal to earth ground in ONE LOCATION within the system. Multiple earth ground connections may cause ground loop problems and is not advised.



Important: **Incorrect connection may result in damage. Observe POLARITY on 12 to 24 VDC input.**

There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

Note: For UL compliance, only 12 VDC was evaluated.

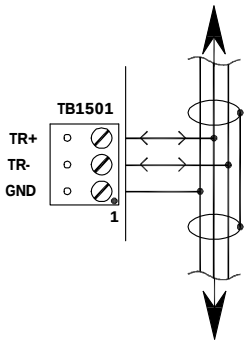
13.6 Communication Wiring

The LNL-M3300 controller communicates with the host via the on-board Ethernet 10Base-T/100Base-TX port and/or the USB port (2.0) with an optional Micro USB to Ethernet adapter.

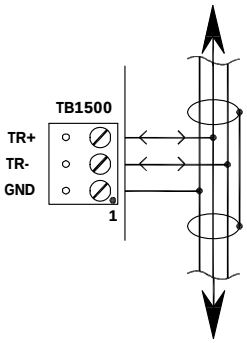
Ports 1 and 2 use a 2-wire RS-485 interface. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair, shielded, 120 ohm impedance, 24 AWG. 4,000 ft. (1,219 m) maximum cable length.

Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. If the LNL-M3300 is at one end of the RS-485 bu, jumper J1503 (Port 1) or J1500 (Port 2) can be installed for termination.

Port 1: 2-Wire RS-485



Port 2: 2-Wire RS-485



13.7 Memory and Real Time clock Backup Battery

The real time clock is backed up by a super capacitor or optional lithium battery when input power is interrupted. All other data is stored in non-volatile flash memory.

Note: If using an optional lithium battery, replace it annually.

The super capacitor is selected by default (J1002 jumper link 1 and 2).

To change to battery back up, install jumper link 2 and 3 and install the lithium coin cell.

Battery type: Panasonic BR2032 or CR2032.

Note: Data is stored in flash memory to prevent loss of data in the case of power interruption.

13.8 IT Security

When installing the LNL-M3300, it is important to ensure that it is done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and all DIP switches set in the OFF position for the normal operating mode.

The LNL-M3300 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name (admin) and password (password) will be available for five minutes once the DIP switch is toggled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-M3300 is commissioned.

It is highly recommended **not** to configure the LNL-M3300 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

13.9 Status LEDs

13.9.1 Power-up

NIC LED blinks and all other LEDs are off.

13.9.2 Initialization

The initialization process has several stages, each stage is represented by a different LED pattern in the following
sequence:

- LED 1 is on for about 10 seconds.
- LED 2 is on for 25 seconds.
- LED 3 flashes slowly for 15 seconds.
- LED 3 flashes quickly for 1 second. LED 3 may continue flashing for an additional 60 seconds if the controller firmware is being updated.
- LED 1, LED 2, and LED 3 are off as the application starts.
- LED 4 is then on for 15 seconds indicating a successful initialization

When LEDs 1 through 4 flash at the same time, data is being read from or written to flash memory, do not cycle power when in this state. If the sequence stops or repeats, perform “Bulk Erase Steps” on page 125.

13.9.3 Running

After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-line / On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host Communication Activity (Ethernet)
3	Port 1 Communication Activity
4	Port 2 Communication Activity
5	Unassigned
6	Unassigned
D1200	Ethernet Activity (Ethernet Port 0)
YEL	On-board Ethernet Speed: OFF = 10 Mb/S, ON = 100 Mb/S (Yellow LED)
GRN	OFF = No Link, ON = Good Link (Green LED), Flashing = Ethernet Activity

13.10 Specifications

The interface is for use in low voltage, Class 2 circuits only. All output circuits are Class2/Power Limited.

The installation of this device must comply with all local fire and electrical codes. Units are to be installed in accordance with NFPA 70. The unit is to be powered with a UL-listed UL 294 approved power supply with a class 2 power limited output.

Note: Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.

Primary Power:	12 to 24 VDC ± 10%, 250 mA maximum (USB port current not included)
Micro USB Port:	5 VDC, 500 mA maximum (add 270 mA to primary power current)
	Not Evaluated by UL
Memory and Clock Backup Battery:	Super capacitor or optional 3 Volt Lithium, type Panasonic BR2032 or CR2032
microSD Card	Format: microSD or microSDHC; 2GB to 8GB
Host Communication:	Ethernet: 10Base-T/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100

Serial I/O Device	Two each: 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:	Two unsupervised dedicated for cabinet tamper and UPS fault monitoring
Cable Requirements:	
Power:	1 twisted pair, 18 AWG
Ethernet:	CAT-5, minimum
RS-485:	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum cable length
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	5 in. (127 mm) W x 6 in. (152.4 mm) L x 1 in. (25 mm) H
Weight:	4.1 oz. (115 gm) nominal

These specifications are subject to change without notice.

UL 294 Performance Levels Indoor use:

Feature	**Level**
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

13.10.1 UL Listed Installations

- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/NFPA 70.
- Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.

13.11 Regulatory Information

13.11.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 2610

LNL-M4420 Intelligent Dual Reader Controller

14 LNL-M4420 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-M4420 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.
7. Move jumper J19 to the ON position to enable Real Time Clock battery backup.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

15 LNL-M4420 Reference

15.1 General

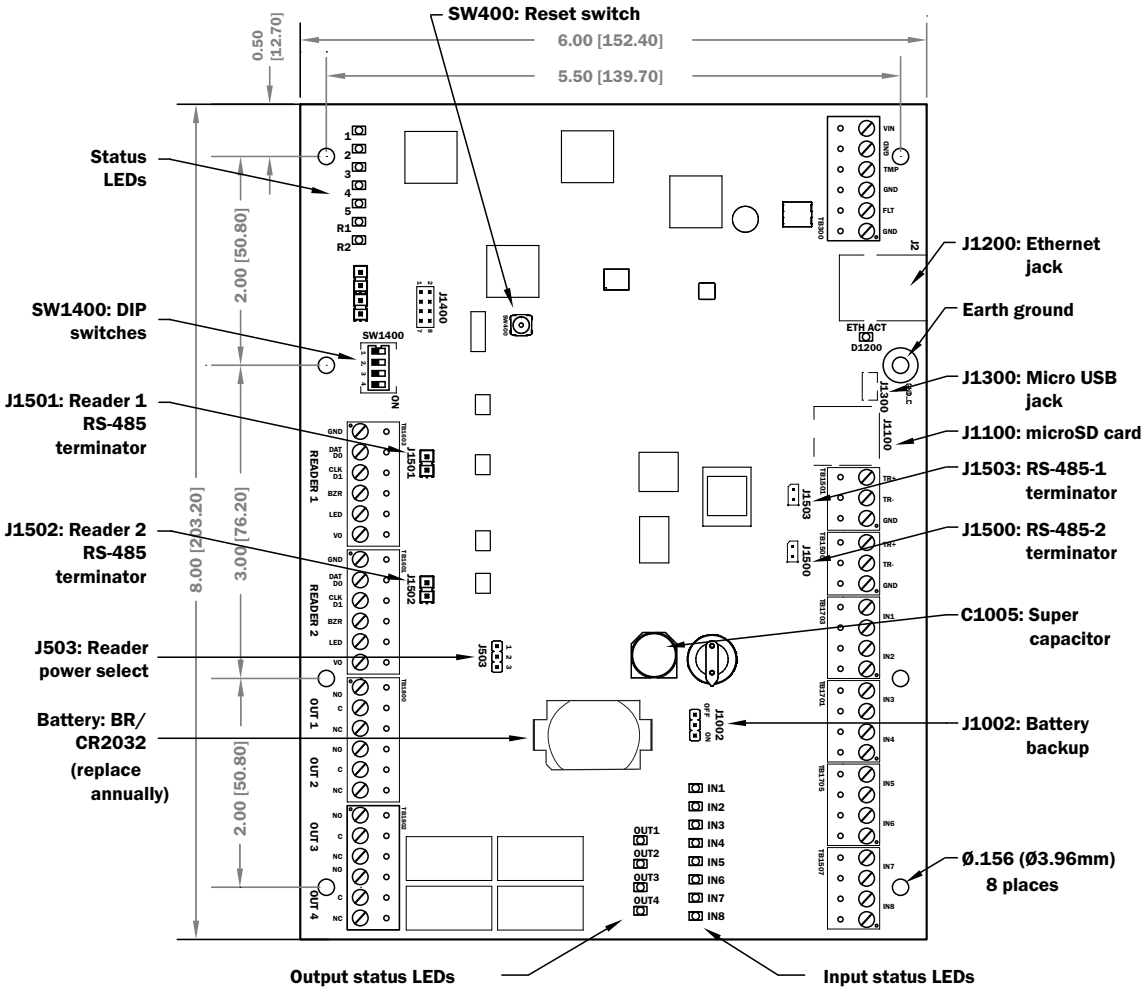
The LNL-M4420 intelligent controller provides decision making, event reporting, and database storage for the LenelS2 hardware platform. Two reader interfaces provide control for two doors.

The LNL-M4420 communicates with the host via on-board 10Base-T/100Base-TX Ethernet port or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

Two physical barriers can be controlled with the LNL-M4420. Each reader port can accommodate a read-head that utilizes TTL (D1/D0, Clock/Data), F/2F or 2-wire RS-485 electrical signaling (OSDP reader for example) and also provides tri-state LED control and buzzer control (one wire LED mode only). Four Form-

C relay outputs may be used for door strike control or alarm signaling. Eight inputs are provided for monitoring the door contacts, exit push buttons, and alarm contacts. Input circuits can be configured as unsupervised or supervised. The LNL-M4420 requires 12 to 24 VDC for power.

15.2 LNL-M4420 Hardware



15.3 LNL-M4420 Wiring

Terminal Block Connections		
TB300-1	Power Fault Input	GND
TB300-2		FLT
TB300-3	Cabinet Tamper Input	GND
TB300-4		TMP
TB300-5	Power Input	GND
TB300-6		VIN: 12 to 24 VDC
TB1501-1	SIO Port 1 (2-wire RS-485)	GND
TB1501-2		TR- (B) *
TB1501-3		TR+ (A) *
TB1500-1	SIO Port 2 (2-wire RS-485)	GND
TB1500-2		TR- (B) *
TB1500-3		TR+ (A) *
TB1703-1	Input 2	IN2
TB1703-2		IN2
TB1703-3	Input 1	IN1
TB1703-4		IN1
TB1701-1	Input 4	IN4
TB1701-2		IN4
TB1701-3	Input 3	IN3
TB1701-4		IN3
TB1705-1	Input 6	IN6
TB1705-2		IN6
TB1705-3	Input 5	IN5
TB1705-4		IN5
TB1707-1	Input 8	IN8
TB1707-2		IN8
TB1707-3	Input 7	IN7
TB1707-4		IN7

Terminal Block Connections		
TB1603-1	Reader 1	GND: Ground
TB1603-2		DAT/D0: Data/ Data 0/TR- (A) *
TB1603-3		CLK/D1: Clock/ Data 1/TR+ (B) *
TB1603-4		BZR: Reader Buzzer
TB1603-5		LED: Reader LED
TB1603-6		VO: Reader Power
TB1601-1	Reader 2	GND: Ground
TB1601-2		DAT/D0: Data/ Data 0/TR- (A) *
TB1601-3		CLK/D1: Clock/ Data 1/TR+ (B) *
TB1601-4		BZR: Reader Buzzer
TB1601-5		LED: Reader LED
TB1601-6		VO: Reader Power
TB1800-1	Out 1	NO: Normally Open Contact
TB1800-2		C: Common
TB1800-3		NC: Normally Closed Contact
TB1800-4	Out 2	NO: Normally Open Contact
TB1800-5		C: Common
TB1800-6		NC: Normally Closed Contact
TB1802-1	Out 3	NO: Normally Open Contact
TB1802-2		C: Common
TB1802-3		NC: Normally Closed Contact
TB1802-4	Out 4	NO: Normally Open Contact
TB1802-5		C: Common
TB1802-6		NC: Normally Closed Contact

* Terms A & B are from the RS-485 standard.

15.3.1 Jumpers and Jacks

The LNL-M4420 processor hardware interface is configured using jumpers to set up the reader port power and end of line termination.

Jumpers	Set at	Description
J1200	N/A	10Base-T/100Base-Tx Ethernet Connection (Port 0)
J1503	OFF	Port 1 RS-485 EOL Terminator is Off
	ON	Port 1 RS-485 EOL Terminator is On
J1500	OFF	Port 2 RS-485 EOL Terminator is Off
	ON	Port 2 RS-485 EOL Terminator is On
J1501	OFF	Reader 1 RS-485 EOL Terminator is Off (Non-OSDP readers)
	ON	Reader 1 RS-485 EOL Terminator is On (OSDP readers)
J1502	OFF	Reader 2 RS-485 EOL Terminator is Off (Non-OSDP readers)
	ON	Reader 2 RS-485 EOL Terminator is On (OSDP readers)
J1300	N/A	Micro USB Port (2.0)
J503	Reader Power Select *	
	12V	12 VDC at Reader Ports
	PASS	VIN "Pass Through" to Reader Ports
J1100	N/A	microSD Card
J1400-1	N/A	Remote Status LED #1 **
J1400-2	N/A	Remote Status LED #2 **
J1400-3	N/A	Remote Status LED #3 **
J1400-4	N/A	Remote Status LED #4 **
J1002	Super capacitor or battery backup real time clock	
	OFF	Backup battery is OFF
	ON	Backup battery is ON. Default J1002 link 1 and 2 for super capacitor real time clock backup. Link 2 and 3 for battery backup. For more information, refer to Memory and Real Time Clock Backup Battery on page 140.

* For regulated reader output, install J503 jumper link in the 12V position (1 and 2) ONLY if the input voltage (VIN) is greater than 17 VDC. Failure to do so may damage the reader or LNL-M4420.

**Observe polarity connection to LED. External current limiting is not required.

15.3.2 DIP Switches

The four switches on SW1400 DIP switch configure the operating mode of the LNL-M4420 processor. DIP switches are read on power-up except where noted.

Pressing reset switch SW400 causes the LNL-M4420 to reboot.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 141.
OFF	ON	OFF	OFF	Use factory default communication parameters. *
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. * Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 135.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 135.
X	X	X	ON	Makes the LNL-M4420 report and function like an LNL-X4420. To be used in situations where the host software has not been updated to support the LNL-M series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.
* In the factory or LenelS2 default modes, downloaded configuration/database is not saved to flash memory.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0
- Alternate Host Port: Disabled

15.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board, less third party applications)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-M4420 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

15.4.1 Bulk Erase Steps

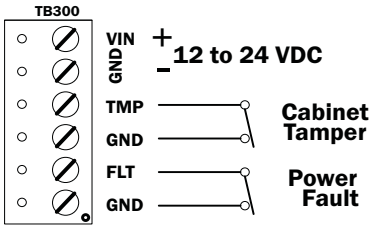
Important: Do not remove power during steps 1-6.

1. Set SW1400 DIP switches: 1 & 2 "ON" and 3 & 4 "OFF."
2. Apply power to the LNL-M4420 board. LED 1 will flash during boot up.
3. After boot up, LEDs 1 & 2, and 3 & 4 start to alternately flashing at a 0.5 second rate. Within 10 seconds, change switch 1 to "OFF."
4. When complete, only LEDs 1 and 4 will flash for about three (3) seconds.
5. The LNL-M4420 reboots and will be available at the default IP address (192.168.0.251).

15.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring

The LNL-M4420 requires 12 to 24 VDC power. Locate power source as close to the unit as possible.

Connect power with minimum of 18 AWG wire. Connect the GND signal to earth ground in ONE LOCATION within the system. Multiple earth ground connections may cause ground loop problems and is not advised.



Observe POLARITY on 12 to 24 VDC input.

There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

Note: For UL compliance, only 12 VDC was evaluated.

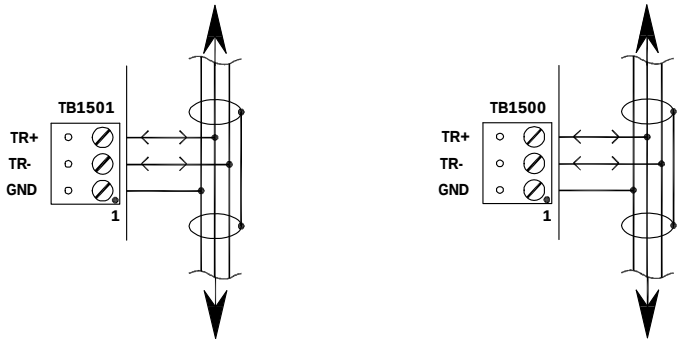
15.6 Communication Wiring

The LNL-M4420 controller communicates to the host via the on-board Ethernet 10Base-T/100Base-TX port and/or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

The serial I/O device communication ports, TB1501 for port 1 and TB1500 for port 2, are 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair, grounded shielded cable, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum for communication.

Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel.

Port 1: To Serial I/O Devices *Port 2: To Serial I/O Devices*



15.7 Reader Wiring

Each reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F (standard or supervised) or 2-wire RS-485 signaling (OSDP reader for example). Power to the readers is selectable: 12 VDC (VIN must be greater than 18 VDC), or power is passed-through (PASS) from the input voltage of the LNL-M4420 (TB300-VIN), 600 mA maximum per reader port. Readers that require different voltage or have high current requirements must be powered separately. Refer to the reader manufacturer's specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set via the host software. Do not terminate any RS-485 devices connected to a reader port.

REX input should use grounded shielded cable.

To fully utilize each reader port:

- TTL signaling requires a 6-conductor cable (18 AWG)
- F/2F signaling requires a 4-conductor cable
- RS-485 signaling requires two 2-conductor cables. Use one cable for power (18 AWG, 1-pair) and one cable for communication (24 AWG, 1-pair, shielded)

Notes: For OSDP communication, install jumper link to J1501 (Reader 1 RS-485 termination end) and jumper link to J1502 (Reader 2 RS-485 termination end) to enable the on-board 120 ohm termination. These jumpers should be closed when using OSDP and open for non-OSDP readers.

Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

Important: Failure to correctly set the OSDP jumper settings can cause communication issues.

15.7.1 Reader Power Select (J503)

12V PASS	J503 Reader Power Select
	12 VDC is available on reader ports (VIN is greater than 17 VDC).
	VIN power is “passed through” (PASS) to reader ports.

Important: For 12 VDC regulated reader output, install J503 jumper link in the 12V position (1 and 2) ONLY if the input voltage (VIN) is greater than 17 VDC.

Notes: Install J503 jumper link 1 and 2 to regulate reader output or pass-through automatically depending on the input voltage:

- VIN 26.4 V to 17 V = 12 V Output
- VIN 17 V to 14.5 V = Output OFF
- VIN 14.5 V to 10.8 V = Pass-through

Install J503 jumper link 2 and 3 for pass-through from 26.4 V to 10.8 V.

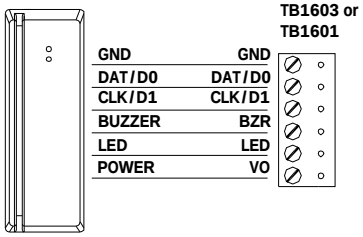
Ensure the pass-through voltage does not exceed the reader maximum operating voltage.

Input Power	Reader Power Select (Jumper J503)	Reader Output
24 VDC	Pass-through 	24 VDC
24 VDC	12 VDC PASS 	12 VDC
12 VDC	Pass-through 	12 VDC
12 VDC	12 VDC PASS* 	12 VDC

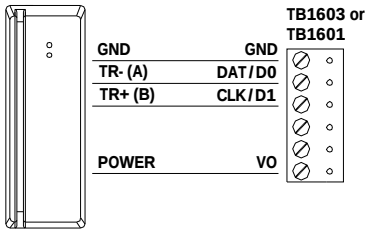
* For UL compliance, only 12 VDC was evaluated; pass-through was not evaluated.

15.7.2 Reader Wiring Diagrams

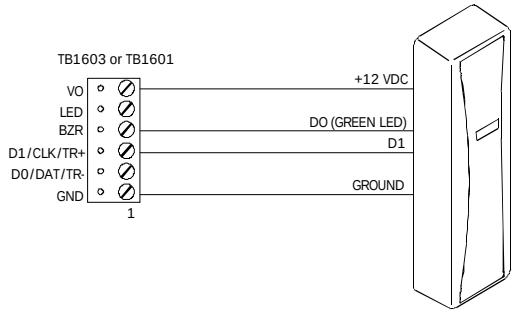
Typical D1/D0 or Clock/Data Reader



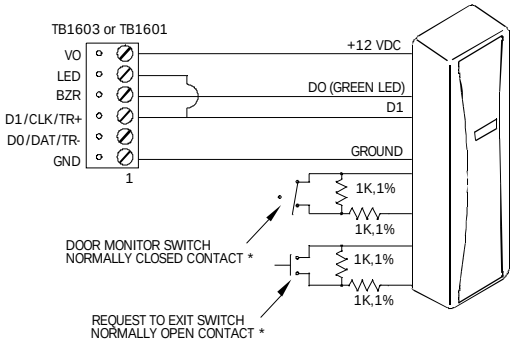
Typical 2-wire RS-485 Device (such as OSDP Reader)



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader



Jumper: Connect D1 and LED on supervised F/2F reader

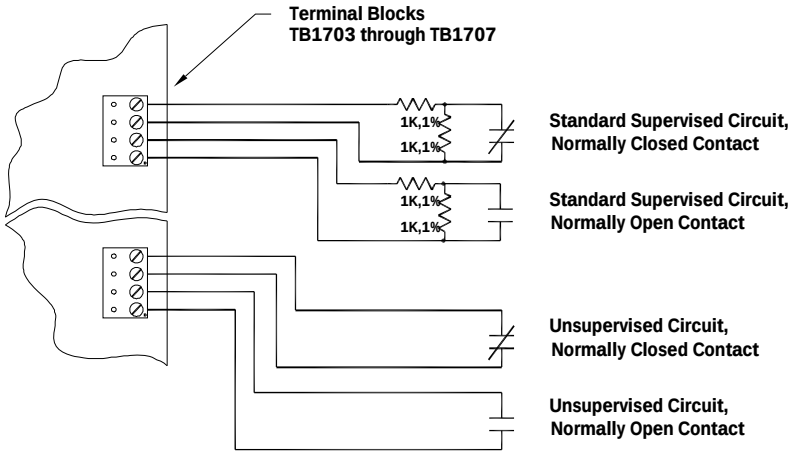
* Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).

15.8 Input Circuit Wiring

There are eight (8) inputs that are typically used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded,* and foreign voltage.* A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical.



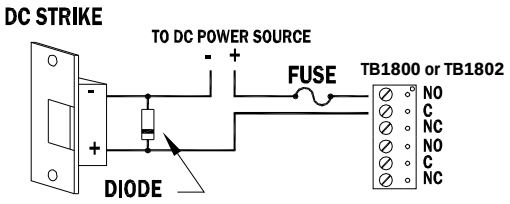
15.9 Relay Circuit Wiring

Four (4) relays with Form-C contacts (dry) are provided for controlling door lock mechanisms or alarm signaling. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When controlling the delivery of power to the door strike, the Normally Open and Common poles are typically used. When momentarily removing power to unlock the door, as with a magnetic lock, the Normally Closed and Common poles are typically used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay plus affect the operation of the LNL-M4420. For this reason, it is recommended that a diode be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

15.9.1 Diode Selection

- Diode current rating: 1x strike current.
- Diode breakdown voltage: 4x strike voltage.
- For 12 VDC or 24 VDC strike, diode 1N4002 (100V/ 1A) typical.



15.10 Memory and Real Time Clock Backup Battery

The real time clock is backed up by a super capacitor or optional lithium battery when input power is interrupted. All other data is stored in non-volatile flash memory.

Note: If using the optional lithium battery, replace it annually.

The super capacitor is selected by default (J1002 jumper link 1 and 2).

To change to battery back up, install jumper link 2 and 3 and install the lithium coin cell.

Battery type: Panasonic BR2032 or CR2032.

Note: Data is stored in flash memory to prevent loss of data in the case of power interruption.

15.11 IT Security

When installing the LNL-M4420, it is important to ensure that it is done in a secure manner. Create user accounts to the web configuration page using secure passwords.

Ensure all DIP switches are in the OFF position for the normal operating mode.

The LNL-M4420 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name (admin) and password (password) will be available for five minutes once the DIP switch is toggled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-M4420 is commissioned. It is also highly recommended **not** to configure the LNL-M4420 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

15.12 Status LEDs

15.12.1 Power-up

NIC LED blinks and all other LEDs are off.

15.12.2 Initialization

The initialization process has several stages, each stage is represented by a different LED pattern in the following
sequence:

- LED 1 is on for about 10 seconds.
- LED 2 is on for 25 seconds.
- LED 3 flashes slowly for 15 seconds.
- LED 3 flashes quickly for 1 second. LED 3 may continue flashing for an additional 60 seconds if the controller firmware is being updated.
- LED 1, LED 2, and LED 3 are off as the application starts.
- LED 4 is then on for 15 seconds indicating a successful initialization.

When LEDs 1, 2, 3, and 4 flash at the same time, data is being read from or written to flash memory, do not cycle power when in this state. If the sequence stops or repeats, perform “Bulk Erase Steps” on page 136.

15.12.3 Running

After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-line / On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host communication activity (Ethernet)
3	Internal SIO communication activity
4	External SIO communication activity (Port 1)
5	External SIO communication activity (Port 2)
R1	Reader 1 Clock/Data or D1/D0 mode: Flashes when Data is Received, either input F/2F mode: Flashes when Data/Acknowledgment is Received RS-485 mode: Flashes when Transmitting Data
R2	Reader 2 Clock/Data or D1/D0 mode: Flashes when Data is Received, either input F/2F mode: Flashes when Data/Acknowledgment is Received RS-485 mode: Flashes when Transmitting Data
ETH ACT	D1200 flashes with Ethernet activity
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	OFF= No link, ON = Good link, Flashing = Ethernet activity
IN1 - IN8	OFF = Inactive, ON = Active, Flash = Fault *
OUT1 - OUT4	Relay K1 - K4: ON = Energized

* If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds; otherwise, the LED is off.

15.13 Specifications

The LNL-M4420 is for use in low voltage, Class 2 circuits only. All output circuits are Class2/Power Limited.

The installation of this device must comply with all local fire and electrical codes. Units are to be installed in accordance with NFPA 70. The unit is to be powered with a UL-listed UL 294 approved power supply with a class 2 power limited output.

Note: Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.

Primary Power:	12 to 24 VDC ± 10%, 550 mA maximum (reader and USB ports not included)
Reader Ports:	600 mA maximum per reader port (add 600 mA to primary power current)
Micro USB Port:	5 VDC, 500 mA maximum (add 270 mA to primary power current)
	Not evaluated by UL
Memory and Clock Backup Battery:	Super capacitor or optional 3 Volt Lithium, type Panasonic BR2032 or CR2032
microSD Card	Format: microSD or microSDHC; 2GB to 8GB
Host Communication:	Ethernet: 10Base-T/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Serial I/O Device	Two each: 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:	Eight unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, ¼ watt
	Two unsupervised dedicated for cabinet tamper and UPS fault monitoring
Outputs:	Four relays, Form-C with dry contacts Normally open contact (NO) contact: 5 A @ 30 VDC resistive Normally closed contact (NC) contact: 3 A @ 30 VDC resistive
Reader Interface:	
Power:	12 VDC ± 10% regulated, 600 mA maximum each reader port (input voltage (VIN) must be greater than 17 VDC)
(jumper selectable) 18 AWG (when using local 12 VDC power supply)	or
	12 to 24 VDC ± 10% (input voltage (VIN) passed through), 600 mA maximum per reader port
Data Inputs:	TTL compatible, F/2F or 2-wire RS-485
RS-485 Mode (OSDP):	9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2000 ft. (609.6 m)
LED Output:	TTL levels, high>3 V, low<0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
Cable Requirements:	
Power:	1 twisted pair, 18 AWG (when using local 12 VDC power supply)
Ethernet:	CAT-5, minimum
Reader data (TTL):	6-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (F/2F):	4-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (RS-485 OSDP):	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 2,000 ft. (610 m) maximum
Bus data (RS-485 Bus):	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 2,000 ft. (610 m) maximum

Alarm Input:	1 twisted pair, 30 ohm maximum, typically 22 AWG @ 1000 ft. (304.8 m)
Outputs	As required for the load
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	8 in. (203.2 mm) W x 6 in. (152.4 mm) L x 1 in. (25 mm) H
Weight:	10.65 oz. (302 g) nominal, board only

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

These specifications are subject to change without notice.

UL 294 Performance Levels Indoor use:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

15.13.1 UL Listed Installations

- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.
- Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.
- For UL installation, 12 VDC input with 12 VDC pass-through shall be used.
- Reader Ports are Special Applications rated: 10.95 – 12 VDC (Reader 1) and 11.06 – 12 VDC (Reader 2).
- The following readers are to be connected:
  - BlueDiamond models: LNL-R11330-05TB, LNL-R11320-05TB, LNL-R11325-05TB
  - HID Signo models: 20, 20K, 40, 40K

15.14 Regulatory Information

15.14.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 2610

LNL-X2210 Intelligent Controller

16 LNL-X2210 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-X2210 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.

Note: For PoE or 12VDC, set jumper J3 in accordance with the power source.

7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.
9. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

17 LNL-X2210 Reference

17.1 General

The LNL-X2210 intelligent controller provides decision making, event reporting and database storage for the LenelS2 hardware platform. Two reader interfaces configured as paired or alternate readers provide control for one physical barrier.

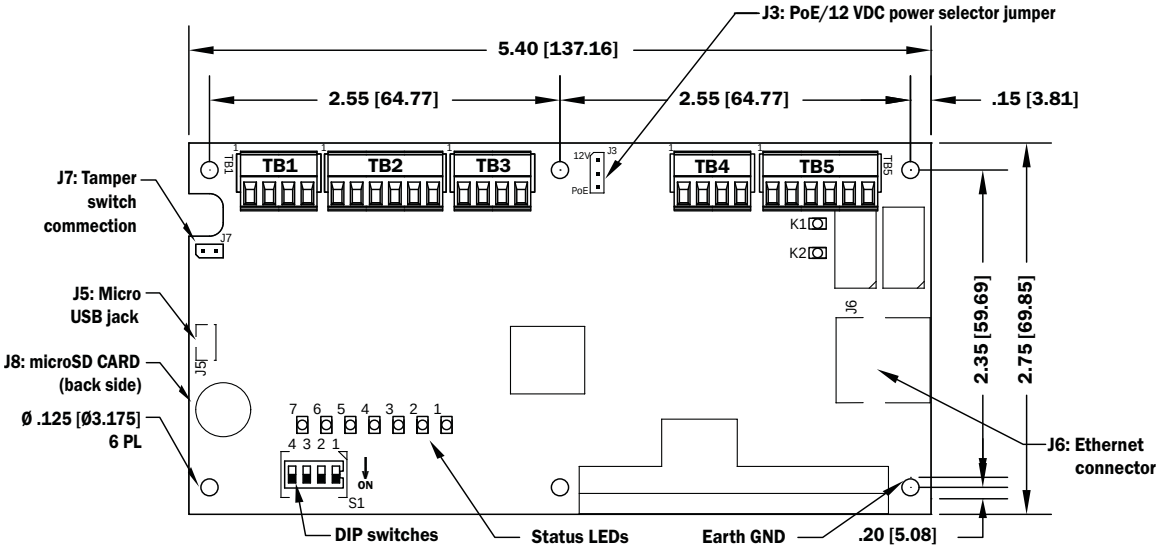
Host communication is via the on-board 10-BaseT/100Base-TX Ethernet port.

Note: For UL compliance, the Power Sourcing Equipment (PSE) such as a PoE or PoE+ enabled network switch and/or PoE or PoE+ power injectors must be UL Listed under UL 294.

Reader port 1 can accommodate a reader that utilizes TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 device signaling (for example an OSDP reader), also provides tri-state LED control, and buzzer control (one wire LED mode only). This port can also utilize multiple 2-wire RS-485 multi-dropped devices, such as up to two OSDP readers or up to eight remote serial I/O devices.

Reader port 2 can accommodate a reader that utilizes TTL (D1/D0, Clock/Data), or F/2F signaling, also provides tri-state LED control, and buzzer control (one wire LED mode only). Two Form-C contact relay outputs may be used for door strike control or alarm signaling. The relay contacts are rated at 2 A @ 30 VDC, dry contact configuration. Two inputs are provided that may be used for monitoring the door contact, exit push button or alarm contact. Input circuits can be configured as unsupervised or supervised. The LNL-X2210 requires Power over Ethernet (PoE or PoE+) or 12 VDC for power. The LNL-X2210 may be mounted in a 3-gang switch box; a mounting plate is supplied with the unit, or may be mounted in an enclosure; the supplied mounting plate has mounting holes that match the LNL-1300 mounting footprint.

17.2 LNL-X2210 Hardware



17.3 LNL-X2210 Wiring

LNL-X2210 CONNECTIONS		
TB1-1	IN1	Input 1
TB1-2	IN1	

LNL-X2210 CONNECTIONS		
TB1-3	IN2	Input 2
TB1-4	IN2	
TB2-1	VO	Reader 1 Power Output – 12 VDC
TB2-2	LED	Reader 1 LED Output
TB2-3	BZR	Reader 1 Buzzer Output
TB2-4	CLK	Reader 1 CLK/Data 1/TR+ (B) *
TB2-5	DAT	Reader 1 DAT/Data 0/TR- (A) *
TB2-6	GND	Reader 1 Ground
TB3-1	LED	Reader 2 LED Output
TB3-2	BZR	Reader 2 Buzzer Output
TB3-3	CLK	Reader 2 CLK/Data 1 Input
TB3-4	DAT	Reader 2 DAT/Data 0 Input
TB4-1	VO	Auxiliary Power Output – 12 VDC
TB4-2	GND	Auxiliary Power Output Ground
TB4-3	VIN	Input Power – 12 VDC (from local power supply)
TB4-4	GND	Input Power Ground
TB5-1	NO	Relay K1 – Normally Open Contact
TB5-2	1-C	Relay K1 – Common Contact
TB5-3	NC	Relay K1 – Normally Closed Contact
TB5-4	NO	Relay K2 – Normally Open Contact
TB5-5	2-C	Relay K2 – Common Contact
TB5-6	NC	Relay K2 – Normally Closed Contact

*Terms A & B are from the RS-485 standard.

17.3.1 Jumpers

Jumper	Set	Description
J1	N/A	Factory Use Only
J2	N/A	
J3	PoE	LNL-X2210 powered from the Ethernet connection
	12V	LNL-X2210 powered from an local 12 VDC power source connected to TB4-3 (VIN), TB4-4 (GND)

Jumper	Set	Description
J4	N/A	Factory Use Only
J5	N/A	Micro USB port (2.0)
J6	N/A	10-Base-T/100Base-TX Ethernet Connection
J7		Cabinet Tamper Switch Input: short = tamper secure
J8	N/A	microSD Card

17.3.2 DIP Switches

The four switches on S1 DIP switch configure the operating mode of the LNL-X2210 processor. DIP switches are read on power-up except where noted.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information, refer to IT Security on page 156.
OFF	ON	X	OFF	Use factory default communication parameters.
ON	ON	X	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See “Bulk Erase Configuration Memory” on page 151.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See “Bulk Erase Configuration Memory” on page 151.
X	X	X	ON	Makes the LNL-X2210 report and function like an LNL-2210. To be used in situations where the host software has not been updated to support the LNL-X series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0
- Alternate Host Port: Disabled

17.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-X2210 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

17.4.1 Bulk Erase Steps

Important: Do not remove power during steps 1-6.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-X2210 board. LED 1 on for about 15 seconds while LNL-X2210 boots up.
3. After the LNL-X2210 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-X2210 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased. Full memory erase takes up to 60 seconds, usually a lot less.
   When complete, only LEDs 1 & 4 will flash for about 3 seconds.
6. The LNL-X2210 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

17.5 Input Power

The LNL-X2210 is powered by one of two ways (jumper selected, J3):

- Power is supplied via the Ethernet connection using PoE or PoE+
- Or local 12 VDC power supply, TB4-3 (VIN), TB4-4 (GND)

17.6 Communication Wiring

The LNL-X2210 controller communicates to the host via the on-board 10-BaseT/100Base-TX Ethernet interface.

17.7 Reader/Serial I/O Device Wiring

Reader port 1 supports TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 device(s). Reader port 2 supports TTL (D1/D0, Clock/Data), or F/2F. Power to reader port 1 is 12 VDC at 300 mA maximum. The reader connected to reader port 2 may be powered from the 12 VDC auxiliary power supply output; TB4-1 and TB4-2. Readers that require different voltage or have high current requirements should be powered

separately. Refer to the reader manufacturer's specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

Reader port 1 can support up to eight 2-wire RS-485 remote serial I/O devices using MSP1 protocol or up to two OSDP devices. If two OSDP devices are used, reader port 2 will not support a third reader. If only one OSDP device is configured, then reader port 2 is available for a second reader. The maximum cable length is 2000 ft. (610 m). Do not terminate any RS-485 devices connected to reader port 1.

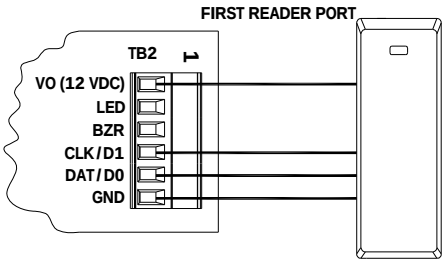
Notes: For OSDP cable lengths greater than 200 ft (61 m) or EMF interference, install 120Ω +/- 2Ω resistor across RS-485 termination ends.

Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

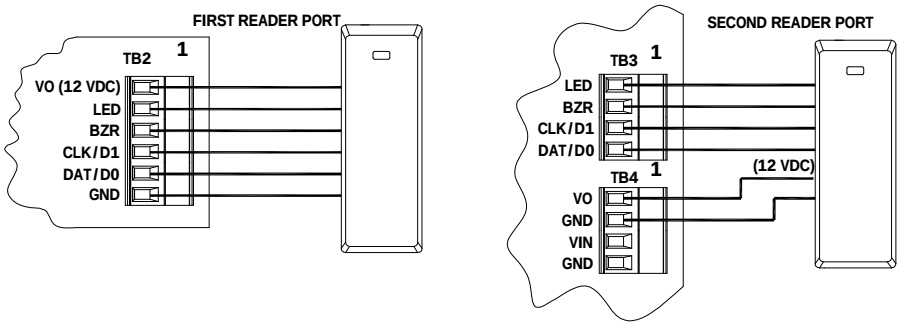
Important: When powering remote device(s) from the LNL-X2210, be cautious not to exceed the maximum current limit. Cable gauge must also be evaluated. See specifications section for details.

17.7.1 Reader Wiring Diagrams

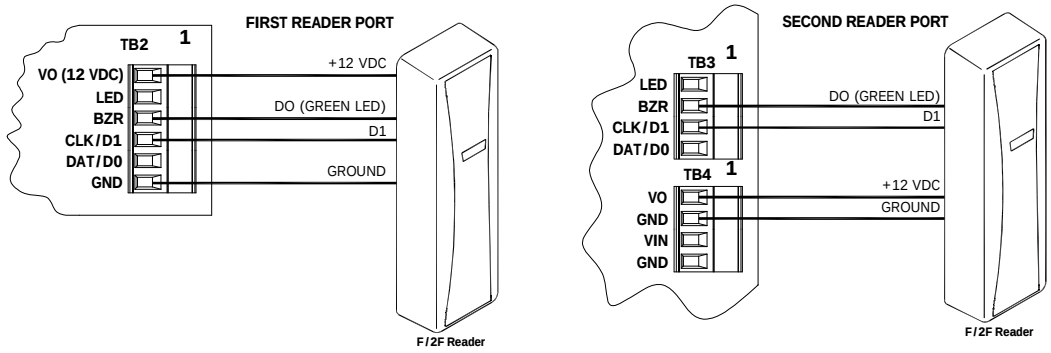
Typical Reader (OSDP Installation)



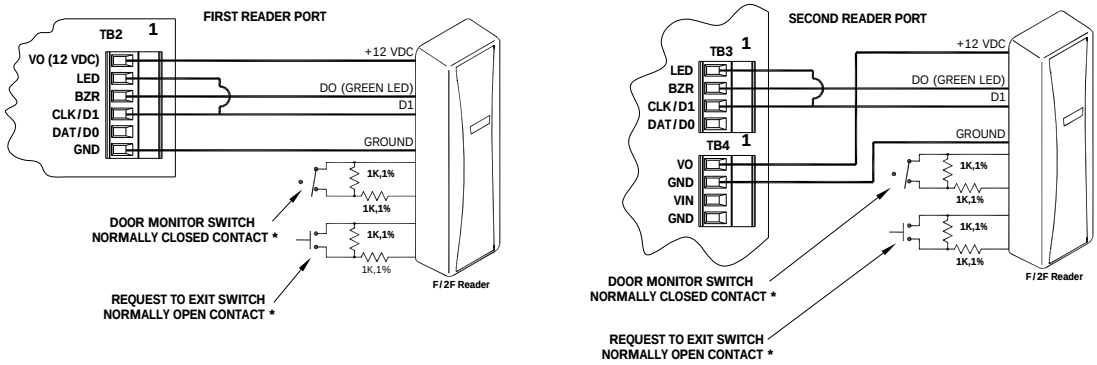
Typical D1/D0 or Clock/Data Reader Ports 1 and 2



Typical Unsupervised F/2F Reader Ports 1 and 2



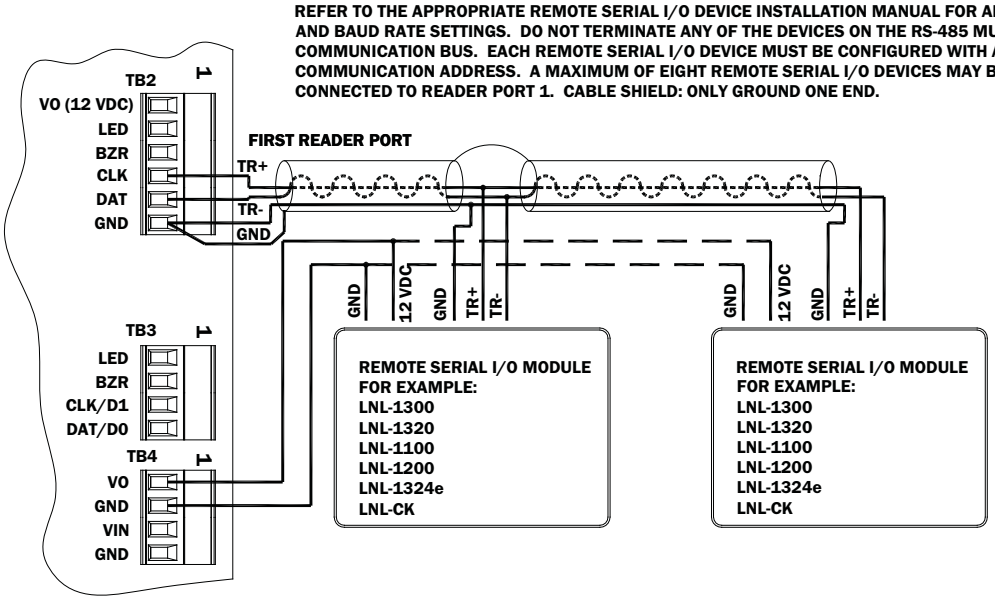
Typical Supervised F/2F Reader Ports 1 and 2



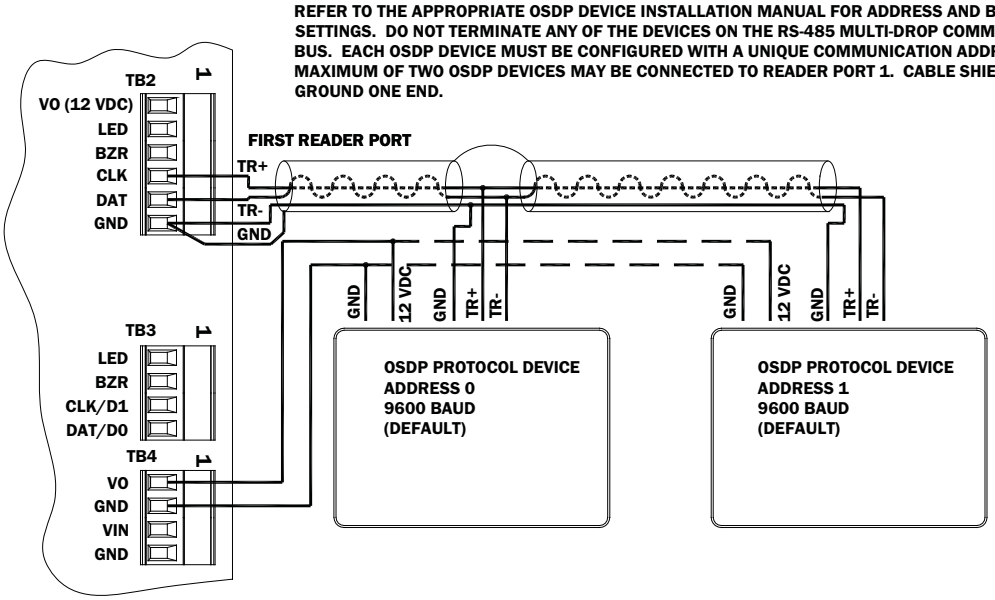
* Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).

Note: Jumper: Connect D1 and LED on supervised F/2F reader.

Reader Port 1 Remote Serial I/O Devices using MSP1 Protocol (2-Wire RS-485)



Reader Port 1 OSDP Protocol Devices (2-Wire RS-485)



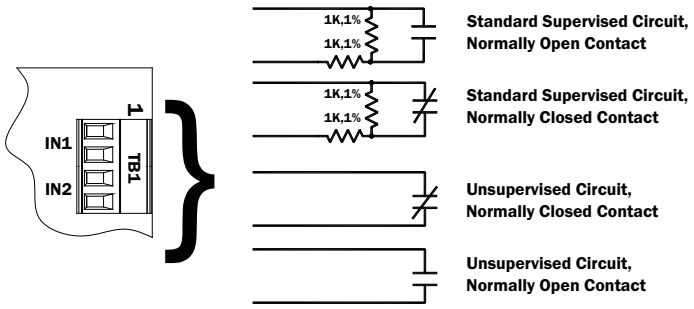
17.8 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states.

When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded*, and foreign voltage*. A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical:



17.9 Relay Circuit Wiring

Two Form-C contact relays are provided for controlling door lock mechanisms or alarm signaling devices. The relay contacts are rated at 2 A @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When momentarily removing power to unlock the door, as with a magnetic lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

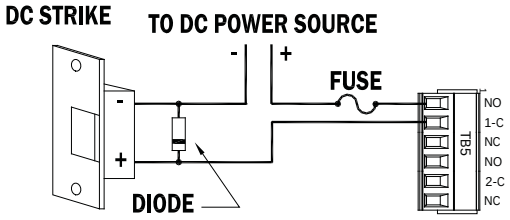
Door lock mechanisms can generate EMF feedback to the relay circuit that can cause damage and premature failure of the relay plus affect the operation of the LNL-X2210. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

CAUTION From the Auxiliary output, the LNL-X2210 can provide 12 VDC power for external devices provided that the maximum current is not exceeded. See the specifications section for details. If a local power supply is used, it must be UL Listed Class 2 rated.

PRÉCAUTION Depuis la sortie auxiliaire, le LNL-X2210 peut fournir une alimentation 12 Vcc aux équipements externe pourvu que le courant maximum n'est pas dépassé. Se référer à la section sur les spécifications pour plus de détails. Si une alimentation locale est utilisée, elle doit être homologué UL de classe 2.

17.9.1 Diode Selection

Diode current rating: 1x strike current. Diode breakdown voltage: 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



17.10 Memory Backup Battery

The SRAM is backed up by a rechargeable battery when input power is removed. This battery should retain the data for a minimum of 3 days. If data in the SRAM is determined to be corrupt after power up, all data, including flash memory, is considered invalid and is erased. All configuration data must be re-downloaded.

Note: The initial charge of the battery may take up to 48 hours to be fully charged.

17.11 IT Security

When installing the LNL-X2210, it is important to ensure that it is done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and that all DIP switches are in the off position for the normal operating mode. The LNL-X2210 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-X2210 is commissioned. It is also highly recommended not to configure the LNL-X2210 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

17.12 Status LEDs

Power-up: All LEDs OFF.

Initialization: After power is applied, LED 1 is ON for about 15 seconds, then LEDs 2 through 7 are flashed once at the beginning of initialization.

LEDs 5, 6 and 7 are turned ON for approximately 1 second after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the

size of the database, about 1 second without a card database. Each 10,000 cards adds about 2 seconds to the application initialization.

When LEDs 1 through 4 flash at the same time, data is being read from or written to flash memory; do not cycle power when in this state.

If the sequence stops or repeats, perform "Bulk Erase Steps" on page 151.

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

Running: After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-Line / On-Line: Off-Line = 20% ON, On-Line = 80% ON
2	Host Communication Activity
3	Readers (combined): Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data F/2F Mode = Flashes when Data/Acknowledgment is Received
4	Input IN1 Status: OFF = Inactive, ON = Active, Flash = Fault *
5	Input IN2 Status: OFF = Inactive, ON = Active, Flash = Fault *
6	Cabinet Tamper
7	Reserved for Future Use
D9	Relay K1: ON = Energized
D10	Relay K2: ON = Energized
YEL	Ethernet Speed: OFF = 10 Mb/S, ON = 100 Mb/S
GR	OFF = No Link, ON = Good Link, Flashing = Ethernet Activity

*If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds, otherwise, the LED is off.

17.13 Specifications

The interface is for use in low voltage, Class 2 circuits only.

The installation of this device must comply with all local fire and electrical codes.

Primary Power:	PoE (12.95 W), compliant to IEEE 802.3af or PoE+ (25 W), compliant to IEEE 802.3at or 12 VDC ± 10%, 1.8 A maximum provided by a UL 294 or UL 603, power-limited power supply with appropriate ratings
Power Output:	PoE: 12 VDC @ 625 mA including reader and Auxiliary Power output *
Power Output:	PoE+ or external 12 VDC: 12 VDC @ 1.25 A including reader and Auxiliary Power output *
Micro USB Port:	5 VDC maximum (deduct 270 mA from reader and Auxiliary Power output)

* Excluding micro USB port

CAUTION	PoE power is to be supplied by an Access Control System Unit (ALVY), power limited, PoE+ injector or PoE+ Ethernet switch providing 42.5 – 57 VDC, 25.5W for maximum output.
PRÉCAUTION	L'alimentation PoE doit être fournie par une unité de système de contrôle d'accès (ALVY), limitée en puissance, interrupteur injecteur PoE+ ou PoE+ Ethernet fournissant une sortie maximale entre 42,5 et 57 Vcc, 25,5 W.
SRAM Backup Battery:	Rechargeable battery
microSD Card	Format: microSD or microSDHC; 2GB to 8GB.
Host Communication:	Ethernet: 10-BaseT/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Inputs:	Two unsupervised/supervised, Programmable End of Line resistors, 1k/1k ohm, 1%, ¼ watt standard One unsupervised input dedicated for cabinet tamper
Outputs:	Two relays: Form-C contacts: 2 A @ 30 VDC, resistive
Reader Interface: Power:	12 VDC ± 10%: PoE, PoE+ or local power supply, 300 mA maximum
Data Inputs:	Reader port 1: TTL compatible, F/2F or 2-wire RS-485 Reader port 2: TTL compatible or F/2F
LED Output:	TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
Cable Requirements: Power:	1 twisted pair, 18 AWG (when using local 12 VDC power supply)
Ethernet:	CAT-5, minimum

Reader data (TTL):	6-conductor, 18 AWG, 500 ft. (152 m) maximum
Reader data (F/2F):	4-conductor, 18 AWG, 500 ft. (152 m) maximum
Reader data (RS-485):	1 twisted pair, shielded. 24 AWG, 120 ohm impedance, 2000 ft. (610 m) maximum
Alarm Input:	1 twisted pair per input, 30 ohm maximum
Outputs:	As required for the load
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	5.5 in. (140 mm) W x 2.75 in. (70 mm) L x 0.96 in. (24 mm) H without bracket 5.5 in. (140 mm) W x 3.63 in. (92 mm) L x 1.33 in. (34 mm) H with bracket
Weight:	3.6 oz. (103 g) without bracket 4.43 oz. (125.5 g) with bracket

UL 294, 7th edition Performance Levels:

Feature	**Level**
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

These specifications are subject to change without notice.

17.13.1 UL Listed Installations

- PoE is only for use with Access control-only installations and not for use with burglar installations.
- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/NFPA 70.

For UL installations, the following must be observed:

- PoE power is to be supplied by an Access Control System Unit (ALVY), power limited, PoE injector (PSE) providing 44-57VDC and 15W for maximum output, and PoE+ injector (PSE) providing 42.5 – 57 VDC, 25.5W for maximum output).
- This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.
- Category 5e cabling is the minimum performance category recommended.
- The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG (0.13 mm^2) for patch cords; 24 AWG (0.21 mm^2) for horizontal or riser cable.
- Connected through standard eight-pin RJ-45 connectors.
- Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.

17.13.2 Firmware Revision

In Alarm Monitoring, the firmware revision can be displayed in the System Status Tree by selecting **Display Device Firmware Version** from the **Options** menu.

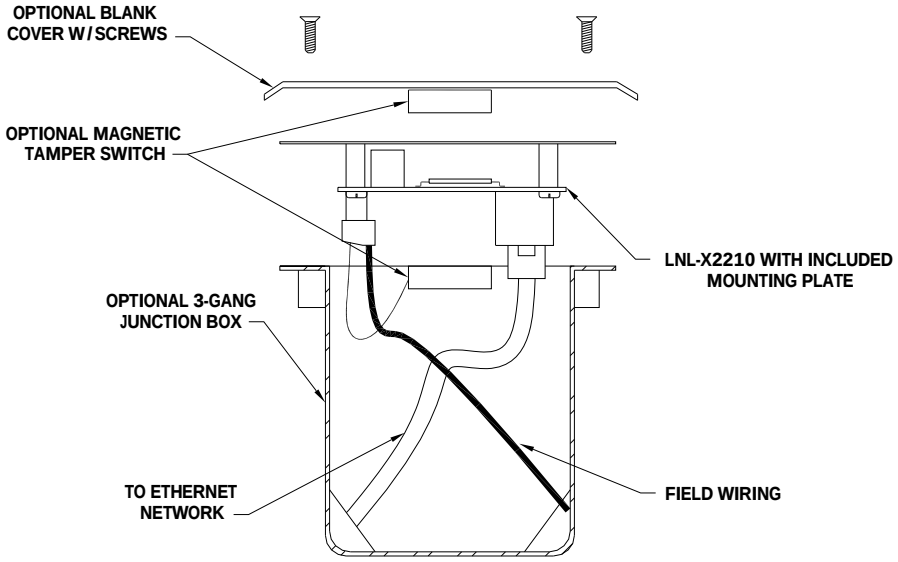
In the Controller Web Page, select **Device Info**. For more information, refer to the Controller Web Page Configuration chapter in the Hardware Installation Guide (DOC-600).

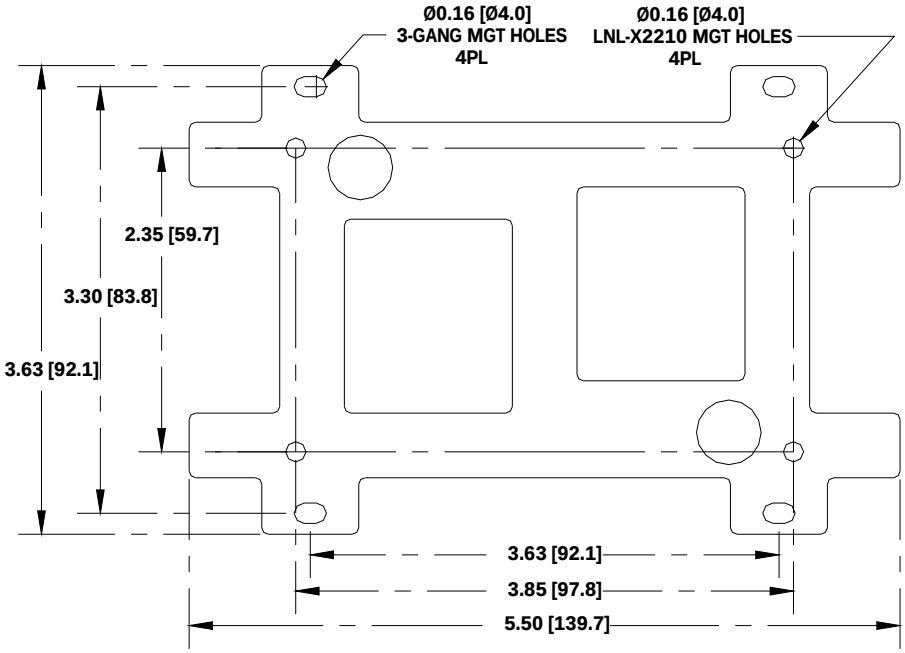
17.14 Additional Mounting Information

Sources for the optional items:

- 3-gang stainless steel blank cover. Available from: Leviton: part number 84033-40
  Graybar: part number 88158404

- Magnetic switch set: G.R.I. part number: 505





17.15 Regulatory Information

17.15.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 1076
- CSA C22.2 No. 205-1983
- cUL/ORD-C1076

LNL-X2220 Intelligent Controller

18 LNL-X2220 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-X2220 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.
7. Move jumper J19 to the ON position to enable Real Time Clock battery backup.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

19 LNL-X2220 Reference

19.1 General

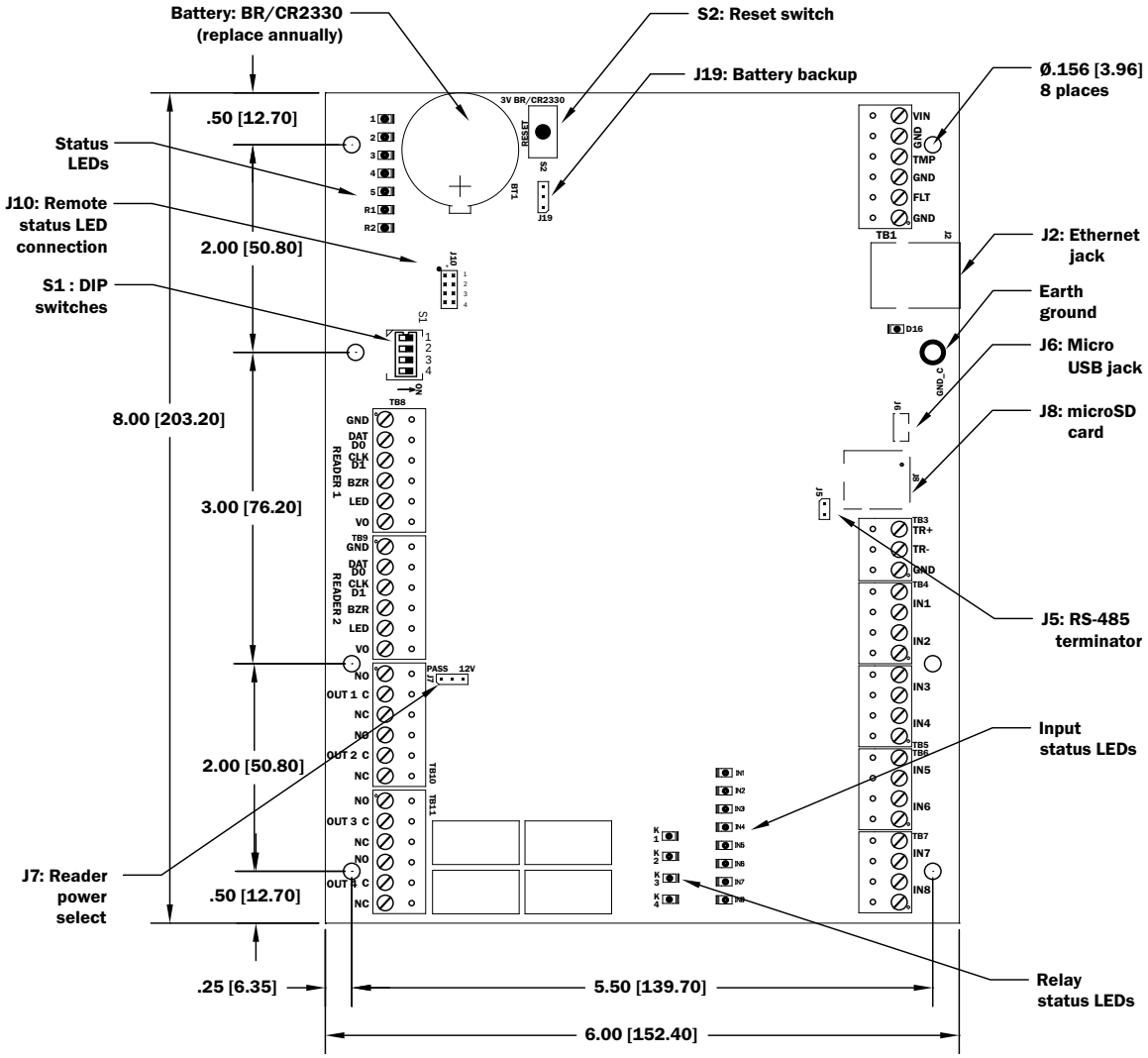
The LNL-X2220 intelligent controller provides decision making, event reporting, and database storage for the LenelS2 hardware platform. Two reader interfaces provide control for two physical barriers.

The LNL-X2220 communicates with the host via on-board 10-BaseT/100Base-TX Ethernet port or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

Each reader port can accommodate a reader that utilizes TTL (D1/D0, Clock/Data), F/2F (standard or supervised) or 2-wire RS-485 device signaling (OSDP reader for example) and also provides tri-state LED control, and buzzer control (one wire LED mode only). Four Form-C relay outputs may be used for door

strike control or alarm signaling. Eight inputs are provided that may be used for monitoring the door contacts, exit push buttons, and alarm contacts. Input circuits may be configured as unsupervised or supervised. The LNL-X2220 requires 12 to 24 VDC for power.

19.2 LNL-X2220 Hardware



19.3 LNL-X2220 Wiring

Terminal Blocks 1-7 Connections		
TB1-1	Power Fault Input	GND
TB1-2		FLT
TB1-3	Cabinet Tamper Input	GND
TB1-4		TMP
TB1-5	Power Input	GND
TB1-6		VIN: 12 to 24 VDC
TB2	N/A	Not Used
TB3-1	SIO Port (2-wire RS-485)	GND
TB3-2		TR- (B) *
TB3-3		TR+ (A) *
TB4-1	Input 2	IN2
TB4-2		IN2
TB4-3	Input 1	IN1
TB4-4		IN1
TB5-1	Input 4	IN4
TB5-2		IN4
TB5-3	Input 3	IN3
TB5-4		IN3
TB6-1	Input 6	IN6
TB6-2		IN6
TB6-3	Input 5	IN5
TB6-4		IN5
TB7-1	Input 8	IN8
TB7-2		IN8
TB7-3	Input 7	IN7
TB7-4		IN7

Terminal Blocks 8-11 Connections		
TB8-1	Reader 1	GND: Ground
TB8-2		DAT/D0: Data/Data 0/ TR- (A) *
TB8-3		CLK/D1: Clock/Data 1/ TR+ (B) *
TB8-4		BZR: Reader Buzzer
TB8-5		LED: Reader LED
TB8-6		VO: Reader Power
TB9-1	Reader 2	GND: Ground
TB9-2		DAT/D0: Data/Data 0/ TR- (A) *
TB9-3		CLK/D1: Clock/Data 1/ TR+ (B) *
TB9-4		BZR: Reader Buzzer
TB9-5		LED: Reader LED
TB9-6		VO: Reader Power
TB10-1	Out 1	NO: Normally Open Contact
TB10-2		C: Common
TB10-3		NC: Normally Closed Contact
TB10-4	Out 2	NO: Normally Open Contact
TB10-5		C: Common
TB10-6		NC: Normally Closed Contact
TB11-1	Out 3	NO: Normally Open Contact
TB11-2		C: Common
TB11-3		NC: Normally Closed Contact
TB11-4	Out 4	NO: Normally Open Contact
TB11-5		C: Common
TB11-6		NC: Normally Closed Contact

* Terms A & B are from the RS-485 standard.

19.3.1 Jumpers and Jacks

The LNL-X2220 processor hardware interface is configured using jumpers to setup the reader port power and end of line termination.

Jumpers	Set at	Description
J1	N/A	Factory Use Only
J2	N/A	10-Base-T/100Base-Tx Ethernet Connection (Port 0)
J3	N/A	Factory Use Only
J4	N/A	N/A
J5	OFF	RS-485 EOL Terminator is Off
	ON	RS-485 EOL Terminator is On
J6	N/A	Micro USB Port (2.0)
J7	Reader Power Select *	
	12V	12 VDC at Reader Ports
	PASS	VIN "Pass Through" to Reader Ports
J8	N/A	microSD Card
J10-1	N/A	Remote Status LED #1 **
J10-2	N/A	Remote Status LED #2 **
J10-3	N/A	Remote Status LED #3 **
J10-4	N/A	Remote Status LED #4 **
J19	OFF	Backup battery is OFF
	ON	Backup battery is ON. For more information, refer to Memory and Real Time Clock Backup Battery on page 171.

* Install jumper J7 in the 12V position ONLY if the input voltage (VIN) is greater than 20 VDC. Failure to do so may damage the reader or LNL-X2220.

**Observe polarity connection to LED. External current limiting is not required.

19.3.2 DIP Switches

The four switches on S1 DIP switch configure the operating mode of the LNL-X2220 processor. DIP switches are read on power-up except where noted.

Pressing reset switch S2 causes the LNL-X2220 to reboot.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 172.
OFF	ON	OFF	OFF	Use factory default communication parameters. *
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. * Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 167.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 167.
X	X	X	ON	Makes the LNL-X2220 report and function like an LNL-2220. To be used in situations where the host software has not been updated to support the LNL-X series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.

* In the factory or LenelS2 default modes, downloaded configuration/database is not saved to flash memory.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0
- Alternate Host Port: Disabled

19.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board, less third party applications)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-X2220 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

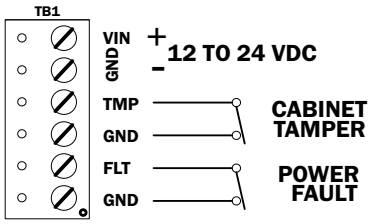
19.4.1 Bulk Erase Steps

Important: Do not remove power during steps 1-6.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-X2220 board. LED 1 on for about 15 seconds while LNL-X2220 boots up.
3. After the LNL-X2220 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-X2220 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased. Full memory erase takes up to 60 seconds, usually a lot less.
   When complete, only LEDs 1 & 4 will flash for about 3 seconds.
6. The LNL-X2220 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

19.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring

The LNL-X2220 requires 12 to 24 VDC power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire.



Connect the GND signal to earth ground in ONE LOCATION within the system. Multiple earth ground connections may cause ground loop problems and is not advised.

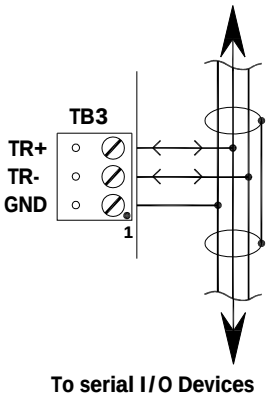
Observe POLARITY on 12 to 24 VDC input.

There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

19.6 Communication Wiring

The LNL-X2220 controller communicates to the host via the on-board Ethernet 10-BaseT/100Base-TX port and/or the USB port (2.0) with an optional USB to Ethernet adapter.

The serial I/O device communication port (TB3) is a 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair with drain wire and shield, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum for communication.



Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel.

19.7 Reader Wiring

Each reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F (standard or supervised) or 2-wire RS-485 signaling (OSDP reader for example). Power to the readers is selectable: 12 VDC (VIN must be greater than 20 VDC), or power is passed-through (PASS) from the input voltage of the LNL-X2220 (TB1-VIN), 300 mA maximum per reader port. Readers that require different voltage or have high current requirements must be powered separately. Refer to the reader manufacturer's specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

To fully utilize each reader port:

- TTL signaling requires a 6-conductor cable (18 AWG)
- F/2F signaling requires a 4-conductor cable
- RS-485 signaling requires two 2-conductor cables. Use one cable for power (18 AWG) and one cable for communication (24 AWG, with drain wire and shield)

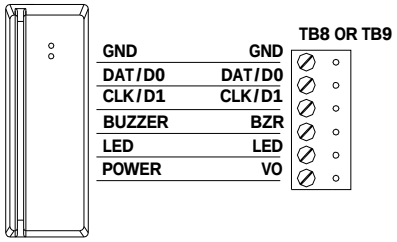
Notes: For OSDP cable lengths greater than 200 ft (61 m) or EMF interference, install 120Ω +/- 2Ω resistor across RS-485 termination ends.

Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

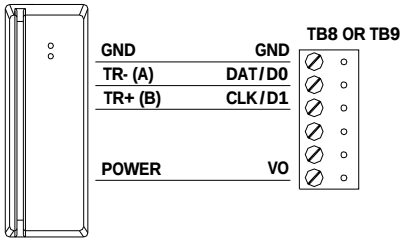
12V PASS	J7 Reader Power Select
	12 VDC is available on reader ports (VIN is greater than or equal to 20 VDC).
	VIN power is "passed through" (PASS) to reader ports.

Note: If the input voltage to the LNL-X2220 is 12 VDC, jumper J7 MUST be in the PASS position.

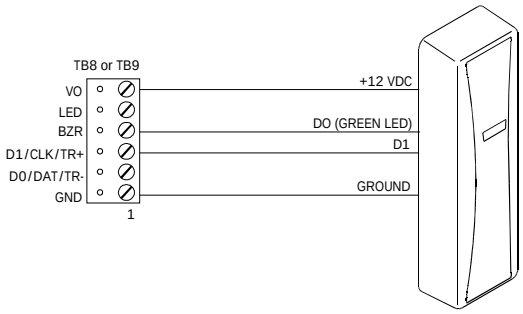
Typical D1/D0 or Clock/Data Reader



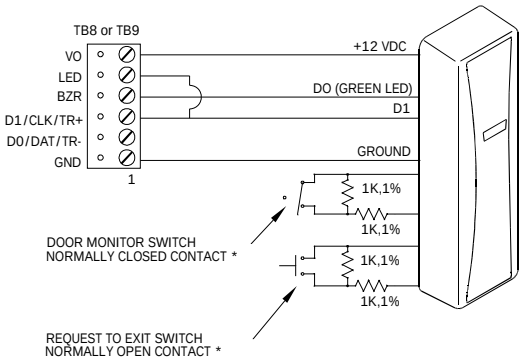
Typical 2-wire RS-485 Device (such as OSDP Reader)



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader



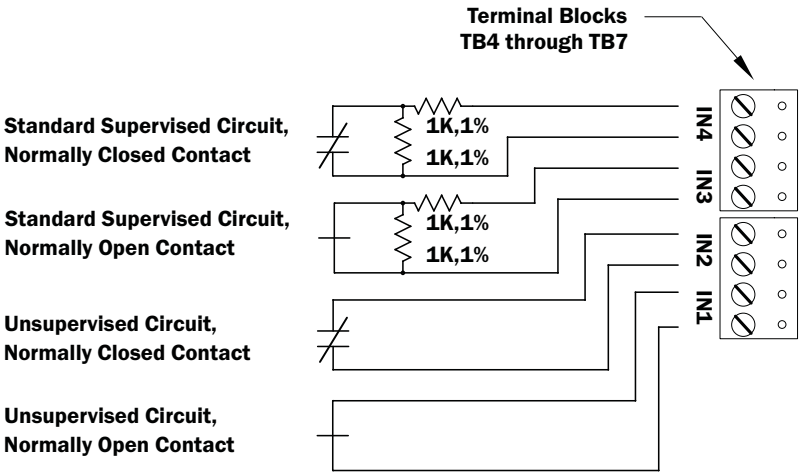
* Jumper: Connect D1 and LED on supervised F/2F readers.

19.8 Input Circuit Wiring

There are 8 inputs that are typically used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded,* and foreign voltage.* A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical:



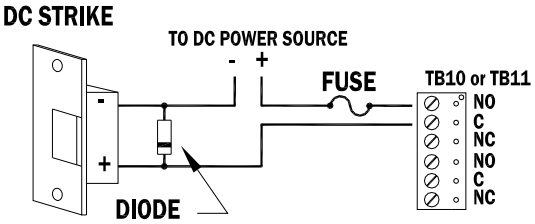
19.9 Relay Circuit Wiring

Four relays with Form-C contacts (dry) are provided for controlling door lock mechanisms or alarm signaling. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When controlling the delivery of power to the door strike, the Normally Open and Common poles are typically used. When momentarily removing power to unlock the door, as with a magnetic lock, the Normally Closed and Common poles are typically used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay plus affect the operation of the LNL-X2220. For this reason, it is recommended that a diode be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

19.9.1 Diode Selection

Diode current rating: 1x strike current. Diode breakdown voltage: 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



19.10 Memory and Real Time Clock Backup Battery

The static RAM and the real time clock are backed up by a lithium battery when input power is removed. This battery should be replaced annually. If data in the static RAM is determined to be corrupt after power

up, all data, including flash memory, is considered invalid and is erased. All configuration data must be re-downloaded.

During installation and while the unit is not powered, change the jumper (J19) position from **OFF** to **ON** to enable the battery backup.

Battery type: BR2330 or CR2330.

19.11 IT Security

When installing the LNL-X2220, it is important to ensure that it is done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and that all DIP switches are in the off position for the normal operating mode. The LNL-X2220 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-X2220 is commissioned. It is also highly recommended **not** to configure the LNL-X2220 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

19.12 Status LEDs

Power-up: All LEDs OFF.

Initialization: After power is applied or the reset switch is pressed, LED 1 is ON for about 15 seconds, then LEDs 2 through 6, R1, R2, and IN1 through IN8 are flashed once at the beginning of initialization.

LEDs 3 and 4 turn ON for approximately 1 second after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 1 second without a card database. Each 10,000 cards adds about 2 seconds to the application initialization.

When LEDs 1 through 4 flash at the same time, data is being read from or written to flash memory; do not cycle power when in this state.

If the sequence stops or repeats, perform “Bulk Erase Steps” on page 168.

Running: After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-line / On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host communication activity (Ethernet or Micro USB port)
3	Internal SIO communication activity
4	External SIO communication activity
5	Unassigned
R1	Reader 1 Clock/Data or D1/D0 mode: Flashes when Data is Received, either input F/2F mode: Flashes when Data/Acknowledgment is Received RS-485 mode: Flashes when Transmitting Data
R2	Reader 2 Clock/Data or D1/D0 mode: Flashes when Data is Received, either input F/2F mode: Flashes when Data/Acknowledgment is Received RS-485 mode: Flashes when Transmitting Data
D16	Flashes with Ethernet traffic
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	OFF= No link, ON = Good link, Flashing = Ethernet activity
IN1 - IN8	OFF = Inactive, ON = Active, Flash = Fault *
K1 - K4	ON = Energized

* If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds, otherwise, the LED is off.

19.13 Specifications

The interface is for use in low voltage, Class 2 circuits only.

The installation of this device must comply with all local fire and electrical codes.

Primary Power:	12 to 24 VDC ± 10%, 500 mA maximum (reader and USB ports not included)
Reader Ports:	600 mA maximum (add 600 mA to primary power current)
Micro USB Port:	5 VDC, 500 mA maximum (add 270 mA to primary power current)
Memory and Clock Backup Battery:	3 Volt Lithium, type BR2330 or CR2330

microSD Card	Format: microSD or microSDHC; 2GB to 8GB
Host Communication:	Ethernet: 10-BaseT/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Serial I/O Device	One each: 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:	Eight unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, ¼ watt Two unsupervised dedicated for cabinet tamper and UPS fault monitoring
Outputs:	Four relays, Form-C with dry contacts Normally open contact (NO) contact: 5 A @ 30 VDC resistive Normally closed contact (NC) contact: 3 A @ 30 VDC resistive
Reader Interface:	
Power: (jumper selectable)	12 VDC ± 10% regulated, 300 mA maximum each reader (input voltage (VIN) must be greater than 20 VDC) or 12 to 24 VDC ± 10% (input voltage (VIN) passed through), 300 mA maximum each reader
Data Inputs:	TTL compatible, F/2F or 2-wire RS-485
RS-485 Mode:	9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2000 ft. (609.6 m)
LED Output:	TTL levels, high>3 V, low<0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
Cable Requirements:	
Power:	1 twisted pair, 18 to 16 AWG
Ethernet:	CAT-5, minimum
RS-485:	
I/O Device Port:	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) max.
Reader Port:	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 2,000 ft. (610 m) max.
Alarm Input:	1 twisted pair, 30 ohm maximum
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	8 in. (203.2 mm) W x 6 in. (152.4 mm) L x 1 in. (25 mm) H
Weight:	9 oz. (255 g) nominal, board only

UL 294, 7th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

These specifications are subject to change without notice.

19.13.1 UL Listed Installations

- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603/ UL 2610, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603/UL 2610 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.
  For ULC 60839-11-1 compliance: This product was evaluated as Access Control Grade Assignment: Grade 1 Suitable for “Indoor dry conditions.” Readers (Wiegand or OSDP type) and power supplies connected to this system are to be ULC 60839-11-1 listed for ULC 60839-11-1 compliance.
- For ULC 60839-11-1 compliance: When the release time is system-defined, the permitted value shall not be less than three (3) seconds.

19.14 Regulatory Information

19.14.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 1076
- CSA C22.2 No. 205-1983
- cUL/ORD-C1076

LNL-X3300 Intelligent System Controller

20 LNL-X3300 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-X3300 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire the input circuit.
4. Wire the relay circuit.
5. Supply power to the controller.
6. Move jumper J19 to the ON position to enable Real Time Clock battery backup.
7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.
9. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

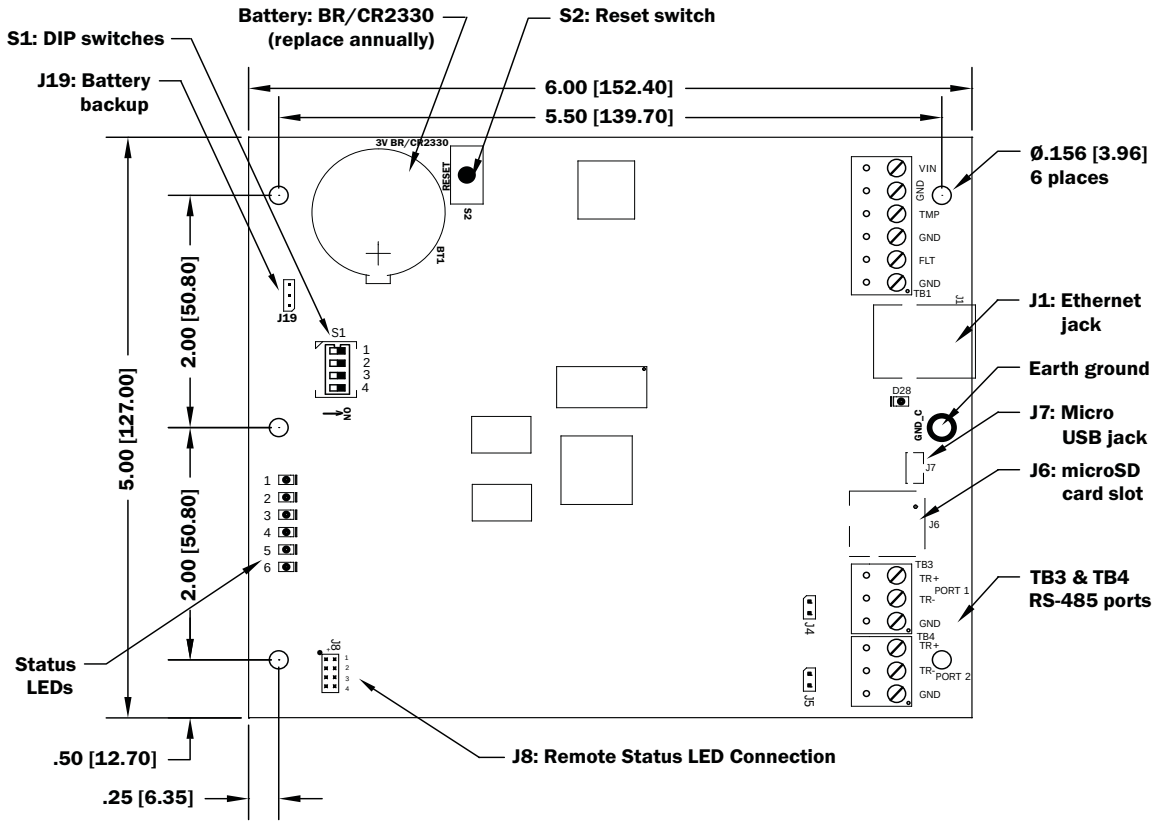
21 LNL-X3300 Reference

21.1 General

The LNL-X3300 intelligent controller provides decision-making, event reporting, and database storage for the LenelS2 hardware platform.

The LNL-X3300 communicates with the host via on-board 10-BaseT/100Base-TX Ethernet port or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter. Sub controllers are connected via ports 1 and 2 using 2-wire RS-485 multi-drop communication buses. The LNL-X3300 requires 12 to 24 VDC for power.

21.2 LNL-X3300 Hardware



21.3 LNL-X3300 Wiring and Setup

Connection		
TB1-1	Power Fault Input	GND
TB1-2		FLT
TB1-3	Cabinet Tamper Input	GND
TB1-4		TMP
TB1-5	Power Input	GND
TB1-6		VIN: 12 to 24 VDC
TB2	N/A	Not Used
TB3-1	SIO Port 1 (2-wire RS-485)	GND
TB3-2		TR- (B) *
TB3-3		TR+ (A) *
TB4-1	SIO Port 2 (2-wire RS-485)	GND
TB4-2		TR- (B) *
TB4-3		TR+ (A) *

* Terms A & B are from the RS-485 standard.

21.3.1 Jumpers and Jacks

The LNL-X3300 controller hardware interface is configured using jumpers to set up the port interface and end of line termination.

Jumpers	Set at	Description
J1	N/A	10-Base-T/100Base-Tx Ethernet Connection (Port 0)
J2	N/A	Factory Use Only
J3	N/A	Factory Use Only
J4	OFF	Port 1 RS-485 EOL Terminator is Off
	ON	Port 1 RS-485 EOL Terminator is On
J5	OFF	Port 2 RS-485 EOL Terminator is Off
	ON	Port 2 RS-485 EOL Terminator is On
J6	N/A	microSD Card
J7	N/A	USB Port (2.0)
J8-1	N/A	Remote Status LED #1 *
J8-2	N/A	Remote Status LED #2 *

Jumpers	Set at	Description
J8-3	N/A	Remote Status LED #3 *
J8-4	N/A	Remote Status LED #4 *
J19	OFF	Backup battery is OFF
	ON	Backup battery is ON. For more information, refer to Memory and Real Time clock Backup Battery on page 182.

*Observe polarity connection to LED. External current limiting is not required.

21.3.2 DIP Switches

The four switches on S1 DIP switch configure the operating mode of the LNL-X3300 controller. DIP switches are read on power-up except where noted.

Pressing reset switch S2 causes the LNL-X3300 to reboot.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 182.
OFF	ON	OFF	OFF	Use factory default communication parameters. *
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. * Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 181.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 181.
X	X	X	ON	Makes the LNL-X3300 report and function like an LNL-3300. To be used in situations where the host software has not been updated to support the LNL-X series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.

* In the factory or LenelS2 default modes, downloaded configuration/database is not saved to flash memory.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1

- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0
- Alternate Host Port: Disabled

21.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board, less third party applications)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-X3300 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

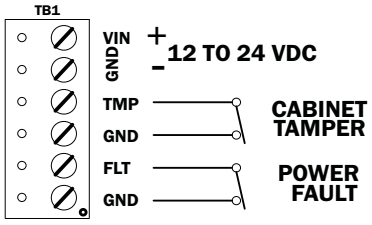
21.4.1 Bulk Erase Steps

Important: Do not remove power during steps 1-6.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-X3300 board. LED 1 on for about 15 seconds while LNL-X3300 boots up.
3. After the LNL-X3300 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-X3300 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased. Full memory erase takes up to 60 seconds, usually a lot less.
   When complete, only LEDs 1 & 4 will flash for about 3 seconds.
6. The LNL-X3300 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

21.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring

The LNL-X3300 requires 12 to 24 VDC power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire.



Connect the GND signal to earth ground in ONE LOCATION within the system. Multiple earth ground connections may cause ground loop problems and is not advised.

Observe POLARITY on 12 to 24 VDC input.

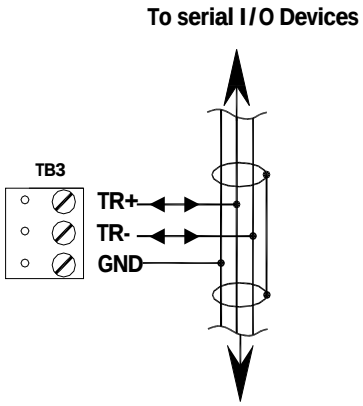
There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

21.6 Communication Wiring

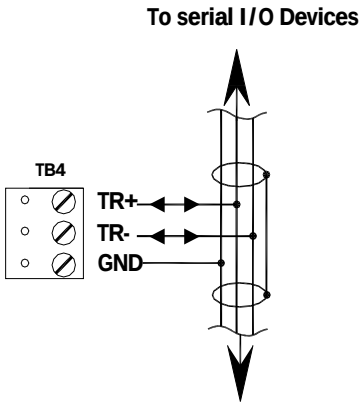
The LNL-X3300 controller communicates to the host via the on-board Ethernet 10-BaseT/100Base-TX port and/or the USB port (2.0) with an optional Micro USB to Ethernet adapter.

Ports 1 and 2 utilize 2-wire RS-485 interface. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair, shielded, 120 ohm impedance, 24 AWG. 4,000 ft. (1,219 m) maximum cable length.

Port 1: 2-Wire RS-485



Port 2: 2-Wire RS-485



Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel.

21.7 Memory and Real Time clock Backup Battery

The static RAM and the real time clock are backed up by a lithium battery when input power is removed. This battery should be replaced annually. If data in the static RAM is determined to be corrupt after power up, all data, including flash memory, is considered invalid and is erased. All configuration data must be re-downloaded.

During installation and while the unit is not powered, change the jumper (J19) position from **OFF** to **ON** to enable the battery backup.

Battery type: BR2330 or CR2330.

21.8 IT Security

When installing the LNL-X3300, it is important to ensure that it is done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and all DIP switches set in the OFF position for the normal operating mode.

The LNL-X3300 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-X3300 is commissioned.

It is highly recommended **not** to configure the LNL-X3300 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

21.9 Status LEDs

Power-up: All LEDs OFF.

Initialization: After power is applied or the reset switch is pressed, LED 1 is ON for about 15 seconds, then LEDs 2 through 6 are flashed once at the beginning of initialization.

LEDs 3 and 4 turn ON for approximately 1 second after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 1 second without a card database. Each 10,000 cards adds about 2 seconds to the application initialization.

When LEDs 1 through 4 flash at the same time, data is being read from or written to flash memory; do not cycle power when in this state.

If the sequence stops or repeats, perform “Bulk Erase Steps” on page 181.

Running: After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-line / On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host Communication Activity (Ethernet)
3	Port 1 Communication Activity
4	Port 2 Communication Activity
5	Unassigned
6	Unassigned
D28	Ethernet Activity (Ethernet Port 0)

LED	Description
YEL	On-board Ethernet Speed: OFF = 10 Mb/S, ON = 100 Mb/S
GRN	OFF = No Link, ON = Good Link, Flashing = Ethernet Activity

21.10 Specifications

The interface is for use in low voltage, Class 2 circuits only.

The installation of this device must comply with all local fire and electrical codes.

Primary Power:	12 to 24 VDC ± 10%, 250 mA maximum (USB port current not included)
Micro USB Port:	5 VDC, 500 mA maximum (add 270 mA to primary power current)
Memory and Clock Backup Battery:	3 Volt Lithium, type BR2330 or CR2330
microSD Card	Format: microSD or microSDHC; 2GB to 8GB
Host Communication:	Ethernet: 10-BaseT/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Serial I/O Device	Two each: 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:	Two unsupervised dedicated for cabinet tamper and UPS fault monitoring
Cable Requirements:	
Power:	1 twisted pair, 18 AWG
Ethernet:	CAT-5, minimum
RS-485:	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum cable length
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	5 in. (127 mm) W x 6 in. (152.4 mm) L x 1 in. (25 mm) H
Weight:	4.1 oz. (115 gm) nominal

UL 294, 7th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

These specifications are subject to change without notice.

21.10.1 UL Listed Installations

- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.

21.11 Regulatory Information

21.11.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 1076
- CSA C22.2 No. 205-1983
- cUL/ORD-C1076

LNL-X4420 Intelligent Dual Reader Controller

22 LNL-X4420 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-X4420 Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.
7. Move jumper J19 to the ON position to enable Real Time Clock battery backup.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

23 LNL-X4420 Reference

23.1 General

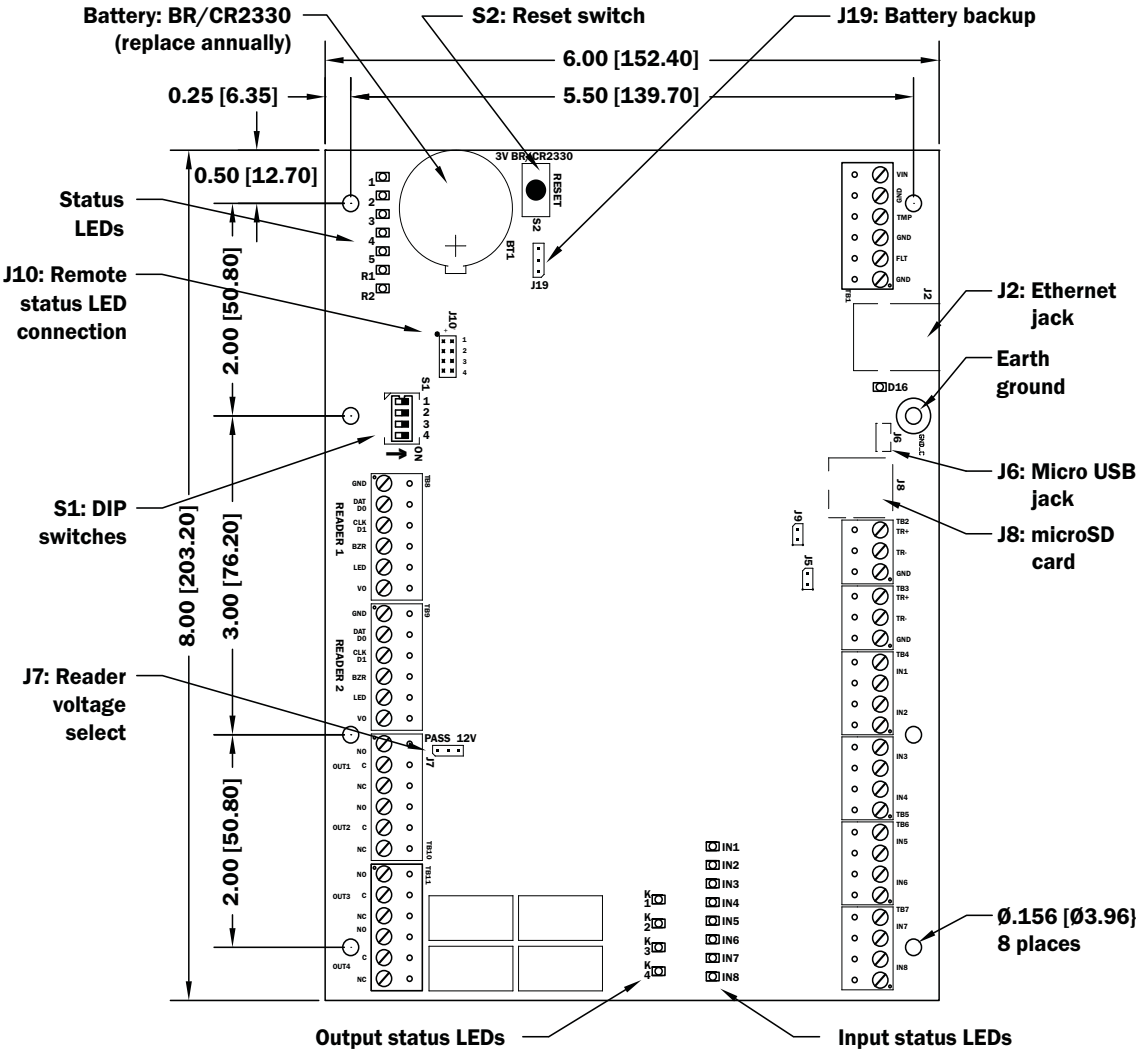
The LNL-X4420 intelligent controller provides decision making, event reporting, and database storage for the LenelS2 hardware platform. Two reader interfaces provide control for two doors.

The LNL-X4420 communicates with the host via on-board 10Base T/100Base-TX Ethernet port or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

Two physical barriers can be controlled with the LNL-X4420. Each reader port can accommodate a read-head that utilizes TTL (D1/D0, Clock/Data), F/2F or 2-wire RS-485 electrical signaling (OSDP reader for example) and also provides tri-state LED control and buzzer control (one wire LED mode only). Four Form-

C relay outputs may be used for door strike control or alarm signaling. Eight inputs are provided for monitoring the door contacts, exit push buttons, and alarm contacts. Input circuits can be configured as unsupervised or supervised. The LNL-X4420 requires 12 to 24 VDC for power.

23.2 LNL-X4420 Hardware



23.3 LNL-X4420 Wiring

Terminal Blocks 1-7 Connections		
TB1-1	Power Fault Input	GND
TB1-2		FLT
TB1-3	Cabinet Tamper Input	GND
TB1-4		TMP
TB1-5	Power Input	GND
TB1-6		VIN: 12 to 24 VDC
TB2-1	SIO Port 1 (2-wire RS-485)	GND
TB2-2		TR- (A) *
TB2-3		TR+ (B) *
TB3-1	SIO Port 2 (2-wire RS-485)	GND
TB3-2		TR- (A) *
TB3-3		TR+ (B) *
TB4-1	Input 2	IN2
TB4-2		IN2
TB4-3	Input 1	IN1
TB4-4		IN1
TB5-1	Input 4	IN4
TB5-2		IN4
TB5-3	Input 3	IN3
TB5-4		IN3
TB6-1	Input 6	IN6
TB6-2		IN6
TB6-3	Input 5	IN5
TB6-4		IN5
TB7-1	Input 8	IN8
TB7-2		IN8
TB7-3	Input 7	IN7
TB7-4		IN7

Terminal Blocks 8-11 Connections		
TB8-1	Reader 1	GND: Ground
TB8-2		DAT/D0: Data/Data 0/ TR- (A) *
TB8-3		CLK/D1: Clock/Data 1/ TR+ (B) *
TB8-4		BZR: Reader Buzzer
TB8-5		LED: Reader LED
TB8-6		VO: Reader Power
TB9-1	Reader 2	GND: Ground
TB9-2		DAT/D0: Data/Data 0/ TR- (A) *
TB9-3		CLK/D1: Clock/Data 1/ TR+ (B) *
TB9-4		BZR: Reader Buzzer
TB9-5		LED: Reader LED
TB9-6		VO: Reader Power
TB10-1	Out 1	NO: Normally Open Contact
TB10-2		C: Common
TB10-3		NC: Normally Closed Contact
TB10-4	Out 2	NO: Normally Open Contact
TB10-5		C: Common
TB10-6		NC: Normally Closed Contact
TB11-1	Out 3	NO: Normally Open Contact
TB11-2		C: Common
TB11-3		NC: Normally Closed Contact
TB11-4	Out 4	NO: Normally Open Contact
TB11-5		C: Common
TB11-6		NC: Normally Closed Contact

* Terms A & B are from the RS-485 standard.

23.3.1 Jumpers and Jacks

The LNL-X4420 processor hardware interface is configured using jumpers to setup the reader port power and end of line termination.

Jumpers	Set at	Description
J2	N/A	10-Base-T/100Base-Tx Ethernet Connection (Port 0)
J5	OFF	Port 2 RS-485 EOL Terminator is Off
	ON	Port 2 RS-485 EOL Terminator is On
J6	N/A	Micro USB Port (2.0)
J7		Reader Power Select *
	12V	12 VDC at Reader Ports
	PASS	VIN "Pass Through" to Reader Ports
J8	N/A	microSD Card
J9	OFF	Port 1 RS-485 EOL Terminator is Off
	ON	Port 1 RS-485 EOL Terminator is On
J10-1	N/A	Remote Status LED #1 **
J10-2	N/A	Remote Status LED #2 **
J10-3	N/A	Remote Status LED #3 **
J10-4	N/A	Remote Status LED #4 **
J19	OFF	Backup battery is OFF
	ON	Backup battery is ON. For more information, refer to Memory and Real Time Clock Backup Battery on page 196.

* Install jumper J7 in the 12V position ONLY if the input voltage (VIN) is greater than 20 VDC. Failure to do so may damage the reader or LNL-X4420.

**Observe polarity connection to LED. External current limiting is not required.

23.3.2 DIP Switches

The four switches on S1 DIP switch configure the operating mode of the LNL-X4420 processor. DIP switches are read on power-up except where noted.

Pressing reset switch S2 causes the LNL-X4420 to reboot.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 196.
OFF	ON	OFF	OFF	Use factory default communication parameters. *
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. * Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 191.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 191.
X	X	X	ON	Makes the LNL-X4420 report and function like an LNL-4420. To be used in situations where the host software has not been updated to support the LNL-X series product line.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.

* In the factory or LenelS2 default modes, downloaded configuration/database is not saved to flash memory.

Factory Default Communication Parameters

Interface 1 (NIC1)

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1
- DNS Server: 192.168.0.1
- Primary Host port: IP server, Data Security: TLS if Available, port 3001, communication address: 0
- Alternate Host Port: Disabled

23.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board, less third party applications)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-X4420 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

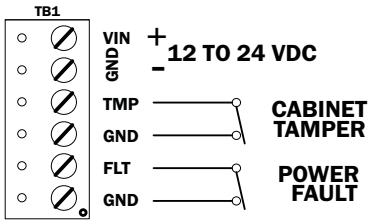
23.4.1 Bulk Erase Steps

Important: Do not remove power during steps 1-6.

1. Set S1 DIP switches: 1 & 2 "ON" and 3 & 4 "OFF."
2. Apply power to the LNL-X4420 board. LED 1 on for about 15 seconds while LNL-X4420 boots up.
3. After the LNL-X4420 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-X4420 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased. Full memory erase takes up to 60 seconds, usually a lot less.
   When complete, only LEDs 1 & 4 will flash for about 3 seconds.
6. The LNL-X4420 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

23.5 Input Power, Cabinet Tamper, and UPS Fault Input Wiring

The LNL-X4420 requires 12 to 24 VDC power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire.



Connect the GND signal to earth ground in ONE LOCATION within the system. Multiple earth ground connections may cause ground loop problems and is not advised.

Observe POLARITY on 12 to 24 VDC input.

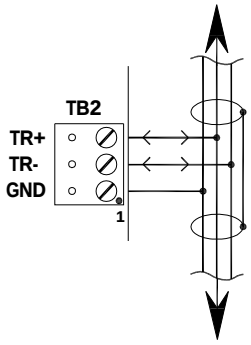
There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

23.6 Communication Wiring

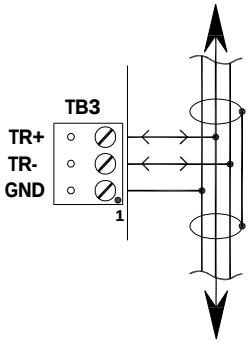
The LNL-X4420 controller communicates to the host via the on-board Ethernet 10-BaseT/100Base-TX port and/or the Micro USB port (2.0) with an optional Micro USB to Ethernet adapter.

The serial I/O device communication ports, TB2 for port 1 and TB3 for port 2, are 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4,000 feet (1,219 m). Use 1-twisted pair, shielded cable, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum for communication.

Port 1: To Serial I/O Devices



Port 2: To Serial I/O Devices



Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel.

23.7 Reader Wiring

Each reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F (standard or supervised) or 2-wire RS-485 signaling (OSDP reader for example). Power to the readers is selectable: 12 VDC (VIN must be greater than 20 VDC), or power is passed-through (PASS) from the input voltage of the LNL-X4420 (TB1-VIN), 300 mA maximum per reader port. Readers that require different voltage or have high current requirements must be powered separately. Refer to the reader manufacturer's specifications for cabling requirements. In the 2-wire LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set via the host software. Do not terminate any RS-485 devices connected to a reader port.

To fully utilize each reader port:

- TTL signaling requires a 6-conductor cable (18 AWG)
- F/2F signaling requires a 4-conductor cable
- RS-485 signaling requires two 2-conductor cables. Use one cable for power (18 AWG, 1-pair) and one cable for communication (24 AWG, 1-pair, shielded)

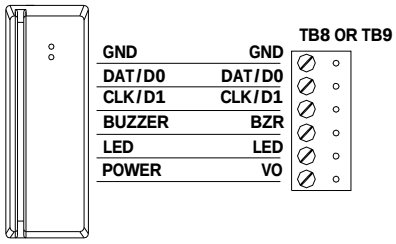
Notes: For OSDP cable lengths greater than 200 ft (61 m) or EMF interference, install 120Ω +/- 2Ω resistor across RS-485 termination ends.

Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

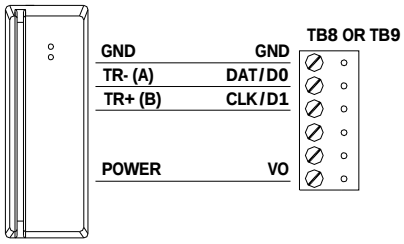
12V PASS	J7 Reader Power Select
	12 VDC is available on reader ports (VIN is greater than or equal to 20 VDC).
	VIN power is “passed through” (PASS) to reader ports.

Note: Install jumper J7 in the 12V position ONLY if the input voltage (VIN) is greater than 20 VDC. Failure to do so may damage the reader or the LNL-X4420.

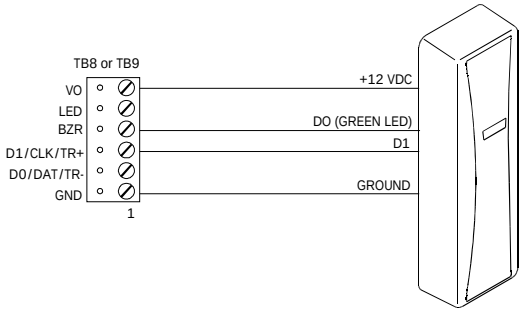
Typical D1/D0 or Clock/Data Reader



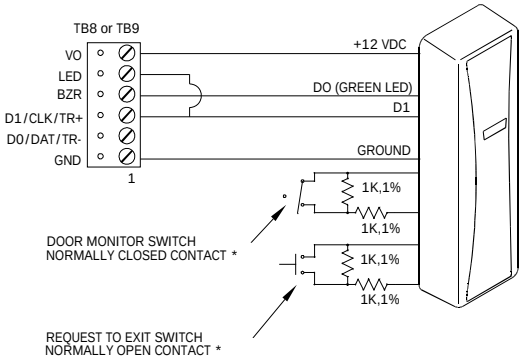
Typical 2-wire RS-485 Device (such as OSDP Reader)



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader



* Jumper: Connect D1 and LED on supervised F/2F readers.

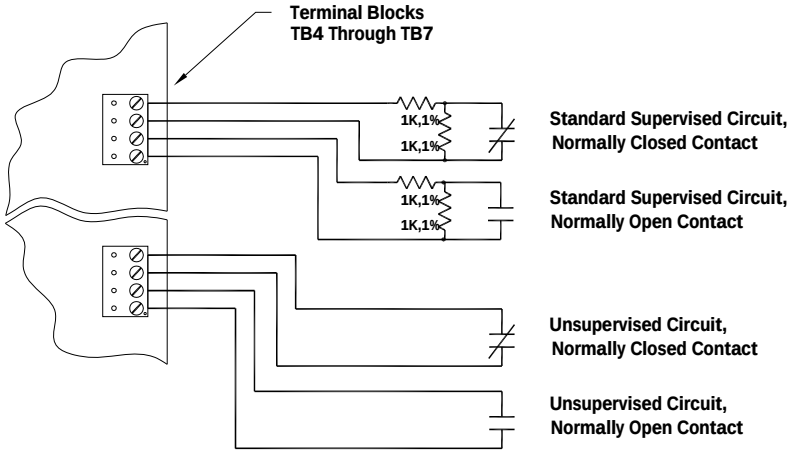
23.8 Input Circuit Wiring

There are 8 inputs that are typically used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded,* and foreign voltage.* A supervised input circuit requires two

resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical.



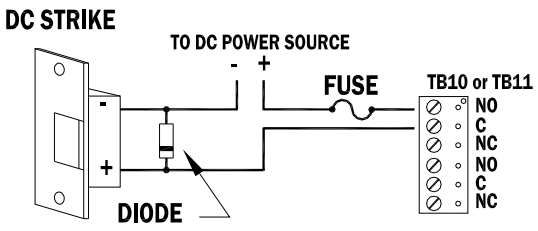
23.9 Relay Circuit Wiring

Four relays with Form-C contacts (dry) are provided for controlling door lock mechanisms or alarm signaling. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When controlling the delivery of power to the door strike, the Normally Open and Common poles are typically used. When momentarily removing power to unlock the door, as with a magnetic lock, the Normally Closed and Common poles are typically used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay plus affect the operation of the LNL-X4420. For this reason, it is recommended that a diode be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

23.9.1 Diode Selection

Diode current rating: 1x strike current. Diode breakdown voltage: 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



23.10 Memory and Real Time Clock Backup Battery

The static RAM and the real time clock are backed up by a lithium battery when input power is removed. This battery should be replaced annually. If data in the static RAM is determined to be corrupt after power up, all data, including flash memory, is considered invalid and is erased. All configuration data must be re-downloaded.

During installation and while the unit is not powered, change the jumper (J19) position from **OFF** to **ON** to enable the battery backup.

Battery type: BR2330 or CR2330.

23.11 IT Security

When installing the LNL-X4420, it is important to ensure that it is done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and that all DIP switches are in the OFF position for the normal operating mode. The LNL-X4420 is shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-X4420 is commissioned. It is also highly recommended **not** to configure the LNL-X4420 with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

23.12 Status LEDs

Power-up: All LEDs OFF.

Initialization: After power is applied or the reset switch is pressed, LED 1 is ON for about 15 seconds, then LEDs 2 through 6, R1, R2, and IN1 through IN8 are flashed once at the beginning of initialization.

LEDs 3 and 4 turn ON for approximately 1 second after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 1 second without a card database. Each 10,000 cards adds about 2 seconds to the application initialization.

When LEDs 1 through 4 flash at the same time, data is being read from or written to flash memory; do not cycle power when in this state.

If the sequence stops or repeats, perform “Bulk Erase Steps” on page 192.

Running: After initialization is complete, the LEDs have the following meanings:

LED	Description
1	Off-line / On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host communication activity (Ethernet)
3	Internal SIO communication activity
4	External SIO communication activity (Port 1)
5	External SIO communication activity (Port 2)
R1	Reader 1 Clock/Data or D1/D0 mode: Flashes when Data is Received, either input F/2F mode: Flashes when Data/Acknowledgment is Received RS-485 mode: Flashes when Transmitting Data
R2	Reader 2 Clock/Data or D1/D0 mode: Flashes when Data is Received, either input F/2F mode: Flashes when Data/Acknowledgment is Received RS-485 mode: Flashes when Transmitting Data
D16	Ethernet activity
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	OFF= No link, ON = Good link, Flashing = Ethernet activity
IN1 - IN8	OFF = Inactive, ON = Active, Flash = Fault *
K1 - K4	ON = Energized

* If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds, otherwise, the LED is off.

23.13 Specifications

The interface is for use in low voltage, Class 2 circuits only.

The installation of this device must comply with all local fire and electrical codes.

Primary Power:	12 to 24 VDC ± 10%, 550 mA maximum (reader and USB ports not included)
Reader Ports:	600 mA maximum (add 600 mA to primary power current)
Micro USB Port:	5 VDC, 500 mA maximum (add 270 mA to primary power current)
Memory and Clock Backup Battery:	3 Volt Lithium, type BR2330 or CR2330
microSD Card	Format: microSD or microSDHC; 2GB to 8GB

Host Communication:	Ethernet: 10-BaseT/100Base-TX and Micro USB port (2.0) with optional adapter: pluggable model USB2-OTGE100
Serial I/O Device	Two each: 2-wire RS-485, 2,400 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit
Inputs:	Eight unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, ¼ watt Two unsupervised dedicated for cabinet tamper and UPS fault monitoring
Outputs:	Four relays, Form-C with dry contacts Normally open contact (NO) contact: 5 A @ 30 VDC resistive Normally closed contact (NC) contact: 3 A @ 30 VDC resistive
Reader Interface:	
Power: (jumper selectable)	12 VDC ± 10% regulated, 300 mA maximum each reader (input voltage (VIN) must be greater than 20 VDC) or 12 to 24 VDC ± 10% (input voltage (VIN) passed through), 300 mA maximum each reader
Data Inputs:	TTL compatible, F/2F or 2-wire RS-485
RS-485 Mode:	9,600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2000 ft. (609.6 m)
LED Output:	TTL levels, high>3 V, low<0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
Cable Requirements:	
Power and Relays:	1 twisted pair, 18 to 16 AWG
Ethernet:	CAT-5, minimum
Reader data (TTL):	6-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (F/2F):	4-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (RS-485):	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 2,000 ft. (610 m) maximum
RS-485 I/O Devices:	1 twisted pair, shielded, 120 ohm impedance, 24 AWG, 4,000 ft. (1,219 m) maximum
Alarm Input:	1 twisted pair, 30 ohm maximum, typically 22 AWG @ 1000 ft. (304.8 m)
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC
Mechanical:	
Dimension:	8 in. (203.2 mm) W x 6 in. (152.4 mm) L x 1 in. (25 mm) H
Weight:	10.65 oz. (302 g) nominal, board only

UL 294, 7th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

These specifications are subject to change without notice.

23.13.1 UL Listed Installations

- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.

23.14 Regulatory Information

23.14.1 Certifications

- FCC Part 15
- CE
- RoHS
- UL 294
- UL 1076
- CSA C22.2 No. 205-1983
- cUL/ORD-C1076

LNL-2210 Intelligent Single Door Controller

24 Overview of the LNL-2210

This controller provides a single door solution with either a single reader or two readers for ingress/egress operation. It holds the database for the hardware configuration, and cardholder database in nonvolatile memory. The event log buffer is stored in battery backed memory. The first reader port can accommodate readers that utilize D1/D0, Clock/Data or OSDP 2-wire RS-485 electrical signaling, one or two wire LED controls, and buzzer control (one wire LED mode only). The first reader port can also be used as a 2-wire RS-485 interface which can be used to connect additional I/O boards. The second reader port can accommodate readers that utilize D1/D0, Clock/Data, one or two wire LED controls, and buzzer control (one wire LED mode only). Form-C relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 2A @ 30 VDC, dry contact configuration. Inputs are provided for monitoring the door contact, exit push button, or alarm contact. The controller requires either 12 VDC for power or Power over Ethernet (PoE).

The intelligent single door controller may be mounted in a UL Listed 3-gang switch box; a mounting plate is supplied with the unit. The controller may be mounted in an enclosure; the supplied mounting plate has mounting holes that match the LNL-1300 mounting footprint.

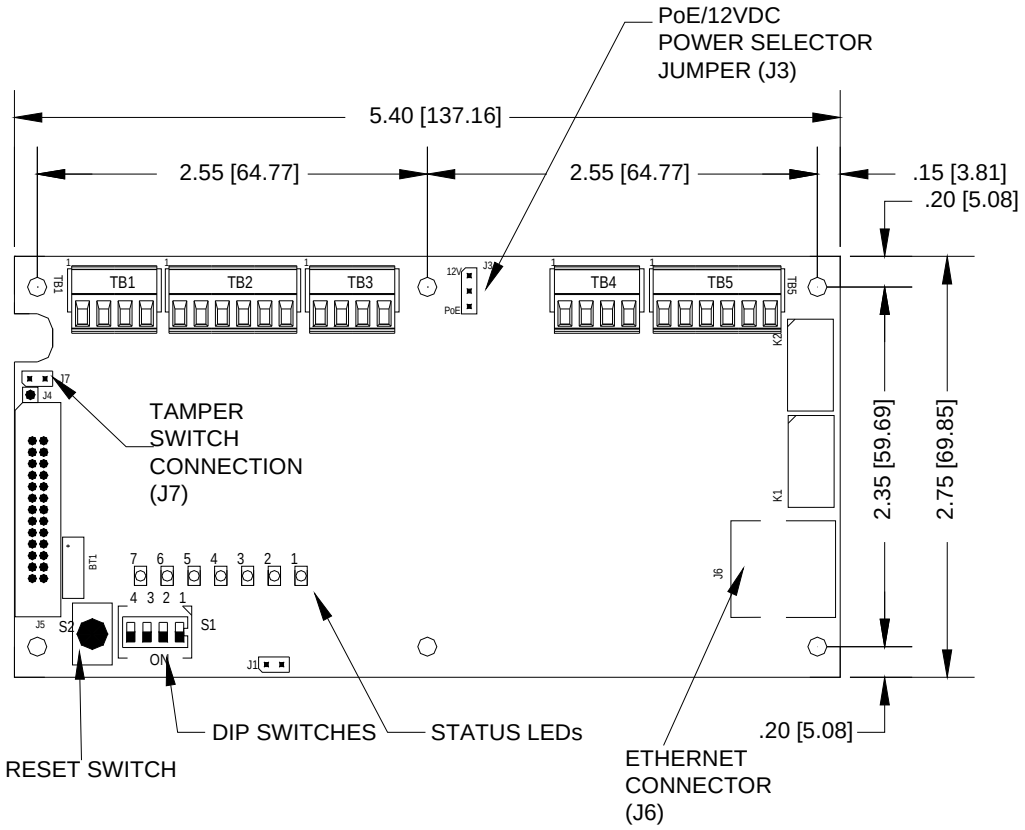
Note: This product has been evaluated by UL for access control applications only.

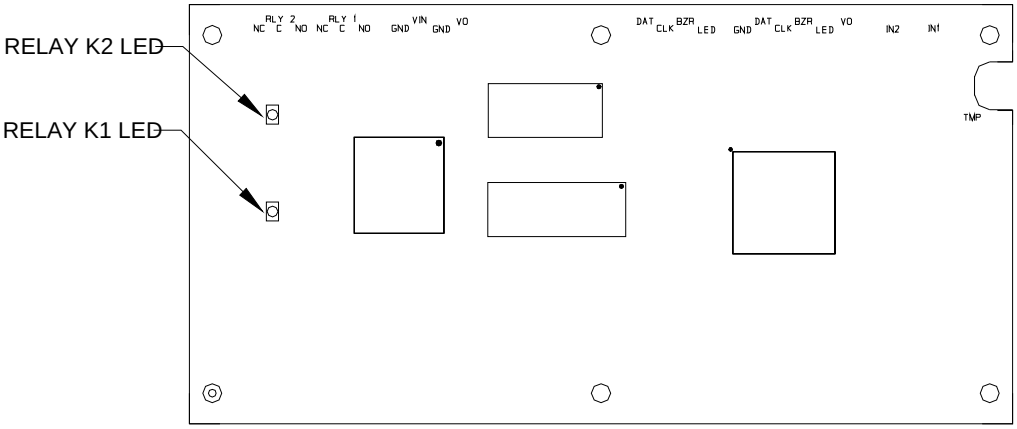
24.1 LNL-2210 Board Components

The board contains the following components: one (1) host Ethernet interface, one (1) power-in input, two (2) unsupervised/supervised inputs, two (2) reader interfaces, two (2) output relays, four (4) DIP switches, seven (7) jumpers, seven (7) status LEDs, and one (1) reset switch.

Note: The intelligent single door controller does not have a real-time clock. Therefore, you will need to synchronize the time for this device whenever there is an extended power loss, or firmware download. This can be accomplished by bringing the panel online with the OnGuard Communication Server. Alternatively, either keep the board powered up when transferring it to or from the communication bus lines or use a different controller such as the LNL-2220 that does have a real-time clock.

The LNL-2210 Board





SOLDER SIDE

24.2 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP address: DHCP
- Communication address: 0. This must match the setting in System Administration for successful communication.
- Host port: IP server, no encryption, port 3001

25 Installation

To install the intelligent single door controller, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.
7. Remove the plastic safety strip from the memory backup battery.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. Your grounding connection must be made at this point. The system should be connected to earth ground at one point and one point only.

25.1 Wiring and Setup

Refer to the following table for wiring and setup of the LNL-2210.

Connections		
TB1-1	IN1	Input 1 (typically door contact)
TB1-2	IN1	
TB1-3	IN2	Input 2 (typically request to exit)
TB1-4	IN2	
TB2-1	VO	Reader 1 Power Output – 12 VDC
TB2-2	LED	Reader 1 LED Output
TB2-3	BZR	Reader 1 Buzzer Output
TB2-4	CLK	Reader 1 CLK/Data 1/TR+
TB2-5	DAT	Reader 1 DAT/Data 0/TR-
TB2-6	GND	Reader 1 Ground
TB3-1	LED	Reader 2 LED Output
TB3-2	BZR	Reader 2 Buzzer Output
TB3-3	CLK	Reader 2 CLK/Data 1/TR+
TB3-4	DAT	Reader 2 DAT/Data 0/TR–
TB4-1	VO	Auxiliary Power Output – 12 VDC
TB4-2	GND	Auxiliary Power Output Ground
TB4-3	VIN	Input Power – 12 VDC (from local power supply)
TB4-4	GND	Input Power Ground
TB5-1	NO	Relay K1 – Normally Open Contact
TB5-2	1-C	Relay K1 – Common Contact
TB5-3	NC	Relay K1 – Normally Closed Contact
TB5-4	NO	Relay K2 – Normally Open Contact
TB5-5	2-C	Relay K2 – Common Contact
TB5-6	NC	Relay K2 – Normally Closed Contact

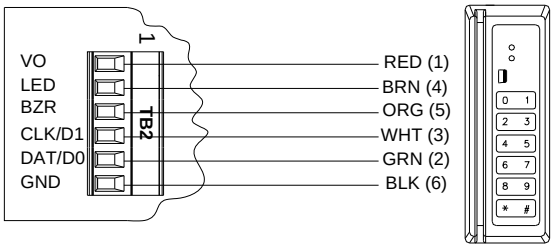
25.1.1 Communication Wiring

The controller communicates to the host via the on-board 10-Base-T/100Base-TX Ethernet interface (port 0).

25.1.2 Reader Wiring

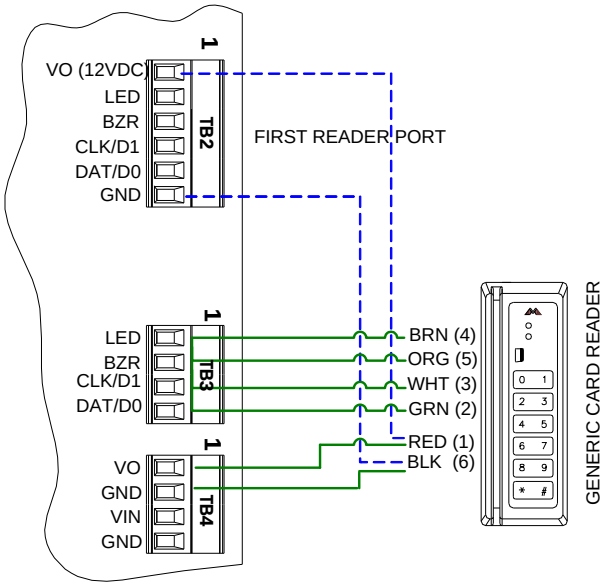
The first reader port supports readers that utilize D1/D0, Clock/Data, or OSDP 2-wire RS-485 electrical signaling. The first reader port can also be used as a 2-wire RS-485 interface which can be used to connect additional I/O boards. The second reader port supports readers that utilize D1/D0, Clock/Data. Power to the first reader is 12 VDC and is current limited to 150mA. The second reader may be powered from the auxiliary power output on TB4-1 and TB4-2. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacturer specifications for cabling requirements. In the 2-wire LED mode, the Buzzer output is used to drive the second LED. Reader port configuration is set via the OnGuard software.

Reader 1 wiring



FIRST READER PORT
DATA1/DATA0 OR CLOCK/DATA

Reader 2 wiring with optional wiring to reader port 1

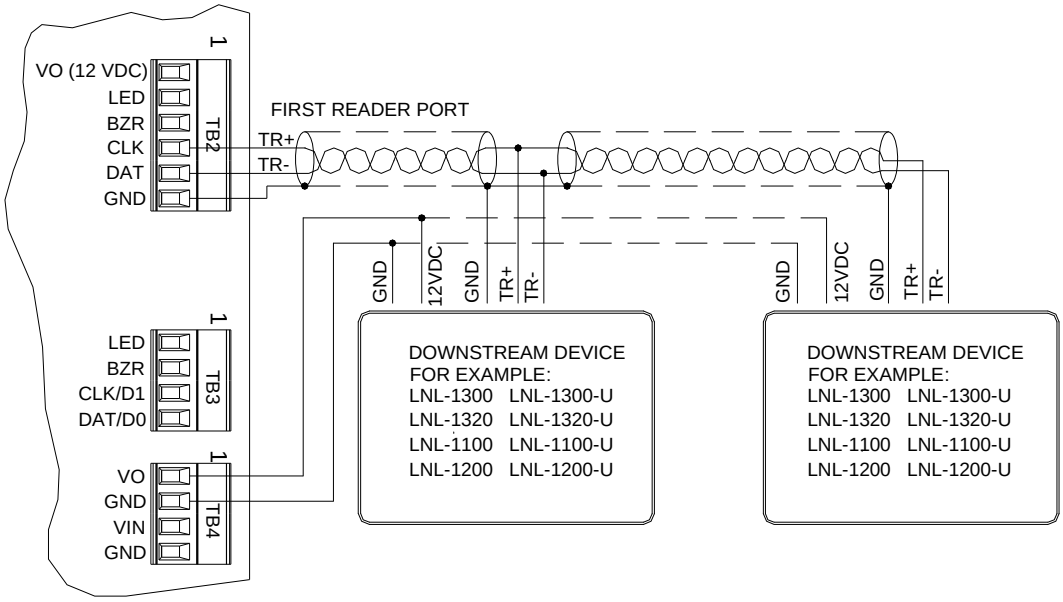


SECOND READER PORT
DATA1/DATA0 OR CLOCK/DATA

Note: For configurations with two on-board readers, the power and ground may be wired to reader port 1.

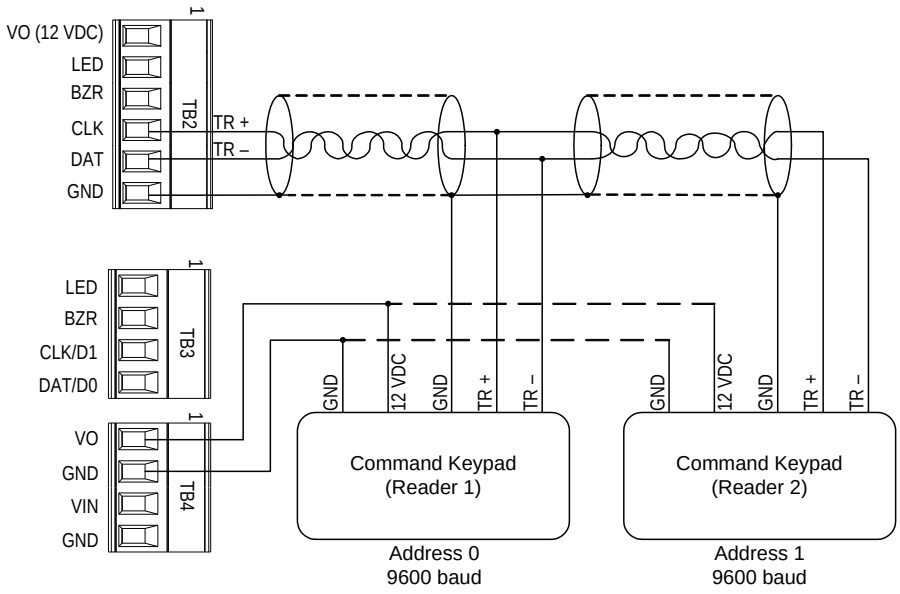
Important: If the power requirements exceed the power output limit of either reader port, an external power supply should be used.

Reader 1 - Downstream devices (RS-485)



Terminate only the first and last module of the RS-485 multi-drop communication bus. Each downstream device must be configured with a unique communication address. A maximum of eight (8) downstream devices may be connected to reader port 1.

Reader 1 - OSDP protocol devices (RS-485)



Terminate only the first and last module on the RS-485 multi-drop communication bus. Each OSDP device must be configured with a unique communication address. The LNL-2210 supports one (1) OSDP device on reader port 1.

The LNL-2210 Single Door Controller supports either of the following configurations:

- Up to two (2) on-board readers
- Up to eight (8) downstream (RS-485) boards (reader interface modules and/or input/output panels) and up to 16 off-board readers if eight (8) LNL-1320 boards are configured.
  - Reader port 1 supports up to eight (8) 2-wire RS-485 downstream devices. If this configuration is used, reader port 2 may be used to support one (1) on-board reader.
  - Reader port 1 can also support one 2-wire RS-485 device using OSDP protocol.

Important: When powering any remote device(s) by the LNL-2210 SDC, care must be taken not to exceed the maximum current available. Cable gauge must also be evaluated. See the specifications section for details.

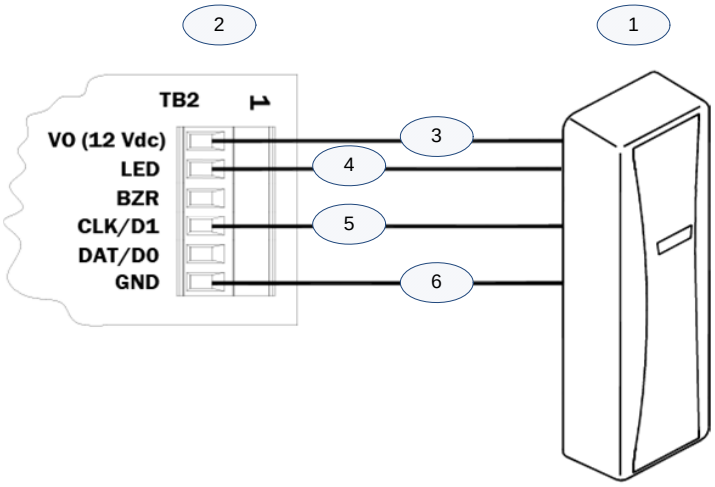
25.1.3 F/2F Protocol

The LNL-2210 accepts data from readers with unsupervised F/2F and supervised F/2F signaling and door hardware. Supervised F/2F is available for Onboard readers 1 and 2 connected to LNL-2210 modules with firmware version 1.196 or later.

Typical Unsupervised F/2F Reader

When the "F/2F Format" **Output** type is configured in System Administration, then door monitor contact and REX are terminated on the LNL-2210 inputs. See the reader manufacturer documentation for the proper connection terminals. End-Of-Line (EOL) resistors are not required.

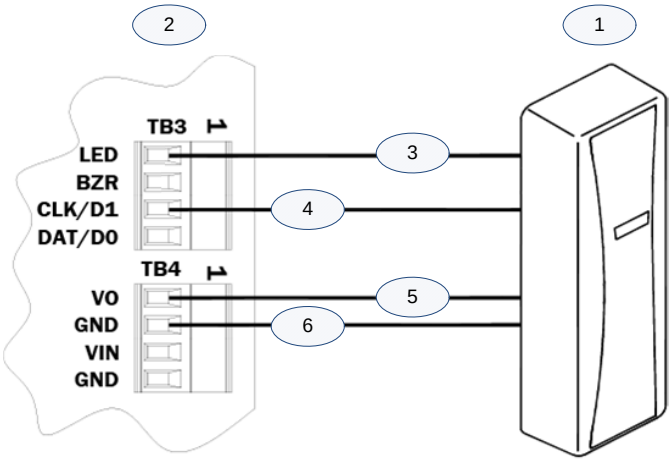
Unsupervised F/2F Wiring (Reader Port 1)



Unsupervised F/2F Wiring (Reader Port 1) Callouts

Callout	Description
1	Unsupervised F/2F reader
2	TB2 on LNL-2210
3	TB2-1: +12 VDC connections
4	TB2-2: LED terminal to Reader DO (GREEN LED) connection
5	TB2-4: Reader Data 1 connection
6	TB2-6: Ground connection

Unsupervised F/2F Wiring (Reader Port 2)



Unsupervised F/2F Wiring (Reader Port 2) Callouts

Callout	Description
1	Unsupervised F/2F reader
2	TB3 and TB4 on LNL-2210
3	TB3-1: LED terminal to Reader DO (GREEN LED) connection
4	TB3-3: Reader Data 1 connection
5	TB4-1: +12 VDC connections
6	TB4-2: Ground connection

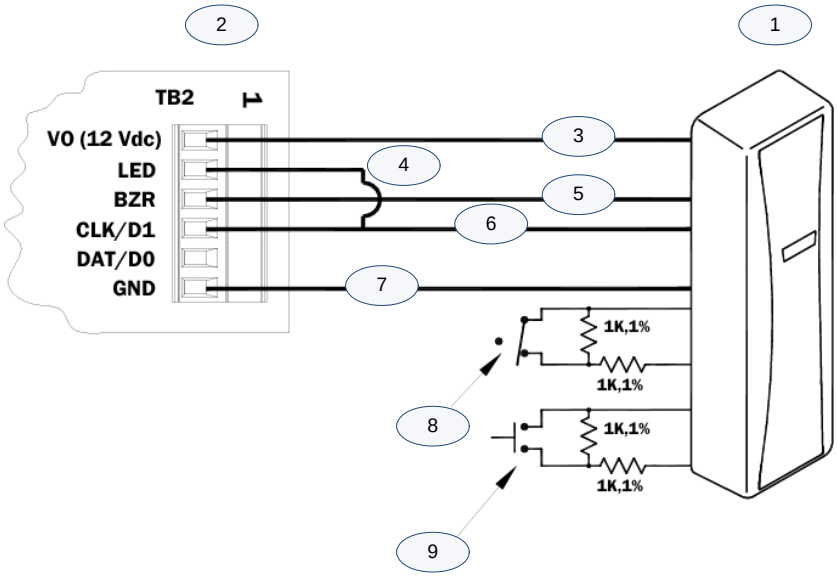
Typical Supervised F/2F Reader Edge Inputs

Inputs for the door position monitor and REX switches are wired directly to the F/2F reader, and can be configured for either 2-State or 4-State Supervision: open, closed, short, and cut. See the reader manufacturer documentation for the proper connection terminals. EOL resistors typically require two 1K ohm resistors as shown in the 4-State example. Install the EOL resistors as close to the switch as possible.

When the "Supervised F/2F Remote Inputs" **Output** type is configured in System Administration, then door contact and REX are sent to the reader device (e.g. T 500).

Note: Because the LNL-2210 is a single door interface, Reader Port 1 supports both Reader Edge and Board Edge connections. Reader Port 2 supports supervised F/2F but maps to the Reader Port 1 door controls.

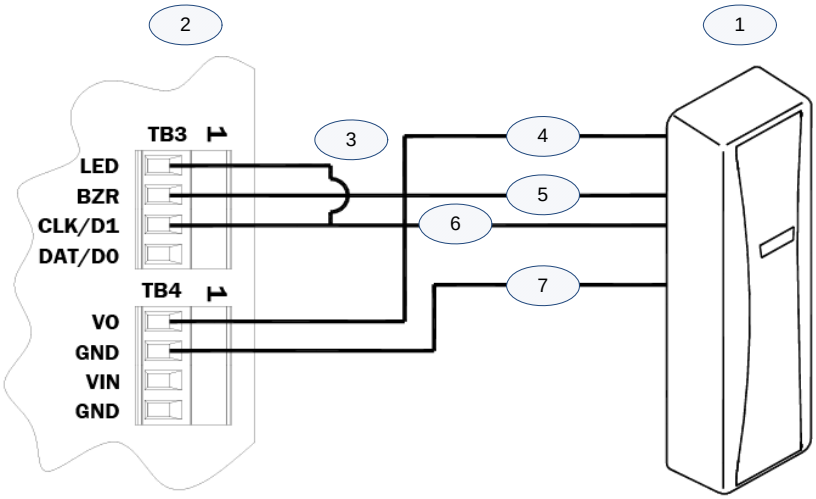
Supervised 4-State F/2F Reader Edge Wiring (Reader Port 1)



Supervised 4-State F/2F Reader Edge Wiring (Reader Port 1) Callouts

Callout	Description
1	Supervised F/2F reader
2	TB2 on LNL-2210
3	TB2-1: +12 VDC connections
4	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
5	TB2-3: Buzzer terminal to Reader DO (GREEN LED) connection
6	TB2-4: Reader Data 1 connection
7	TB2-6: Ground connection
8	Normally Closed contact for door monitor switch
9	Normally Open contact for REX switch

Supervised F/2F Wiring (Reader Port 2)



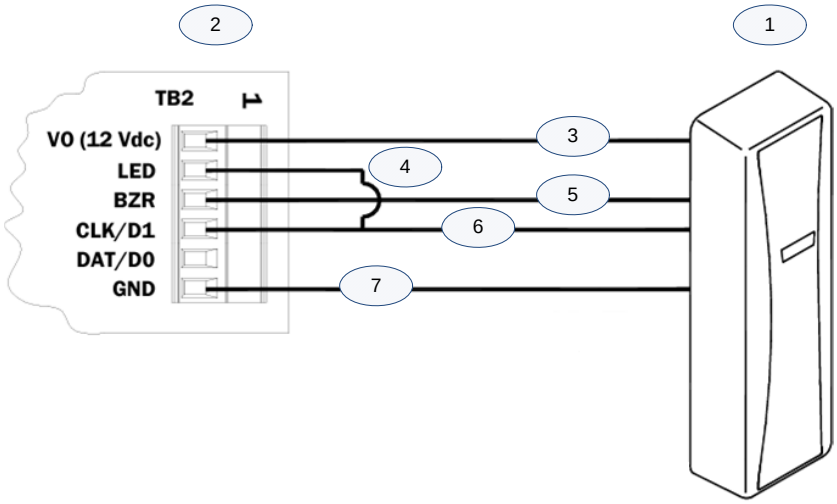
Supervised F/2F Wiring (Reader Port 2) Callouts

Callout	Description
1	Supervised F/2F reader
2	TB3 and TB4 on LNL-2210
3	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
4	TB4-1: +12 VDC connections
5	TB3-2: Buzzer terminal to Reader DO (GREEN LED) connection
6	TB3-3: Reader Data 1 connection
7	TB4-2: Ground connection

Typical Supervised F/2F Board Edge Inputs

When the "Supervised F/2F Board Edge Inputs" **Output** type is configured in System Administration, then door contact and REX are terminated on the LNL-2210 inputs.

Supervised Board Edge Wiring (Reader Port 1)



Supervised Board Edge Wiring (Reader Port 1) Callouts

Callout	Description
1	Unsupervised F/2F reader
2	TB2 on LNL-2210
3	TB2-1: +12 VDC connections
4	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
5	TB2-3: Buzzer terminal to Reader DO (GREEN LED) connection
6	TB2-4: Reader Data 1 connection Door
7	TB2-6: Ground connection

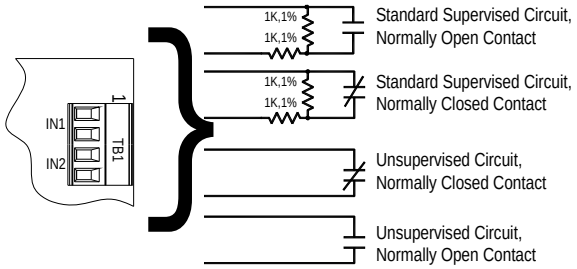
25.1.4 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states.

When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded*, and foreign voltage*. A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K Ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical:

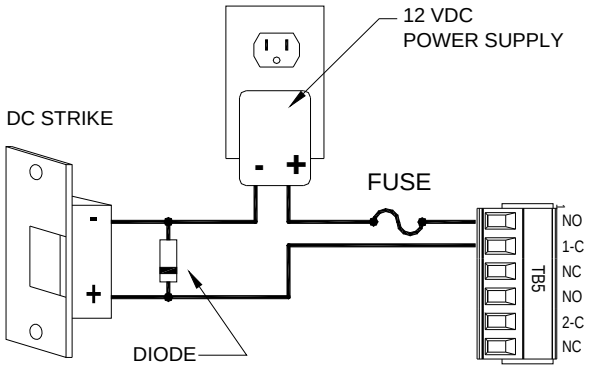


25.1.5 Relay Circuit Wiring

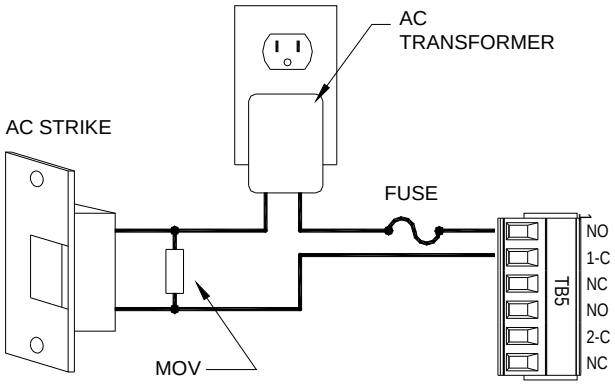
Two (2) relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 2A @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

Inductive door locking devices may induce relay contact arcing as the contact opens that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

Note: Do not program the relays to activate (switched ON state) by default at power up.



- **Diode Selection:** Diode current rating: 1x strike current. Diode breakdown voltage 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



- **MOV Selection:** Clamp voltage: 1.5x VAC RMS. For 24 VAC strike, Panasonic ERZ-C07DK470 typical.

25.1.6 Power

Note: UL certified power supplies are described in section UL/ULC Certified Installations on page 50.

The LNL-2210 is powered in one of two ways:

- Power can be supplied via Ethernet connection using PoE, fully compliant to IEEE 802.3af.

Note: Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.

- Or power can be supplied by a local UL 294 or UL 603 Listed power supply, or the LNL-AL400ULX or LNL-AL600ULX-4CB6 Power Supply/Charger (12 VDC). Connect power with a minimum of 18 AWG wire at TB4-3 and TB4-4.

25.2 Memory Backup Battery

The SRAM is backed up by a rechargeable battery when input power is removed. This battery should retain the data for about 2 weeks. If data in the SRAM is determined to be corrupt after power up, all data, including flash memory, is considered invalid and is erased All configuration data must be redownloaded.

Note: The initial charge of the battery may take up to 24 hours to be fully charged.

CAUTION There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

PRÉCAUTION Il existe un risque d'explosion si la batterie/pile est mal remplacée. Ne remplacer que par un type identique ou équivalent recommandé par le fabricant. Jeter les batteries/piles selon les instructions du fabricant.

25.3 Dip Switches

The DIP switches configure the operating mode of the processor. DIP switches are read on power-up except where noted.

Press switch S2 to reset the board.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information, refer to Secure Access to Controller Web Page Configuration on page 65.
OFF	ON	X	OFF	Use factory default communication parameters.
ON	ON	X	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 216.
ON	ON	X	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 216.
X	X	ON	X	Disables the TLS secure link. The switch is read when logging on only.

25.4 Jumpers

The following chart describes each jumper.

Jumpers	Set at	Description
J1	n/a	Factory use only
J2	n/a	Factory use only
J3	PoE	The board is powered from the Ethernet connection.
	12V	The board is powered from an external 12 VDC power source connected to TB4-3 (VIN), TB4-4 (GND).
J4	n/a	Factory use only
J5	n/a	Factory use only
J6	n/a	10Base-T/100Base-Tx Ethernet Connection (Port 0)
J7		Cabinet Tamper: normally open switch

25.5 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-2210 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

25.5.1 Bulk Erase Steps

Important: Do not remove power during steps 1-8.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-2210 board. LED 1 on for about 15 seconds while LNL-2210 boots up.
3. After the LNL-2210 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-2210 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased.
6. Full memory erase takes up to 60 seconds, usually a lot less.
7. When complete, only LEDs 1 & 4 will flash for about 3 seconds.
8. The LNL-2210 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

25.6 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-2210 can be configured through the web interface.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website security certificate. Although it is not recommended, proceed to the website.

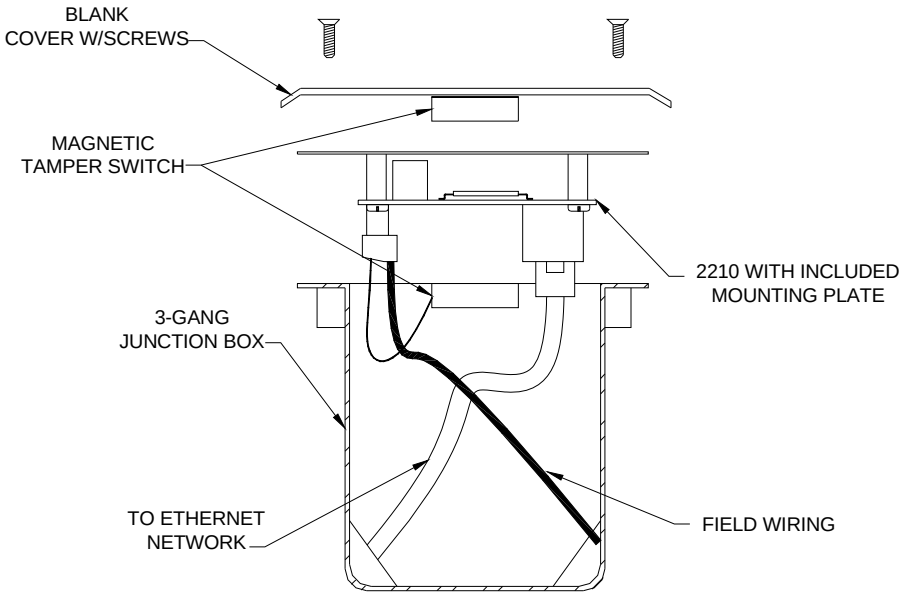
For information about the Configuration Web Page, refer to Controller Web Page Configuration on page 65.

25.7 Additional Mounting Information

Sources for the items shown below:

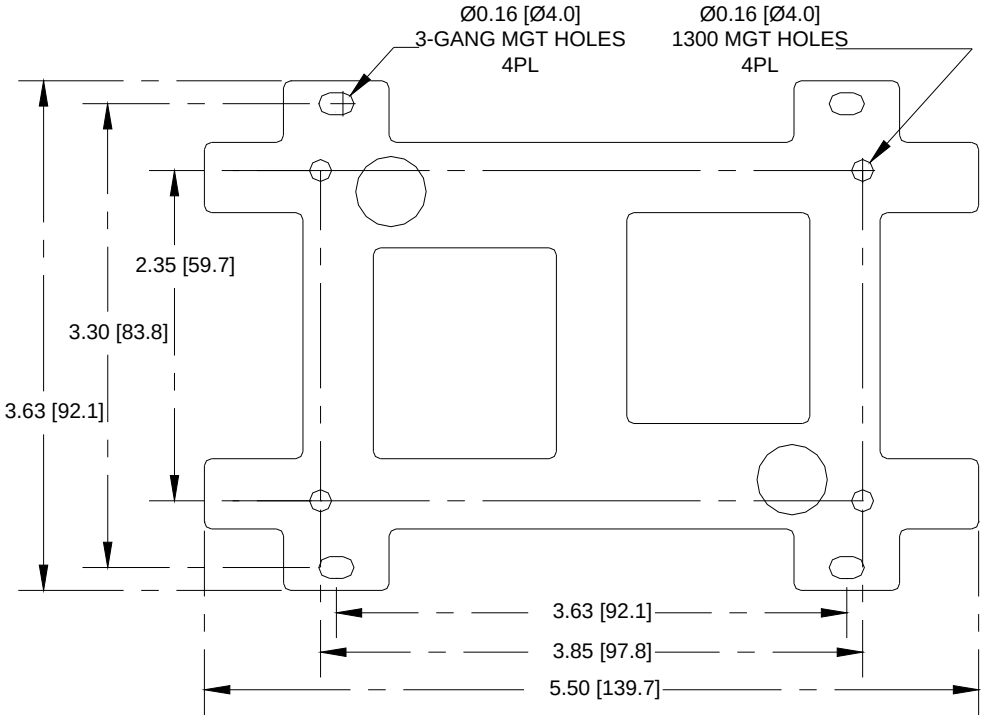
- 3-gang stainless steel blank cover: Leviton part number 84033-40. Available from Graybar, part number 88158404
- Magnetic switch set: G.R.I. part number: 505

Side view



Note: The controller mounting plate requires a separate grounding conductor because the plate does not make positive contact with the earth-grounded main enclosure (J-Box).

Mounting plate dimensions



26 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

26.1 Status LEDs

The board contains seven status LEDs that can be used to verify correct installation after power up.

Power-up: All LEDs OFF.

Initialization: LEDs 1 through 7 are sequenced during initialization. LEDs 1, 3, and 4 are turned ON for approximately four seconds after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 3 seconds without a card database. Each 10,000 cards will add about 3 seconds to the application initialization.

> **Important:** When LEDs 1 through 4 flash at the same time, data is being read from or written to flash memory - do not cycle power when in this state.

If the sequence stops or repeats, perform the Bulk Erase Configuration Memory procedure. If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

Running: After initialization is complete, the LEDs have the following meanings: At power up, LEDs 2 through 7 are turned ON then OFF in sequence.

LED	Description
1	Off-line/On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host communication activity
3	Readers (Combined) Reader 1: Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data
4	Input IN1 Status: OFF = Inactive, ON = Active, Flash = Trouble
5	Input IN2 Status: OFF = Inactive, ON = Active, Flash = Trouble
6	Cabinet tamper
7	Not used
YEL	Ethernet Speed: Off = 10Mb/S, ON = 100Mb/S
GRN	Off = no link, ON = good link, Flashing = Ethernet activity

When the controller is reading the database, LEDs 1 through 4 will simultaneously flash once every two seconds. When the controller is saving the card database, LEDs 1 through 4 will simultaneously flash in a

progressively faster pattern until completion. The final pattern may be so fast that it is hard to distinguish from constant on. Saving large databases can take several seconds.

The LED patterns used for Heartbeat, Host communication, and downstream communication will be suspended during the save/restore and will return to normal once the save/restore is complete.

27 Specifications

The interface is for use in low voltage, Class 2 circuits only, and it is for use with UL Listed access control or burglar alarm power limited power supplies. The installation of this device must comply with all local fire and electrical codes.

- Power Input:
  - PoE power input 12.95W, compliant to IEEE 802.3af or
  - 12 VDC ± 10%, 900 mA maximum
- Power Output (thermally protected)
  - Reader port 1:12 VDC @ 150 mA
  - Reader port 2: use AUX power port
  - AUX power port: used to power reader 2 and/or strike, not to exceed 650 mA
- SRAM Backup Battery: rechargeable battery (Panasonic part number ML920S) with battery life up to 10 years to be replaced by authorized service personnel only.

Note: There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

- Host communication: Ethernet: 10Base-T/100Base-TX
- Inputs: 2 supervised, programmable end of line resistors, 1k/2k – ohm, 1% 1/4W watt standard, and dedicated tamper input.
- Relays: 2 outputs, Form-C contacts: 2A @ 30 VDC
- Reader interface:
  - Reader power: 12 VDC ± 10% or a local UL 294 or UL 603 Listed power supply, or the LNL-AL400ULX or LNL-AL600ULX-4CB6 Power Supply/Charger (12 VDC). (PTC limited 150 mA max)
  - Reader data inputs: Two TTL reader ports
  - RS-485 mode: 9600 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
  - LED output: TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink maximum.
  - Buzzer output: Open collector, 5 VDC open circuit maximum, 10 mA sink maximum.
- Cable requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - Ethernet: CAT 5 (minimum)
  - RS-485: 24 AWG stranded twisted pair(s) with an overall shield, 4,000 feet (1200 m) maximum
  - Alarm Input: 1 stranded twisted pair per input, 30 ohm maximum loop resistance.
  - Reader data (TTL): 18 AWG stranded, 6 conductors, 500 feet (150 m) maximum
  - RS-485 (Port 1 as I/O devices ports): 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet (1219 m) maximum

  - RS-485 (Port 1 as reader port): 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 2000 feet (609.6 m) maximum

- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F), Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimensions: 5.5 x 2.75 x 0.96 in. (140 x 70 x 24 mm)
  - Weight: 3.8 oz. (106.35 g) nominal, board only, 4.7 oz. (133.28 g) with bracket
- Certifications:
  - UL 294
  - FCC Part 15
  - CE marking
  - RoHS compliant
  - WEEE

These specifications are subject to change without notice.

27.1 UL Listed Installations

- PoE is only for use with Access control-only installations and not for use with burglar installations.
- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.

For UL installations, the following must be observed:

- For UL, the Power Sourcing Equipment (PSE) such as a PoE enabled network switch and/or PoE power injectors must be UL Listed under UL 294.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.
- This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.
- Category 5e cabling is the minimum performance category recommended.
- The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG (0.13 mm^2) for patch cords; 24 AWG (0.21 mm^2) for horizontal or riser cable.
- Connected through standard eight-pin RJ-45 connectors.
- Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.
- RS-485 is “Not Evaluated by UL” and therefore cannot be used in UL installations.
- Each field-wiring terminal is suitable for single conductor (wire) only.

- Environmental for UL installations:
  Temperature: -10 to +49°C (14 to 120°F) operating
  Humidity: 85+/-5% at 30+/-2°C (86°F)

27.2 Firmware Revision

In Alarm Monitoring, the firmware revision can be displayed in the System Status Tree by selecting **Display Device Firmware Version** from the **Options** menu.

In the Controller Web Page, select **Device Info**. For more information, refer to the Controller Web Page Configuration chapter in the Hardware Installation Guide (DOC-600).

LNL-2220 Intelligent Dual Reader Controller

28 Overview of the LNL-2220

This installation guide is intended for use by technicians who will be installing and maintaining the LNL-2220 Intelligent Dual Reader Controller (IDRC).

The IDRC provides a single board solution to control two doors, or a single door in paired mode. It holds the database for the hardware configuration, and card holder database in nonvolatile memory. The event log buffer is stored in battery backed memory.

Each reader port can accommodate a read head that utilizes Wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling standards, one or two wire LED controls, and buzzer control (one wire LED mode only). Four form-c relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 5A @ 30 VDC, dry contact configuration. Eight supervised inputs are provided for monitoring the door contacts, exit push buttons and alarm contacts. Inputs can be configured to meet Grade A Supervision requirements. The LNL-2220 requires 12-24 VDC for power. It is recommended that the board be mounted 0.25 inch minimum above any conductive surface.

28.1 Interfaces

The IDRC interfaces upstream with the access control software on a host system.

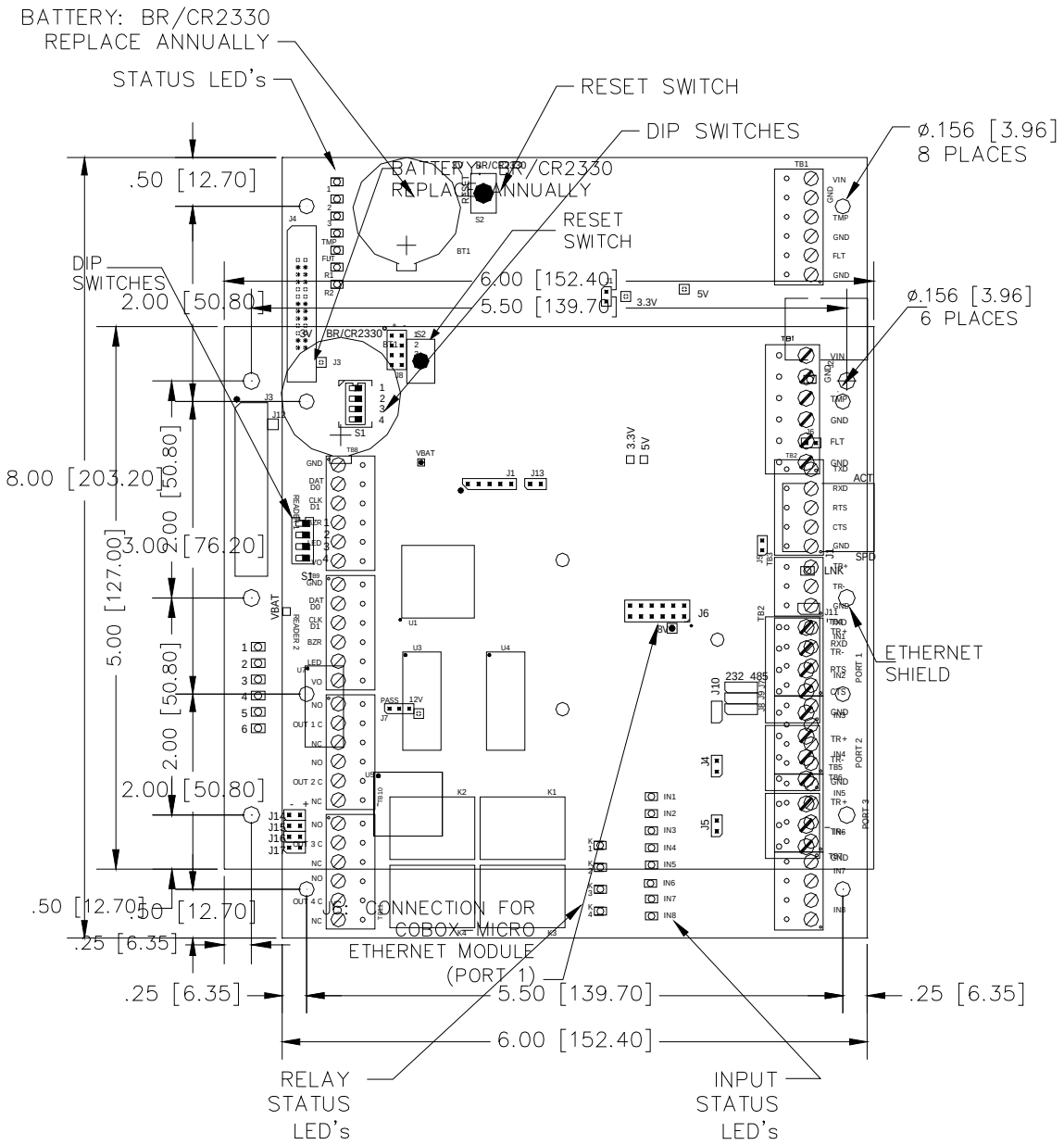
Configuration data and event/status reports are exchanged with the host via port 0, 10BaseT/100BaseTX Ethernet interface or port 1, RS-232 interface. Additional I/O devices are communicated to via the downstream communication port, 2-wire RS-485. It supports 32 downstream devices (16 for reader boards and 16 for alarm panels).

The LNL-2220 has an on-board reader interface device capable of supporting up to two readers. A Bioscrypt reader can be connected directly to the LNL-2220 (this does not count as one of the 16 downstream readers).

28.2 LNL-2220 IDRC Board Components

The IDRC board contains the following components: one (1) host Ethernet interface, one (1) RS-485 interface, one (1) power-in input, two (2) unsupervised alarm inputs, eight (8) unsupervised/supervised inputs, two (2) reader interfaces, four (4) output relays, four (4) DIP switches, and eight (8) jumpers. It also contains a set of 22 status LEDs and one (1) memory backup (3 volt lithium) battery.

The LNL-2220 Board



28.3 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address.
- Device address: 0. This must match the setting in System Administration for successful IP or serial communications
- Primary host port: Ethernet (serial port is disabled)
- Serial port settings: No flow control
- Data security: None
- Baud Rate: 9600
- Login Name: admin
- Login Password: password (The password is case-sensitive.)

29 Installation

To install the IDRC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers, if applicable.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller and wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
7. Remove the plastic safety strip from the memory backup battery.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65) .

29.1 Wiring and Setup

Refer to the following table for wiring and setup of the LNL-2220.

Connection		
TB1	Power input	VIN: 12 to 24 VDC
		GND
	Cabinet tamper input	TMP
		GND
	Power fault input	FLT
		GND
TB2	Host port 1	TXD (RS-232)
		RXD (RS-232)
		RTS (RS-232)
		CTS (RS-232)
		GND (RS-232)
TB3	Downstream port	TR+ (2-wire RS-485)
		TR- (2-wire RS-485)
		GND(2-wire RS-485)
TB4	Input 1	IN 1 Door 1 door contact
	Input 2	IN 2 Door 1 REx
TB5	Input 3	IN 3 Door 1 Aux 1
	Input 4	IN 4 Door 1 Aux 2
TB6	Input 5	IN 5 Door 2 door contact
	Input 6	IN 6 Door 2 REx
TB7	Input 7	IN 7 Door 2 Aux 1
	Input 8	IN 8 Door 2 Aux 2

Connection		
TB8	Reader 1 (current maximum: 150mA)	GND: Ground
		Data/Data 0/RS-485 TR-
		Clock/Data 1/RS-485 TR+
		BZR: Reader buzzer/LED 2
		LED: Reader LED
		VO: Reader power
TB9	Reader 2 (current maximum: 150mA)	GND: Ground
		Data/Data 0/RS-485 TR-
		Clock/Data 1/RS-485 TR+
		BZR: Reader buzzer/LED 2
		LED: Reader LED
		VO: Reader power
TB10	Out 1 Door 1 strike	NO: Normally open contact
		C: Common
		NC: Normally closed contact
	Out 2 Door 1 Aux	NO: Normally open contact
		C: Common
		NC: Normally closed contact
TB11	Out 3 Door 2 strike	NO: Normally open contact
		C: Common
		NC: Normally closed contact
	Out 4 Door 2 Aux	NO: Normally open contact
		C: Common
		NC: Normally closed contact

29.2 Communication Wiring

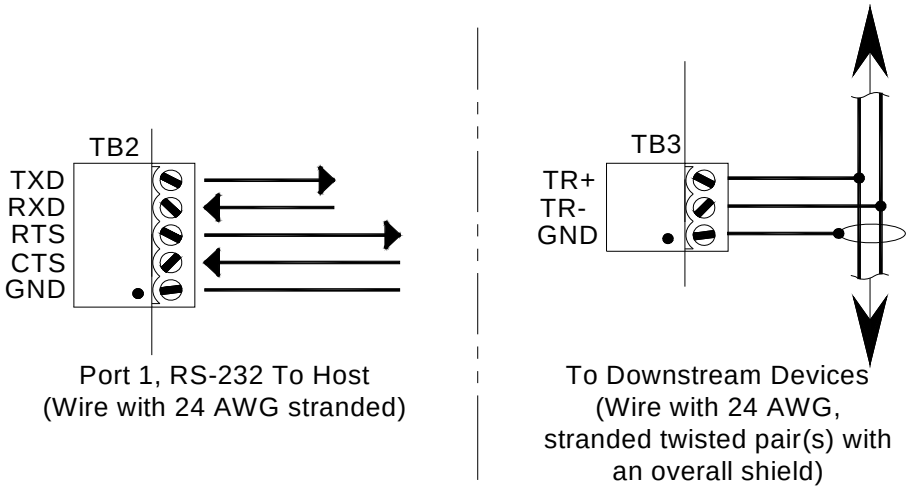
The controller communicates to the host via the onboard 10-BaseT/100Base-TX Ethernet interface (port 0) or RS-232 interface (port 1). The RS-232 interface is for direct one to one connection to a host computer port or via modem, 50 feet maximum.

There are a few options for establishing communication to configure the settings for the first time. For initial configuration prior establishing a LAN connection, a CAT 5 crossover cable can be used to connect directly to a PC. In this scenario, the controller has a static IP address and the web browser-enabled PC is connected directly to the controller using a crossover cable.

The downstream communication port (TB3) is a 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4000 feet (1200 m). Use twisted pairs (minimum 24 AWG) with an overall shield for communication.

Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel!

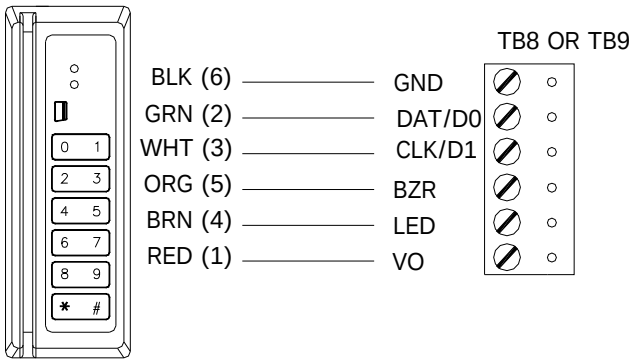
Communication wiring



29.3 Reader Wiring

Each reader port supports Wiegand, magnetic stripe, F/2F, and 2-wire RS-485 electrical interfaces. Voltage at the reader port (VO) is passed-through from the input voltage of the controller (TB1-VIN) and is current limited to 150mA for each reader port. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacturer specifications for cabling requirements. In the 2-wire LED mode the Buzzer output in used to drive the second LED. Reader port configuration is set via the host software.

DATA1/DATA0 – CLOCK/DATA



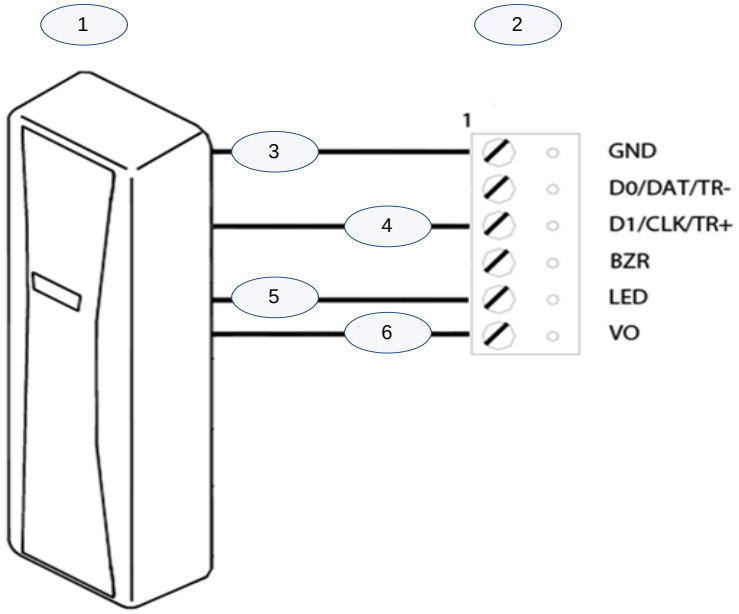
29.3.1 F/2F Protocol

The LNL-2220 accepts data from readers with unsupervised F/2F and supervised F/2F signaling and door hardware. Supervised F/2F is available for Onboard readers 1 and 2 connected to LNL-2220 modules with firmware version 1.196 or later.

Typical Unsupervised F/2F Reader

When the "F/2F Format" **Output** type is configured in System Administration, then door monitor contact and REX are terminated on the LNL-2220 inputs. See the reader manufacturer documentation for the proper connection terminals. End-Of-Line (EOL) resistors are not required.

Unsupervised F/2F Reader Wiring



Unsupervised F/2F Reader Wiring Callouts

Callout	Description
1	Unsupervised F/2F reader
2	TB8 or TB9 on LNL-2220
3	TB8-1: Ground connection
4	TB8-3: Reader Data 1 connection
5	TB8-5: LED terminal to Reader DO (GREEN LED) connection
6	TB8-6: +12 VDC connections

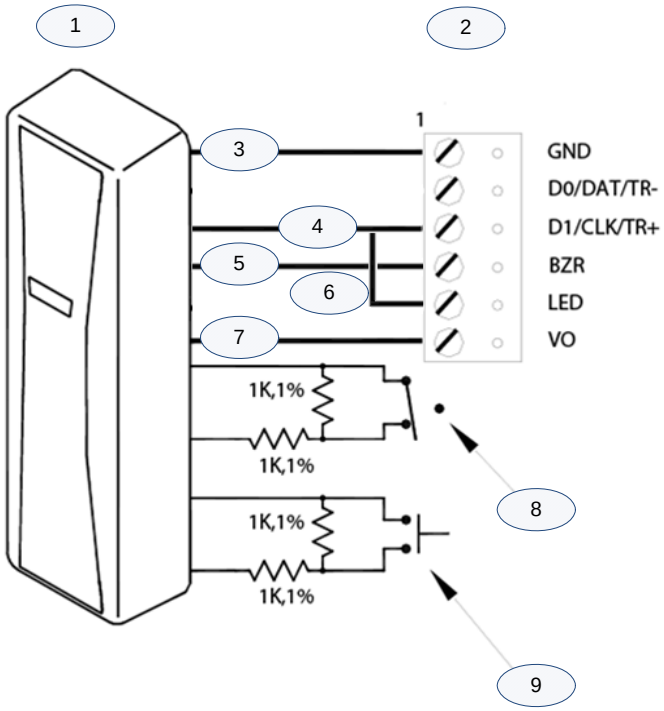
Typical Supervised F/2F Reader Edge Inputs

Inputs for the door position monitor and REX switches are wired directly to the F/2F reader, and can be configured for either 2-State or 4-State Supervision: open, closed, short, and cut. See the reader manufacturer documentation for the proper connection terminals. EOL resistors typically require two 1K ohm resistors as shown in the 4-State example. Install the EOL resistors as close to the switch as possible.

When the "Supervised F/2F Remote Inputs" **Output** type is configured in System Administration, then door contact and REX are sent to the reader device (e.g. T 500).

Note: Supervised F/2F reader edge inputs must be configured for both LNL-2220 Onboard readers. In addition, when using this configuration, Reader 1 aux inputs are wired to input terminals 5/6 and Reader 2 aux inputs are wired to input terminals 7/8.

Supervised 4-State F/2F Reader Edge Wiring



Supervised 4-State F/2F Reader Edge Wiring Callouts

Callout	Description
1	Supervised F/2F reader
2	TB8 or TB9 on LNL-2220
3	TB8-1: Ground connection
4	TB8-3: Reader Data 1 connection
5	TB8-4: Buzzer terminal to Reader DO (GREEN LED connection
6	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.

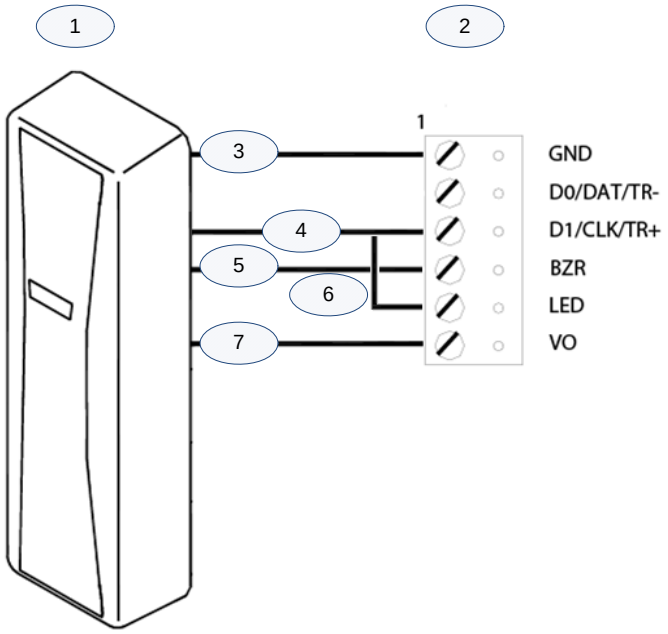
Supervised 4-State F/2F Reader Edge Wiring Callouts

Callout	Description
7	TB8-6: +12 VDC connections
8	Normally Closed contact for door monitor switch
9	Normally Open contact for REX switch

Typical Supervised F/2F Board Edge Inputs

When the "Supervised F/2F Board Edge Inputs" **Output** type is configured in System Administration, then door contact and REX are terminated on the LNL-2220 inputs.

Supervised Board Edge Wiring



Supervised Board Edge Wiring Callouts

Callout	Description
1	Unsupervised F/2F reader
2	TB8 or TB9 on LNL-2220
3	TB8-1: Ground connection
4	TB8-3: Reader Data 1 connection Door
5	TB8-4: Buzzer terminal to Reader DO (GREEN LED) connection
6	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.

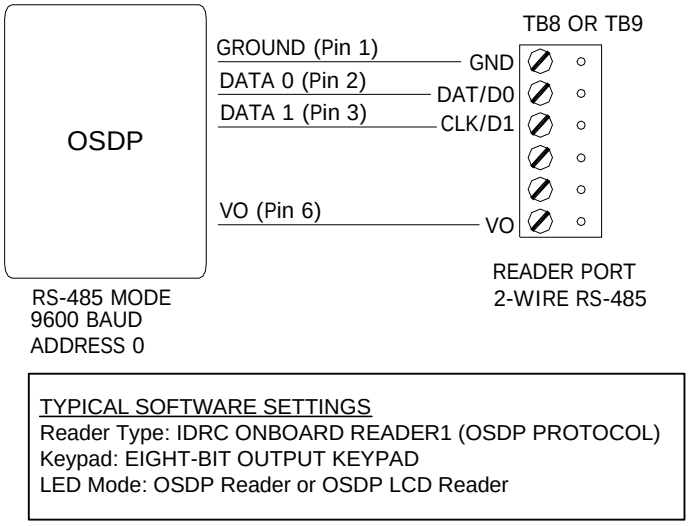
Supervised Board Edge Wiring Callouts

Callout	Description
7	TB8-6: +12 VDC connections

29.3.2 Open Supervised Device Protocol

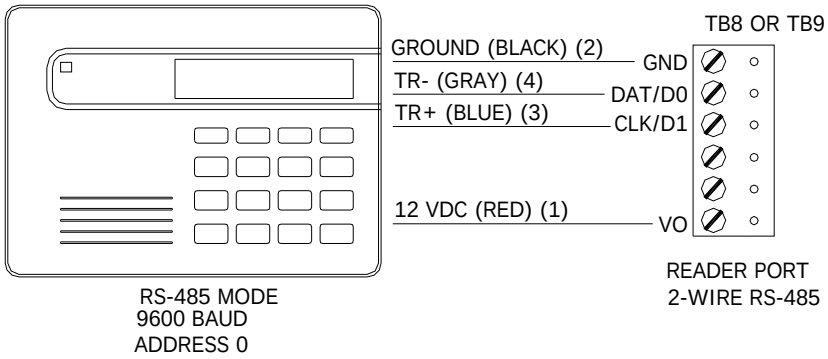
Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control. For OSDP, set the baud rate to 9600 bps.

Wiring for OSDP readers



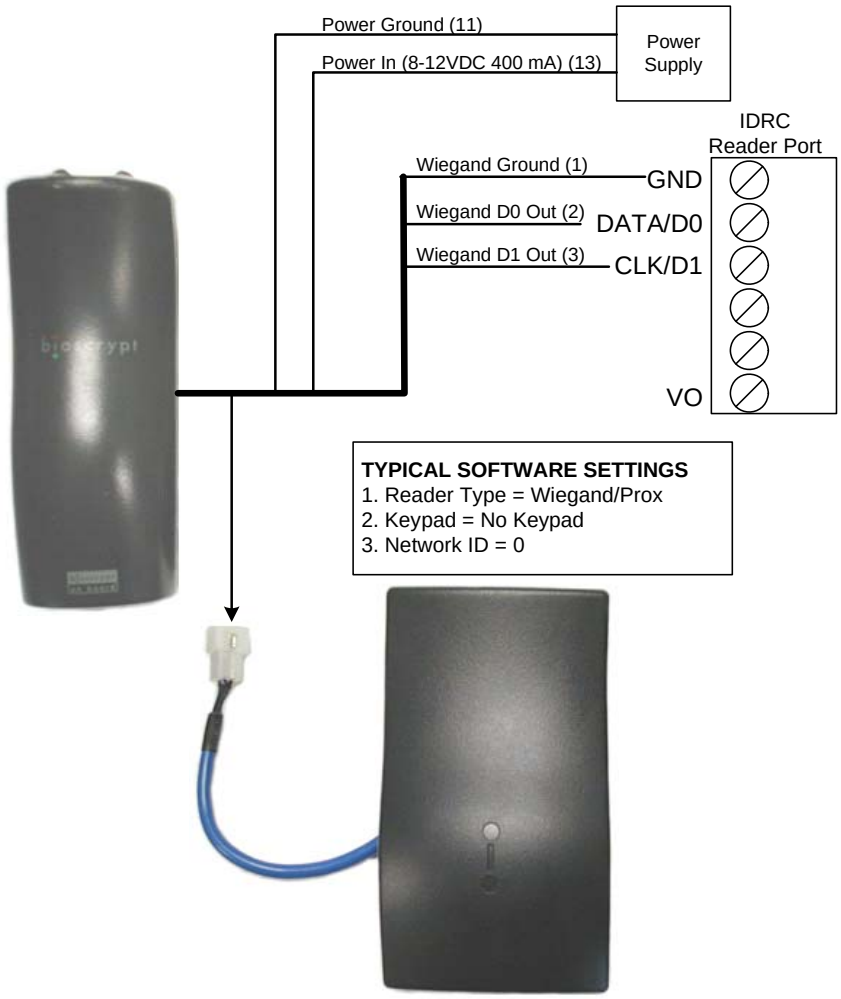
29.3.3 Command Keypad

The command keypad (LNL-CK) can also be connected to the IDRC.



29.3.4 Bioscrypt Readers

The Bioscrypt V-Flex, V-Smart, and V-Station can be connected to the IDRC according to the following diagram.

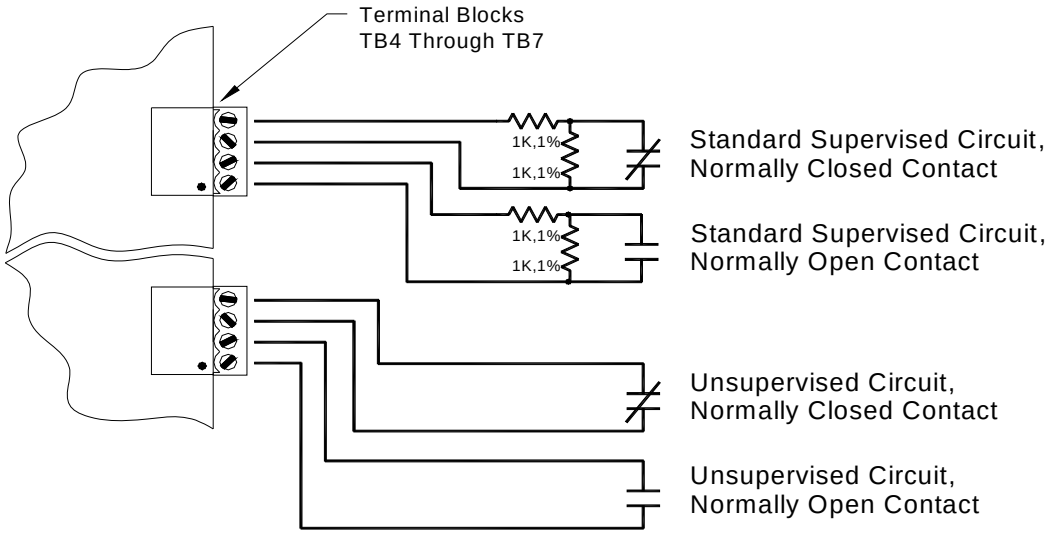


Bioscrypt readers wired to IDRC onboard reader ports 1 and/or 2 should be configured in the Readers form as IDRC Onboard Reader 1/2 (Bioscrypt RS-485) alternate readers associated with any type of primary readers. Bioscrypt readers wired to IDRC Onboard Reader ports 1 and/or 2 should be configured in the VeriAdmin Unit Parameters form for Network ID (0) only.

29.4 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded, and foreign voltage. This implementation exceeds the UL 294 Requirement for Grade A Supervision.

A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K Ohm, 1% resistors and should be located as close to the sensor as possible. Custom EOL resistances may be configured via the host software.



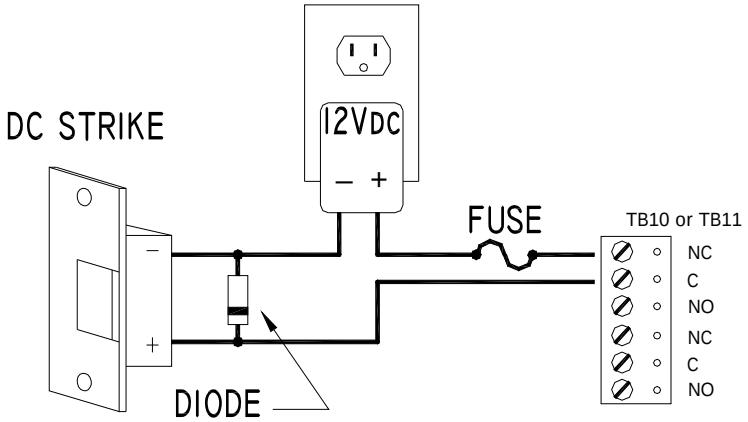
Wire with 22 AWG stranded twisted pair.

29.5 Relay Circuit Wiring

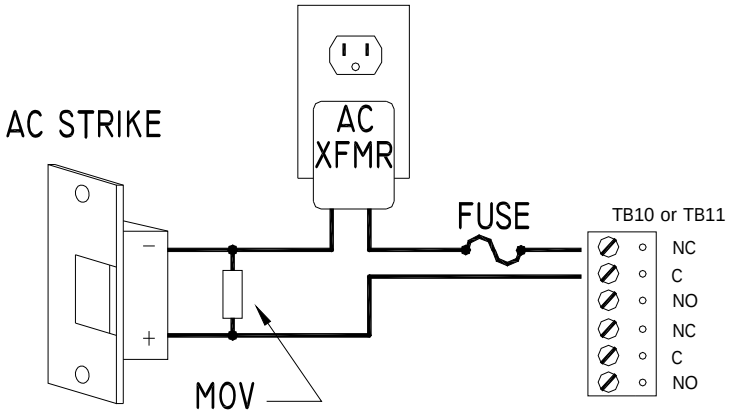
Four relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 5A @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay.

Wire should be of sufficient gauge to avoid voltage loss.



• **Diode Selection:** Diode current rating: 1x strike current. Diode breakdown voltage 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



• **MOV Selection:** Clamp voltage: 1.5x VAC RMS. For 24 VAC strike, Panasonic ERZC07DK470 typical.

29.5.1 Power and Alarm Inputs

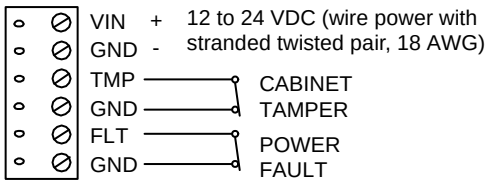
The LNL-2220 requires 12-24 VDC power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire.

Note: Connect the GND signal to earth ground in ONE LOCATION within the system! Multiple earth ground connections may cause ground loop problems and is not advised.

Observe POLARITY on 12-24 VDC input!

There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

Wiring for power, power fault, and cabinet tampering



29.6 Memory Backup Battery

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, event memory is protected.

29.7 Dip Switches

The DIP switches configure the operating mode of the processor. DIP switches are read on power-up except where noted.

Press switch S2 to reset the board.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information, refer to Secure Access to Controller Web Page Configuration on page 65.
OFF	ON	X	OFF	Use factory default communication parameters.
ON	ON	X	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 237.
ON	ON	X	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 237.
X	X	ON	X	Disables the TLS secure link. The switch is read when logging on only. **Note:** Not used on the LNL-4420 or the LNL-X series controllers because TLS is always enabled.

The controller can be reset to its factory default state. For more information, refer to Bulk Erase Configuration Memory on page 237.

29.8 Jumpers

The following chart describes each jumper.

Jumpers	Set at	Description
J1	n/a	Factory use only
J2	n/a	10base-T/100base-Tx Ethernet Connection (Port 0)
J3	n/a	Factory use only
J4	n/a	Factory use only
J5	off	Port 2 RS-485 EOL terminator is off.
	ON	Port 2 RS-485 terminator is ON.
J6	n/a	Factory use only
J7	Reader power select * See Note 1 *	
	12V	12 VDC at reader ports
	PASS	VIN pass through to reader ports

Jumpers	Set at	Description
J8-1	n/a	Remote status LED #1 ** See Note 2 **
J8-2	n/a	Remote status LED #2 ** See Note 2 **
J8-3	n/a	Remote status LED #3 ** See Note 2 **
J8-4	n/a	Remote status LED #4 ** See Note 2 **

* Note 1: The input power (VIN) must be 20 VDC minimum if the 12 VDC selection is to be used.

** Note 2: Observe POLARITY connection to LED. External current limiting is not required.

29.9 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-2220 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

29.9.1 Bulk Erase Steps

Important: Do not remove power during steps 1-8.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-2220 board. LED 1 on for about 15 seconds while LNL-2220 boots up.
3. After the LNL-2220 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-2220 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased.
6. Full memory erase takes up to 60 seconds, usually a lot less.
7. When complete, only LEDs 1 & 4 will flash for about 3 seconds.
8. The LNL-2220 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

29.10 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-2220 can be configured through the web interface.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website security certificate. Although it is not recommended, proceed to the website.

For information about the Configuration Web Page, refer to Controller Web Page Configuration on page 65.

30 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

30.1 Status LEDs

The IDRC board contains 22 status LEDs that can be used to verify correct installation after power up.

Power-up: All LEDs OFF.

Initialization: LEDs are sequenced during initialization.

The following chart describes the purpose of each LED on the IDRC board.

Initialization:

LED 1	LED 2	LED 3	LED 4	LED 5	Purpose
ON	off	off	off	off	Basic processor initialization
ON	ON	off	off	off	Internal SRAM test
ON	off	ON	off	off	External flash test
ON	ON	ON	off	off	External SDRAM, first chip test
ON	off	off	ON	off	External SDRAM, second chip test
ON	ON	off	ON	off	External SRAM test
ON	off	ON	ON	off	External EEPROM test
ON	ON	ON	ON	off	External RTC test
ON	off	off	off	ON	Backup battery ABD reset circuit test
ON	ON	off	off	ON	UART test
ON	off	ON	off	ON	Ethernet interface, MII

Run time:

LED	Description
1	Off-line/On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low

Run time:

LED	Description
2	Primary host communication activity (serial port 1)
3	Internal downstream communication activity
TMP	External downstream communication activity
FLT	Undefined
R1	Reader 1: Clock/Data or D1/D0 mode = flashes when data is received, either input. RS-485 mode = flashes when transmitting data
R2	Reader 2: Clock/Data or D1/D0 mode = flashes when data is received, either input. RS-485 mode = flashes when transmitting data
D16	Flashes with host communication (Ethernet port 0)
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	Off = no link, ON = good link, Flashing = Ethernet activity
IN1 - IN8	Input IN1 Status: Off = Inactive, ON = Active, Flash = Trouble. Note: If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds; otherwise, the LED is Off.
K1	Reader 1 Strike
K2	Reader 1 Aux output 1
K3	Reader 2 Strike
K4	Reader 2 Aux output 1

When the controller is reading the database, LEDs 1 through 4 will simultaneously flash once every two seconds. When the controller is saving the card database, LEDs 1 through 4 will simultaneously flash in a progressively faster pattern until completion. The final pattern may be so fast that it is hard to distinguish from constant on. Saving large databases can take several seconds.

The LED patterns used for Heartbeat, Host communication, and downstream communication will be suspended during the save/restore and will return to normal once the save/restore is complete.

30.2 Replace Memory Backup Battery

The event log buffer and the real time clock are backed up by a 3V lithium battery. Without power being applied to the LNL-2220, the battery will retain events and transactions for 3 months.

This battery should be replaced annually to insure that proper backup functionally is maintained. Remove the insulator from the battery holder after installation. Battery type: Rayovac BR2325 or Wuhan Lixing CR2330.

31 Specifications

The IDRC is for use with UL Listed access control power limited power supplies.

- Primary Power: 12 to 24 VDC ±10%, 500mA maximum (plus reader current)
  - 12 VDC @ 250mA (plus reader current) nominal
  - 24 VDC @ 150mA (plus reader current) nominal
- Memory and Clock Backup: 3V Lithium, Rayovac BR2325 or Wuhan Lixing CR2330
- Host communication: Ethernet: 10BaseT/100Base-TX, and RS-232 9600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
- Downstream communication: 2-wire RS-485, 2400-38400 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
- Inputs:
  - 2 unsupervised, dedicated for tamper and UPS fault monitoring
  - 8 unsupervised/supervised, standard EOL: 1k/1k ohm. Four custom EOL's are available (host software dependent).
- Relays: Four, Form-C, 5A @ 30 VDC, resistive
- Reader interface:
  - Reader power (jumper selectable): 12 VDC ±10% regulated, current limited to 150mA for each reader or 12 to 24 VDC ±10% (input voltage passed through) current limited to 150mA for each reader.
  - Data inputs: TTL compatible inputs, mag stripe and Wiegand standards supported
  - RS-485 mode: 9600 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
  - LED output: TTL levels, high > 3V, low < 0.5 V, 5mA source/sink max.
  - Buzzer output: TTL levels, high > 3V, low < 0.5 V, low=active, 5mA source/sink max.
- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - Ethernet: CAT 5
  - RS-485 (I/O device ports): 24 AWG stranded twisted pair(s) with an overall shield, 4000 feet (1219 m) maximum
  - RS-485 (Reader port): 24 AWG stranded twisted pair(s) with an overall shield, 2000 feet (609.6 m) maximum
  - RS-232: 24 AWG stranded, 50 feet (15.24 m) maximum
  - Alarm Input: stranded twisted pair, 30 ohms maximum, typically 22 AWG @ 1000 feet (300 m)
- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F), Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimensions: 8 x 6 x 1 in. (203.2 x 152.4 x 25 mm)
  - Weight: 9 oz. (255 g) nominal, board only
- Certifications:
  - UL 294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - FIPS 197 Certificate #766
  - CE marking
  - RoHS compliant

- WEEE

Note: These specifications are subject to change without notice.

LNL-3300 Intelligent System Controller

32 Overview of the LNL-3300

This installation guide is intended for use by technicians who will be installing and maintaining the Intelligent System Controller.

The LNL-3300 provides the real time processing for the I/O interfaces connected to it. The database for the subsystem configuration and card holders are stored in flash memory. The event log buffer is stored in battery-backed memory. Configuration data and event/status reports are communicated to the host via onboard 10BaseT/100BaseTX Ethernet port or port 1.

32.1 Interfaces

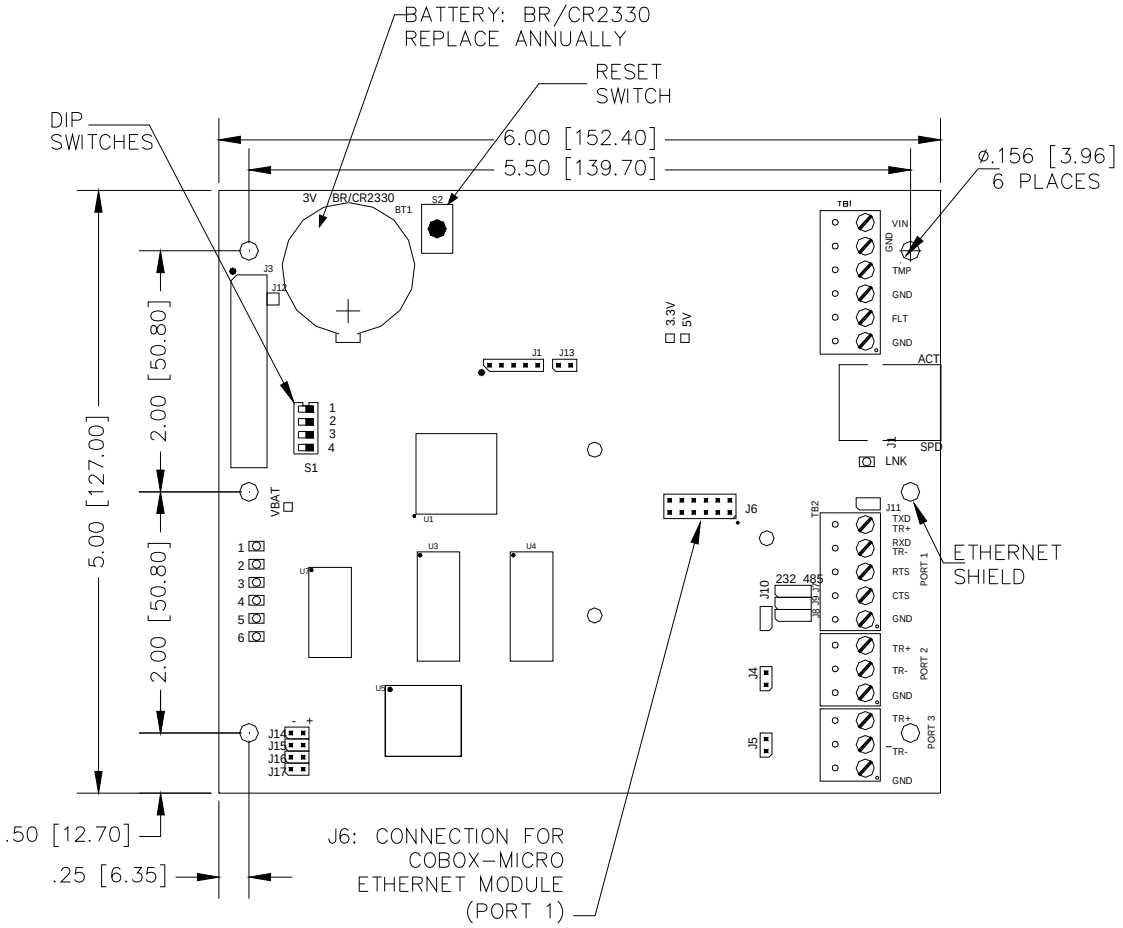
The ISC interfaces upstream with the access control software on a host system. This communication occurs through an onboard 10BaseT/100BaseTX Ethernet port or port 1. Port 1 may be set up as RS-232, 2-wire RS-485 or an optional 10BaseT/100BaseTX using a Lantronix CoBox-Micro interface daughter board. Dual path communication from the host to the controller may be set up via RS-232, RS-485, Ethernet, dial-up, etc.

Downstream devices are connected via ports 2 and 3 using 2-wire RS-485.

32.2 LNL-3300 ISC Board Components

The ISC board contains the following components: two (2) unsupervised alarm inputs, one (1) host Ethernet interface, one (1) RS-232 or RS-485 interface, two (2) RS-485 interfaces (2-wire), one (1) power-in input, four (4) DIP switches, and sixteen (16) jumpers. It also contains a set of six (6) status LEDs and one (1) memory backup (3 volt lithium) battery.

The ISC Board



32.3 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address.
- Device address: 0. This is the RS-485 address, but also must match setting in System Administration for successful IP communications
- Serial port settings: No flow control
- Data security: None
- Baud Rate: 9600
- Login Name: admin
- Login Password: password (The password is case-sensitive.)

33 Installation

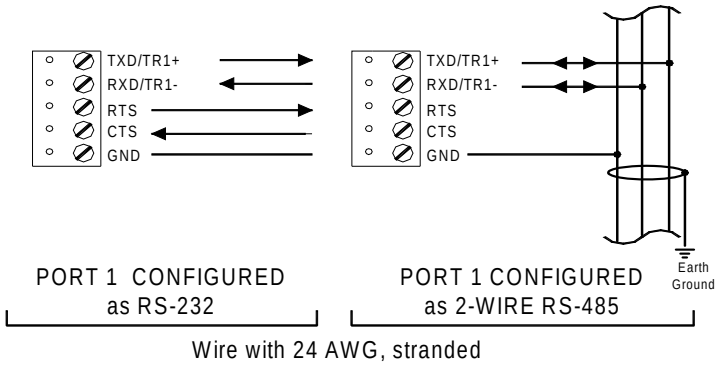
To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Supply power to the controller and wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
4. Remove the plastic safety strip from the memory backup battery.
5. Configure the correct settings using the jumpers and DIP switches.
6. Set the board for the desired initial IP addressing mode.
7. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

33.1 Communication Wiring

The controller communicates to the host via: onboard Ethernet 10Base-T/100Base100-TX port or on port 1. Dual path communication from the host to the LNL-3300 is supported. Port 1 may be configured as RS-232, 2-wire RS-485 or optional Lantronix Ethernet 10baseT/100Base-TX CoBox-Micro interface. RS-232 interface is for direct one to one connection to a host computer port or a modem, 50 feet maximum.

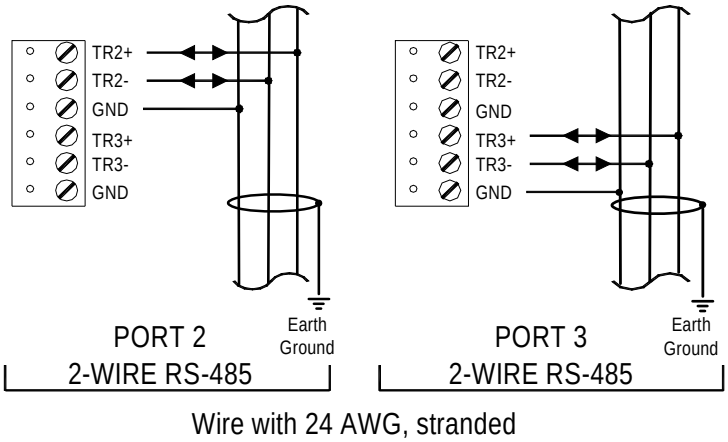
Wiring port 1



There are a few options for establishing communication to configure the settings for the first time. For initial configuration prior establishing a LAN connection, a CAT 5 crossover cable can be used to connect directly to a PC. In this scenario, the controller has a static IP address and the web browser-enabled PC is connected directly to the controller using a crossover cable.

Ports 2 and 3 utilize 2-wire RS-485 interface only. The interface allows multi-drop communication on a single bus of up to 4000 feet (1,200 m). Use twisted pair (minimum 24 AWG) with shield for the communication with 120 ohm impedance. Install termination jumpers only at the end of line unit.

Wiring ports 2 and 3

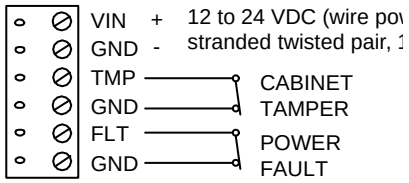


33.2 Power and Alarm Inputs

The LNL-3300 accepts 12 to 24 VDC for power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wires. Inputs TMP and FLT are used for monitoring cabinet tamper and power failure with normally closed contacts. These two inputs are for contact closure monitoring only, and do not use EOL resistor(s). If these inputs are not used, install a short piece of wire at the input to indicate safe condition.

Observe POLARITY on VIN!

Wiring for power, power fault, and cabinet tampering



33.3 Memory Backup Battery

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, event memory is protected.

33.4 DIP Switches

The DIP switches configure the operating mode of the processor. DIP switches are read on power-up except where noted.

Press switch S2 to reset the board.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information, refer to Controller Web Page Configuration on page 65.
OFF	ON	X	OFF	Use factory default communication parameters.
ON	ON	X	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 248.
ON	ON	X	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 248.
X	X	ON	X	Disables the TLS secure link. The switch is read when logging on only. **Note:** Not used on the LNL-4420 or the LNL-X series controllers because TLS is always enabled.

The controller can be reset to its factory default state. For more information, refer to Bulk Erase Configuration Memory on page 248.

33.5 Installing Jumpers

The following chart describes each jumper.

Jumpers	Set at	Description
J2	n/a	Factory use only
J3	n/a	Factory use only
J4	off	Port 2 RS-485 EOL terminator is off.
	ON	Port 2 RS-485 terminator is ON.
J5	off	Port 3 RS-485 EOL terminator is off.
	ON	Port 3 RS-485 terminator is ON.
J6		Connector for Lantronix CoBox-micro connection - port 1
J7, J8, J9	232	Port 1 is RS-232
	485	Port 1 is RS-485
J10	off	Port 1 RS-485 EOL terminator is off.
	ON	Port 1 RS-485 terminator is ON.

Jumpers	Set at	Description
J11	n/a	Factory use only
J12	n/a	Factory use only
J13	n/a	Factory use only
J14	n/a	Remote status LED #1 (see note below)
J15	n/a	Remote status LED #2 (see note below)
J16	n/a	Remote status LED #3 (see note below)
J17	n/a	Remote status LED #4 (see note below)

Note: Observe POLARITY connection to LED. External current limiting is not required.

33.6 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-3300 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

33.6.1 Bulk Erase Steps

Important: Do not remove power during steps 1-8.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-3300 board. LED 1 on for about 15 seconds while LNL-3300 boots up.
3. After the LNL-3300 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-3300 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased.
6. Full memory erase takes up to 60 seconds, usually a lot less.
7. When complete, only LEDs 1 & 4 will flash for about 3 seconds.
8. The LNL-3300 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

33.7 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-3300 can be configured through the web interface.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website security certificate. Although it is not recommended, proceed to the website.

For information about the Configuration Web Page, refer to Controller Web Page Configuration on page 65.

34 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

34.1 Status LEDs

The ISC board contains six status LEDs that can be used to verify correct installation after power up.

The following chart describes the purpose of each LED on the ISC board.

Initialization:

LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	Purpose
ON	off	off	off	off	off	Basic processor initialization
ON	ON	off	off	off	off	Internal SRAM test
ON	off	ON	off	off	off	External flash test
ON	ON	ON	off	off	off	External SDRAM, first chip test
ON	off	off	ON	off	off	External SDRAM, second chip test
ON	ON	off	ON	off	off	External SRAM test
ON	off	ON	ON	off	off	External EEPROM test
ON	ON	ON	ON	off	off	External RTC test
ON	off	off	off	ON	off	Backup battery ABD reset circuit test
ON	ON	off	off	ON	off	UART test
ON	off	ON	off	ON	off	Ethernet interface, MII

Run time:

LED	Description
1	Off-line/on-line and battery status
	Off-line = 20% ON. On-line = 80% ON
	Double flash if battery is low
2	Primary host communication activity (Ethernet or port 1)
3	Port 2 communication activity
4	Port 3 communication activity
5	ON = writing to flash memory. *Do not remove power when ON*.
6	TBD
SPD	Onboard Ethernet speed: off = 10 Mb/S, ON = 100 Mb/S
ACT	Off = no onboard Ethernet activity, ON = Ethernet activity (yellow LED)
LNK	Off = no link, ON = good link (green LED)

When the controller is reading the database, LEDs 1 through 4 will simultaneously flash once every two seconds. When the controller is saving the card database, LEDs 1 through 4 will simultaneously flash in a progressively faster pattern until completion. The final pattern may be so fast that it is hard to distinguish from constant on. Saving large databases can take several seconds.

The LED patterns used for Heartbeat, Host communication, and downstream communication will be suspended during the save/restore and will return to normal once the save/restore is complete.

34.2 Replace Memory Backup Battery

The ISC contains a memory backup battery that is used to back up event and transaction data in the event of a power failure.

A 3V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the memory backup. This battery should be replaced annually.

CAUTION There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

PRÉCAUTION Il existe un risque d’explosion si la batterie/pile est mal remplacée. Ne remplacer que par un type identique ou équivalent recommandé par le fabricant. Jeter les batteries/piles selon les instructions du fabricant.

35 Specifications

** The ISC is for use with UL Listed access control power limited power supplies.

- Primary Power: 12 to 24 VDC ±10%, 300 mA maximum
  - 12 VDC @ 240mA (325mA with CoBox-Micro) nominal
  - 24 VDC @ 135mA (175mA with CoBox-Micro) nominal
- Memory and Clock Backup: 3V Lithium, Rayovac BR2325 or Wuhan Lixing CR2330
- Communication Ports:
  - Port 1: RS-232 or 2-wire RS-485: 9,600 to 115,200 bps, async
  - Ports 2 and 3: 2-wire RS-485: 2,400 to 38,400 bps, async
- Inputs: two non-supervised, dedicated for cabinet tamper and power fault monitoring
- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG stranded twisted pair(s) with shield, 4000 feet (1219 m) maximum, 120 Ohm
  - RS-232: 24 AWG stranded, 50 feet (15.24 m) maximum
  - Ethernet: Cat 5
  - Alarm inputs: stranded twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F). Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 5 in. x 6 in. x 1 in. (127 x 152.4 x 25mm)
  - Weight: 4.1 oz. (115 g) nominal
- Lantronix NIC support: Standoff size - Diameter. 125 inch x 7/16 inch long. Richco Plastics part number LMSP-7-01, 3 pieces (Not supplied)
- Certifications:
  - UL 294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - FIPS 197 Certificate #767
  - CE marking
  - RoHS compliant
  - WEEE

Note: These specifications are subject to change without notice.

LNL-4420 Intelligent Dual Reader Controller

36 Overview of the LNL-4420

This installation guide is intended for use by technicians who will be installing and maintaining the LNL-4420 Intelligent Dual Reader Controller (IDRC).

The Intelligent Dual Reader Controller (IDRC) board provides decision making, event reporting, and database storage for the LenelS2 hardware platform. An on-board dual reader interface provides control for up to two single reader doors. The controller communicates with OnGuard via the on-board 10-BaseT/100Base-TX Ethernet port.

Each reader port can accommodate a read head that utilizes Wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling standards, one or two wire LED controls, and buzzer control. Four Form-C relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 5 A @ 30 VDC, dry contact configuration. Eight (8) inputs are provided for monitoring the door contacts, REX inputs, and alarm contacts. The LNL-4420 requires 12-24 VDC for power.

36.1 Interfaces

The IDRC interfaces upstream with the access control software host system.

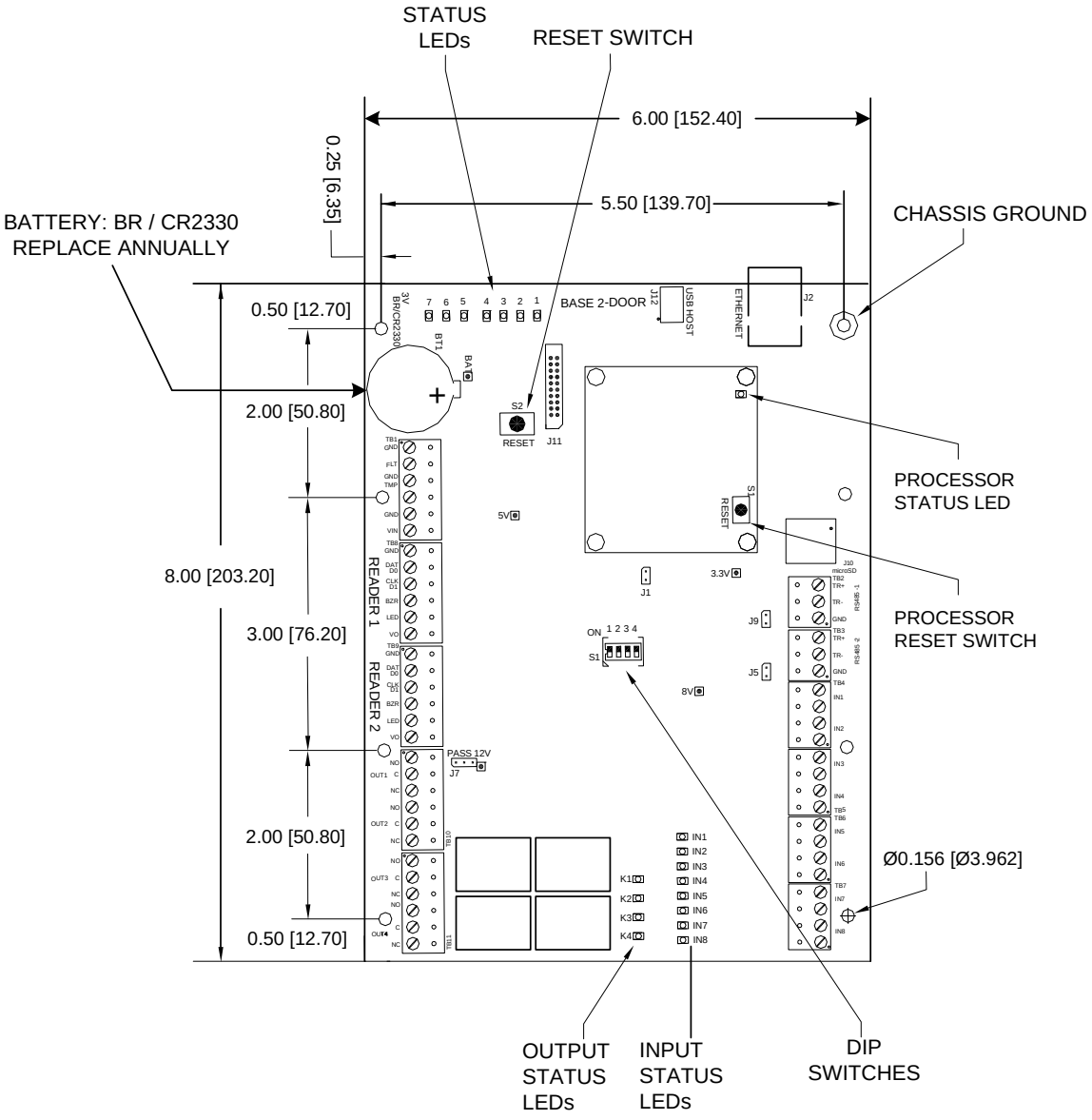
Configuration data and event/status reports are exchanged with the host via 10-BaseT/100BaseTX Ethernet interface (Port 0). Additional I/O devices are communicated to via the downstream communication ports, 2-wire RS-485. The controller supports 64 downstream devices total (32 devices per downstream port).

The LNL-4420 has an on-board reader interface device capable of supporting up to two readers. When on-board reader(s) are configured, these count as one (1) of the downstream devices.

36.2 LNL-4420 IDRC Board Components

The IDRC board contains the following components: one (1) host Ethernet interface, one (1) RS-485 interface, one (1) power-in input, two (2) unsupervised alarm inputs, eight (8) unsupervised/supervised inputs, two (2) reader interfaces, four (4) output relays, four (4) DIP switches, and eight (8) jumpers. It also contains a set of 22 status LEDs and one (1) memory backup (3 volt lithium) battery.

The LNL-4420 Board



36.3 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address.
- Device address: 0. This must match the setting in System Administration for successful IP or serial communications
- Primary host port: Ethernet (serial port is disabled)
- Data security: None
- Login Name: admin
- Login Password: password (The password is case-sensitive.)

37 Installation

To install the IDRC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers, if applicable.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller and wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
7. Remove the plastic safety strip from the memory backup battery.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Controller Web Page Configuration on page 65).

37.1 Wiring and Setup

Refer to the following table for wiring and setup of the LNL-4420.

Connection		
TB8	Reader 1 (current maximum: 150mA)	GND: Ground
		DAT/D0: Data/Data 0/TR-
		CLK/D1: Clock/Data 1/TR+
		BZR: Reader Buzzer
		LED: Reader LED
		VO: Reader Power
TB9	Reader 2 (current maximum: 150mA)	GND: Ground
		DAT/D0: Data/Data 0/TR- (A)
		CLK/D1: Clock/Data 1/TR+ (B)
		BZR: Reader Buzzer
		LED: Reader LED
		VO: Reader Power
TB10	Out 1 Door 1 strike	NO: Normally open contact
		C: Common
		NC: Normally closed contact
	Out 2 Door 1 Aux	NO: Normally open contact
		C: Common
		NC: Normally closed contact
TB11	Out 3 Door 2 strike	NO: Normally open contact
		C: Common
		NC: Normally closed contact
	Out 4 Door 2 Aux	NO: Normally open contact
		C: Common
		NC: Normally closed contact

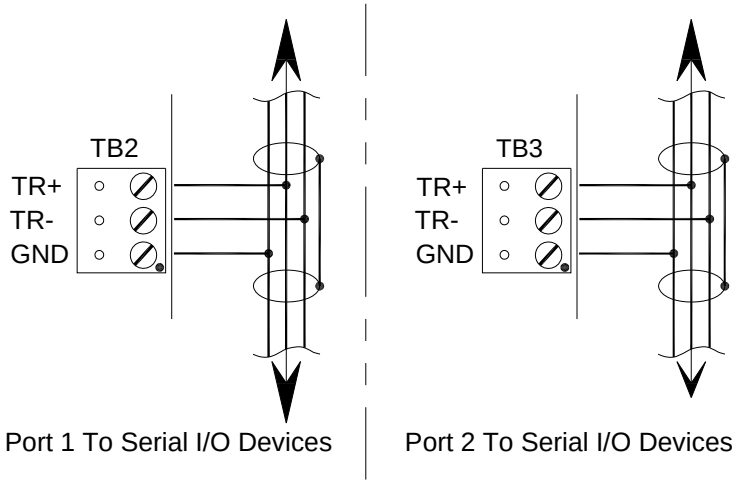
Connection		
TB1	Cabinet Tamper Input	GND
		TMP
	Power Fault Input	GND
		FLT
	Power Input	GND
		VIN: 12 to 24 VDC
TB2	SIO Port 1 (Downstream communication)	TR+ (B) (2-wire RS-485)
		TR- (A) (2-wire RS-485)
		GND (2-wire RS-485)
TB3	SIO Port 2 (Downstream communication)	TR+ (B) (2-wire RS-485)
		TR- (A) (2-wire RS-485)
		GND (2-wire RS-485)
TB4	Input 1	IN1
		IN1
	Input 2	IN2
		IN2
TB5	Input 3	IN3
		IN3
	Input 4	IN4
		IN4
TB6	Input 5	IN5
		IN5
	Input 6	IN6
		IN6
TB7	Input 7	IN7
		IN7
	Input 8	IN8
		IN8

37.2 Communication Wiring

The controller communicates to the host via the on-board 10-BaseT/100Base-TX Ethernet interface (port 0).

The downstream communication ports (TB2 for port 1 and TB3 for port 2) are a 2-wire RS-485 interfaces which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4000 feet (1239 m). Use twisted pairs (minimum 24 AWG) with an overall shield for communication.

Communication wiring port 1 and port 2



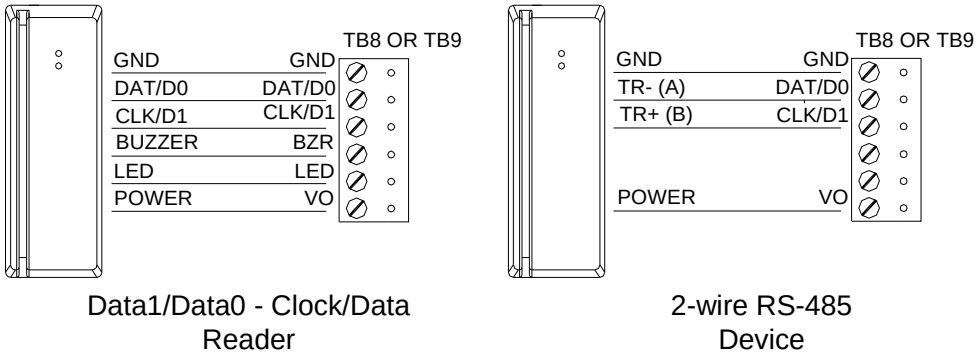
Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel!

37.3 Reader Wiring

Each reader port supports Wiegand, magnetic stripe, and 2-wire RS-485 electrical interfaces. Power to the reader is selectable: 12 VDC (VIN must be greater than 20 VDC), or power is passed-through (PASS) from the input voltage of the LNL-4420 (TB1-VIN), and is current-limited to 150 mA for each reader port. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacture specifications for cabling requirements. In the 2-wire LED mode the Buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

PASS 12V		**READER POWER**
	12V	12 VDC is available on reader ports (VIN is greater than or equal to 20 VDC).
	PASS	VIN power is “passed through” to reader ports.

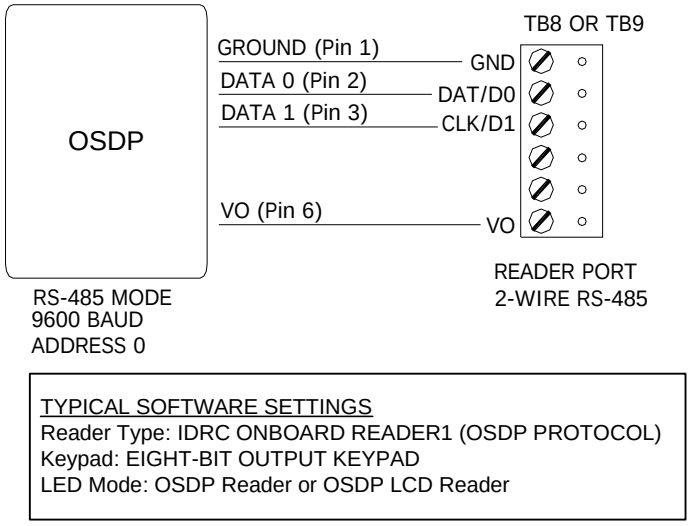
J7 - Reader power select



37.3.1 Open Supervised Device Protocol

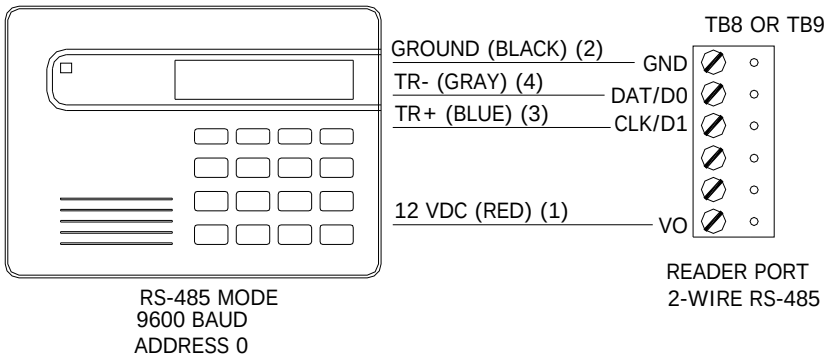
Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control. For OSDP, set the baud rate to 9600 bps.

Wiring for OSDP readers



37.3.2 Command Keypad

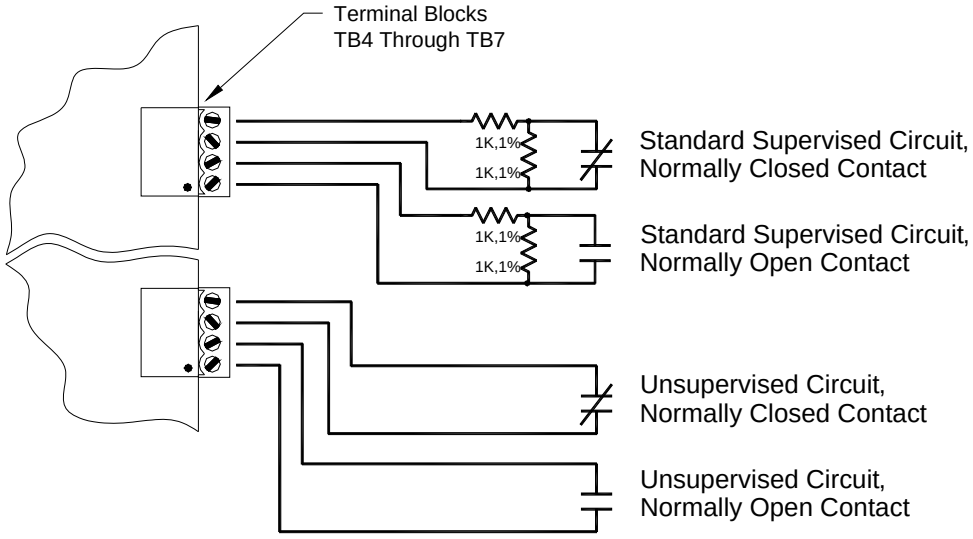
The command keypad (LNL-CK) can also be connected to the IDRC.



37.4 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded, and foreign voltage. This implementation exceeds the UL 294 Requirement for Grade A Supervision.

A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K Ohm, 1% resistors and should be located as close to the sensor as possible. Custom EOL resistances may be configured via the host software.



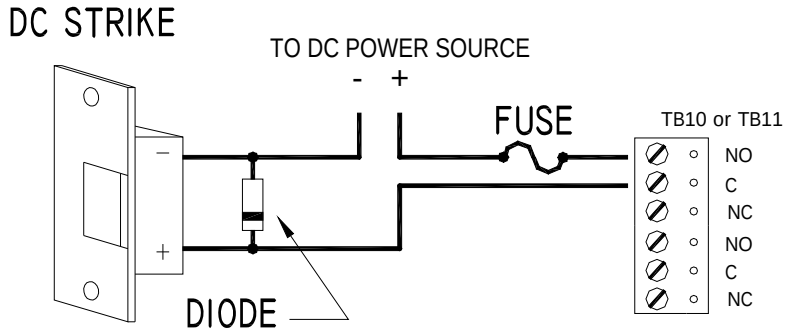
37.5 Relay Circuit Wiring

Four relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 5A @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door

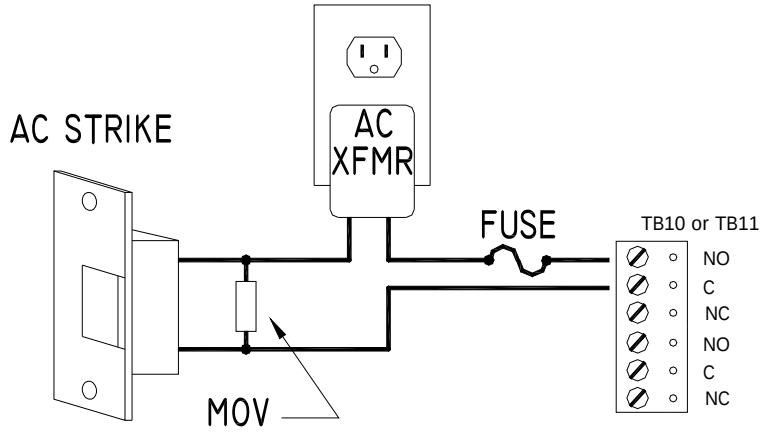
strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay.

Wire should be of sufficient gauge to avoid voltage loss.



- **Diode Selection:** Diode current rating: 1x strike current. Diode breakdown voltage 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



- **MOV Selection:** Clamp voltage: 1.5x VAC RMS. For 24 VAC strike, Panasonic ERZC07DK470 typical.

37.5.1 Power and Alarm Inputs

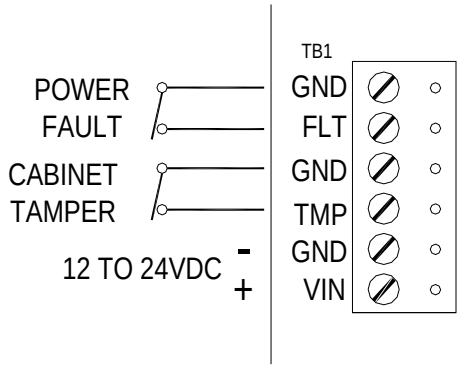
The LNL-4420 requires 12-24 VDC power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire.

> **Note:** Connect the GND signal to earth ground in ONE LOCATION within the system! Multiple earth ground connections may cause ground loop problems and is not advised.

Observe POLARITY on 12-24 VDC input!

There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

Wiring for power, power fault, and cabinet tampering



37.6 Memory Backup Battery

Remove the factory-installed plastic safety strip from the Lithium memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, event memory is protected.

37.7 Dip Switches

The DIP switches configure the operating mode of the processor. DIP switches are read on power-up except where noted.

Press switch S2 to reset the board.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	X	X	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information, refer to Controller Web Page Configuration on page 65.
OFF	ON	X	OFF	Use factory default communication parameters.
ON	ON	X	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 263.
ON	ON	X	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 263.
X	X	ON	X	Disables the TLS secure link. The switch is read when logging on only. **Note:** Not used on the LNL-4420 or the LNL-X series controllers because TLS is always enabled.

The controller can be reset to its factory default state. For more information, refer to Bulk Erase Configuration Memory on page 263.

37.8 Jumpers

The LNL-4420 processor hardware interface is configured using jumpers to set up the port interface and end of line (EOL) termination.

Jumpers	Set at	Description
J1	n/a	Factory use only
J2	n/a	10base-T/100base-Tx Ethernet Connection (Port 0)
J5	off	Port 2 RS-485 EOL terminator is off
	ON	Port 2 RS-485 EOL Terminator is ON
J7	Reader power select * See Note 1 *	
	12V	12 VDC at reader ports
	PASS	VIN pass-through to reader ports
J8	n/a	Processor connection to base board
J9	off	Port 1 RS-485 EOL Terminator is off
	ON	Port 1 RS-485 EOL Terminator is ON
J10	n/a	MicroSD - Not supported
J11	n/a	Factory use only
J12	n/a	USB - Not supported
JP3	ON	On processor board. Factory use only - must be installed

* Note 1: The input power (VIN) must be 20 VDC minimum if the 12 VDC selection is to be used. For more information, see Reader Wiring.

37.9 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board)
- Update OEM default parameters after OEM code has been changed
- Recover from database corruption causing LNL-4420 board to continuously reboot

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

37.9.1 Bulk Erase Steps

Important: Do not remove power during steps 1-8.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."

2. Apply power to the LNL-4420 board. LED 1 on for about 15 seconds while LNL-4420 boots up.
3. After the LNL-4420 boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-4420 board will power up using the OEM default communication parameters.
5. LED 2 will flash indicating that the configuration memory is being erased.
6. Full memory erase takes up to 60 seconds, usually a lot less.
7. When complete, only LEDs 1 & 4 will flash for about 3 seconds.
8. The LNL-4420 board will complete its initialization in 2 seconds after LEDs 1 & 4 stop flashing.

37.10 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-4420 can be configured through the web interface.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website security certificate. Although it is not recommended, proceed to the website.

For information about the Configuration Web Page, refer to Controller Web Page Configuration on page 83.

For information about the Auxiliary Authentication Module Web Configuration, refer to LNL-4420, LNL-X4420, and LNL-M4420: Auxiliary Authentication Module Web Configuration on page 83.

38 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

38.1 Status LEDs

The IDRC board contains 21 status LEDs that can be used to verify correct installation after power up.

Power-up: All LEDs OFF.

Initialization: LEDs 1 through 7 and IN1 through IN8 are sequenced during initialization. LEDs 1, 3, and 4 are turned ON for approximately four seconds after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 3 seconds without a card database. Each 10,000 cards will add about 3 seconds to the application initialization.

Important: When LEDs 1, 2, 3 and TMP flash at the same time, data is being read from or written to flash memory - do not cycle power when in this state.

Running: After initialization is complete, the LEDs have the following meanings: At power up, LEDs 2 through 6 are turned ON then OFF in sequence.

Run time

LED	Description
1	Off-line / On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host communication activity (Ethernet)
3	Internal SIO communication activity
4	External SIO communication activity (Port 1)
5	External SIO communication activity (Port 2)
6	Reader 1: Clock/Data= Flashes when Data is Received, either input. D1/D0 mode = Flashes when Data is Received, either input. RS-485 mode = Flashes when Transmitting Data.
7	Reader 2: Clock/Data= Flashes when Data is Received, either input. D1/D0 mode = Flashes when Data is Received, either input. RS-485 mode = Flashes when Transmitting Data.
YEL	Ethernet Speed: Off = 10Mb/S, ON = 100Mb/S
GRN	Off = No link, ON = Good link, Flashing = Ethernet activity
IN1 - IN8	IN1 input status. Note: If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds; otherwise, the LED is Off.
K1	Relay K1: ON = Energized (Reader 1 Strike)
K2	Relay K1: ON = Energized (Reader 1 Aux output 1)
K3	Relay K1: ON = Energized (Reader 2 Strike)
K4	Relay K1: ON = Energized (Reader 2 Aux output 1)

When the controller is reading the database, LEDs 1 through 4 will simultaneously flash once every two seconds. When the controller is saving the card database, LEDs 1 through 4 will simultaneously flash in a progressively faster pattern until completion. The final pattern may be so fast that it is hard to distinguish from constant on. Saving large databases can take several seconds.

The LED patterns used for Heartbeat, Host communication, and downstream communication will be suspended during the save/restore and will return to normal once the save/restore is complete.

38.2 Replace Memory Backup Battery

The event log buffer and the real time clock are backed up by a 3V lithium battery. Without power being applied to the LNL-4420, the battery will retain events and transactions for 3 months.

This battery should be replaced annually to insure that proper backup functionally is maintained. Remove the insulator from the battery holder after installation. Battery type: BR2325, BR2330 or CR2330.

39 Specifications

The LNL-4420 is for use in low voltage, class 2 circuits only.

- Primary Power: 12 to 24 VDC ±10%, 500mA maximum (plus reader current)
  - 12 VDC @ 250mA (plus reader current) nominal
  - 24 VDC @ 150mA (plus reader current) nominal
- Memory and Clock Backup Battery: Volt Lithium, type BR2325, BR2330 or CR2330
- Host communication: Ethernet: 10BaseT/100Base-TX.
- Downstream communication: Two each, 2-wire RS-485, 2400 to 115200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
- Inputs:
  - Two (2) unsupervised, dedicated for tamper and UPS fault monitoring
  - Eight (8) unsupervised/supervised, for door position monitoring, REX inputs or alarm contacts
- Relays: Four, Form-C, 5A @ 30 VDC, resistive
- Reader interface:
  - Reader power (jumper selectable): 12 VDC ±10% regulated, current limited to 150mA for each reader or 12 to 24 VDC ±10% (input voltage passed through) current limited to 150mA for each reader.
  - Data inputs: TTL compatible inputs, magnetic stripe and Wiegand standards supported
  - RS-485 mode: 9600 to 38400 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
  - LED output: TTL levels, high > 3V, low < 0.5 V, 5mA source/sink max.
  - Buzzer output: TTL levels, high > 3V, low < 0.5 V, low=active, 5mA source/sink max.
- Cable Requirements:
  - Power: 1 twisted pair, 18 to 16 AWG
  - Ethernet: CAT 5
  - TTL Reader: 22 to 16 AWG, depending on length and requirements
  - RS-485 (I/O device ports): 24 AWG stranded twisted pair(s) with an overall shield, 4000 feet (1219 m) maximum
  - RS-485 (Reader port): 24 AWG stranded twisted pair(s) with overall shield, 2000 feet (609.6 m) maximum
  - Alarm Input: 1 stranded twisted pair, 30 ohms maximum, typically 22 AWG @ 1000 feet (304.8 m)
- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F), Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC

- Mechanical:
  - Dimensions: 8 x 6 x 0.78 in. (203.2 x 152.4 x 20 mm)
  - Weight: 9 oz. (255 g) nominal, board only
- Certifications:
  - UL 294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - FIPS 197 Certificate #766
  - CE marking
  - RoHS compliant
  - WEEE

UL 294 Performance Levels:

Feature	**Level**
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

These specifications are subject to change without notice.

INTERFACE AND CONTROL MODULES

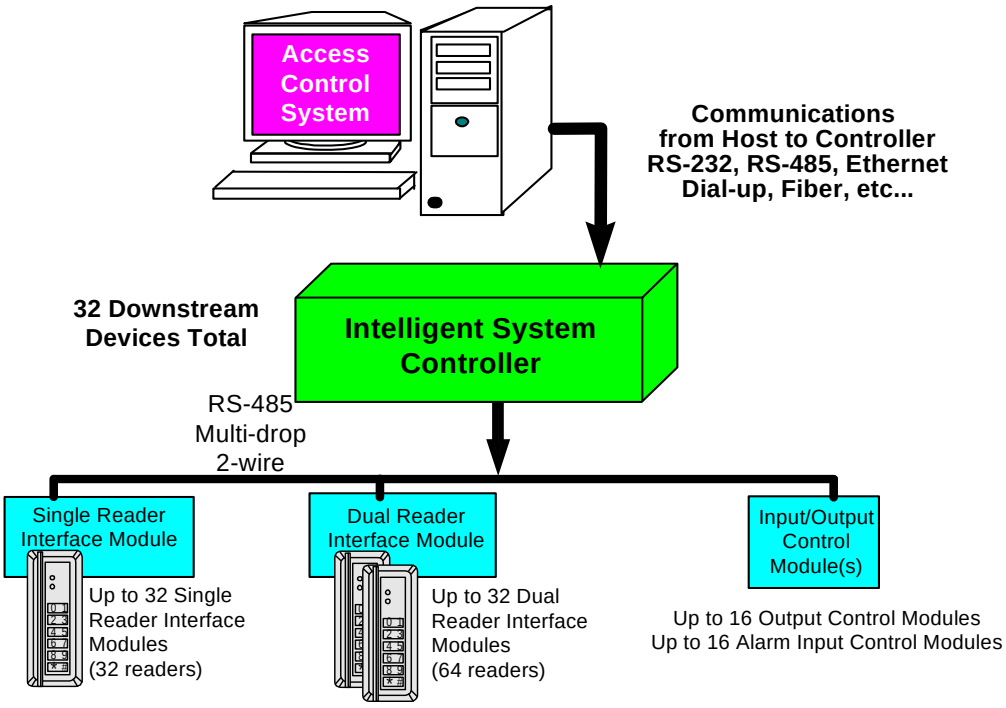
General Control Module Configuration

40 Interfaces

The control modules interface upstream and downstream as follows:

- The Input Control Module (LNL-1100) interfaces upstream with the Intelligent System Controller.
- The Output Control Module (LNL-1200) interfaces upstream with the Intelligent System Controller.
- The Single Reader Interface Module (LNL-1300) interfaces upstream with the Intelligent System Controller, and downstream with a card reader.
- The Dual Reader Interface Module (LNL-1320) interfaces upstream with the Intelligent System Controller, and downstream with two (2) card readers (with or without keypads communicating in either data1/data0, clock and data, or OSDP).
- The Single Door IP Interface Module (LNL-1300e) interfaces upstream with the Intelligent System Controller, and downstream with one or two card readers.

Intelligent System Controller Communications Overview



41 Setting DIP Switches on Control Modules

Each control module has an 8-position DIP switch. The settings identified in this section are the same for all control modules except the LNL-1300e. For more information, refer to LNL-1300e Single Door IP Interface Module on page 325.

DIP Switches (shown in factory default positions: Address 00; 38400 bps)



The following chart describes the use of each DIP switch.

DIP SWITCH(ES)	USED TO CONFIGURE:
1, 2, 3, 4, 5	Device communication address (0 - 31)
6, 7	Communication baud rate
8	Downstream encryption (available with OnGuard 2009 or later)

41.1 Device Address

To configure the device communication address, set DIP switches 1, 2, 3, 4, and 5 according to the following table.

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

41.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table.

BAUD RATE:	DIP SWITCH	
	6:	7:
38,400 bps	ON	ON
19,200 bps	off	ON

BAUD RATE:	DIP SWITCH	
	6:	7:
9600 bps	ON	off
11,5200 bps	off	off

Currently, OnGuard only supports a baud rate of 38400 bps, so be sure to set both DIP switches 6 and 7 to the ON position.

41.3 Bus Encryption

DIP switch 8 controls the utilization of encryption.

Bus communications	DIP SWITCH 8: (OnGuard 2009 or later)	DIP SWITCH 8: (prior to OnGuard 2009)
Encryption is not required	off	Normal operation
Encryption is required	ON	Not allowed

When DIP switch 8 is ON, communication will not be allowed unless the access panel supports downstream encryption and is configured to enable encryption to this device.

When DIP switch 8 is off, the device will accept either encrypted or unencrypted communication. It must be off if the access panel does not support downstream encryption, or if downstream encryption is disabled for this device.

Note: Encryption is automatic for any Series 3 control module connected to an LNL-X Series controller.

LNL-1100 Input Control Module

42 Overview of the LNL-1100

The Input Control Module (ICM) provides the access control system with high-speed acknowledgment of critical alarm points in monitored areas. It has sixteen configurable input control points and two output control relays. The ICM supports normally open, normally closed, supervised and non-supervised circuits.

The input circuits are scanned at a rate of sixty (60) times per second, with a debounce timing of 64mS. The digitized input status signal is software monitored and controlled, resulting in the ability for each input point to be programmed as a supervised or non-supervised alarm point, normally open or normally closed monitoring point.

The output relays can also be configured for fail-safe or fail-secure. The relays support “On,” “Off,” and “Pulse” controls.

The series 2 and series 3 boards differ slightly from the series 1 boards. Where series 3 is indicated, the information only applies to series 3 boards. The same applies for series 2 boards. Otherwise, the information applies to all boards. The following table lists the differences between series 1, series 2, and series 3 boards:

Feature	Series 3	Series 2	Series 1
Serial number	greater than 2,000,000 (revision E)	540,000 or greater (revision D)	less than 540,000
Input power	12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 VDC ±10% or 12 VAC ±15%
ISC communication	2-wire RS-485 only	2-wire RS-485 only	2-wire or 4-wire RS-485
Color	red	green	green
Status LEDs	2 for board status, 16 for input status, 2 for output relay status, 2 for tamper/ power fault status	2 for board status, 16 for input status, 2 for output relay status, 2 for tamper/power fault status	2 for board status
Jumpers	J3: RS-485 termination; install in first and last units, only	J1: RS-485 termination. Install in first and last units only. OFF: Termination is not on ON: Termination is on J3: 2-wire select: install in 2W position only.	

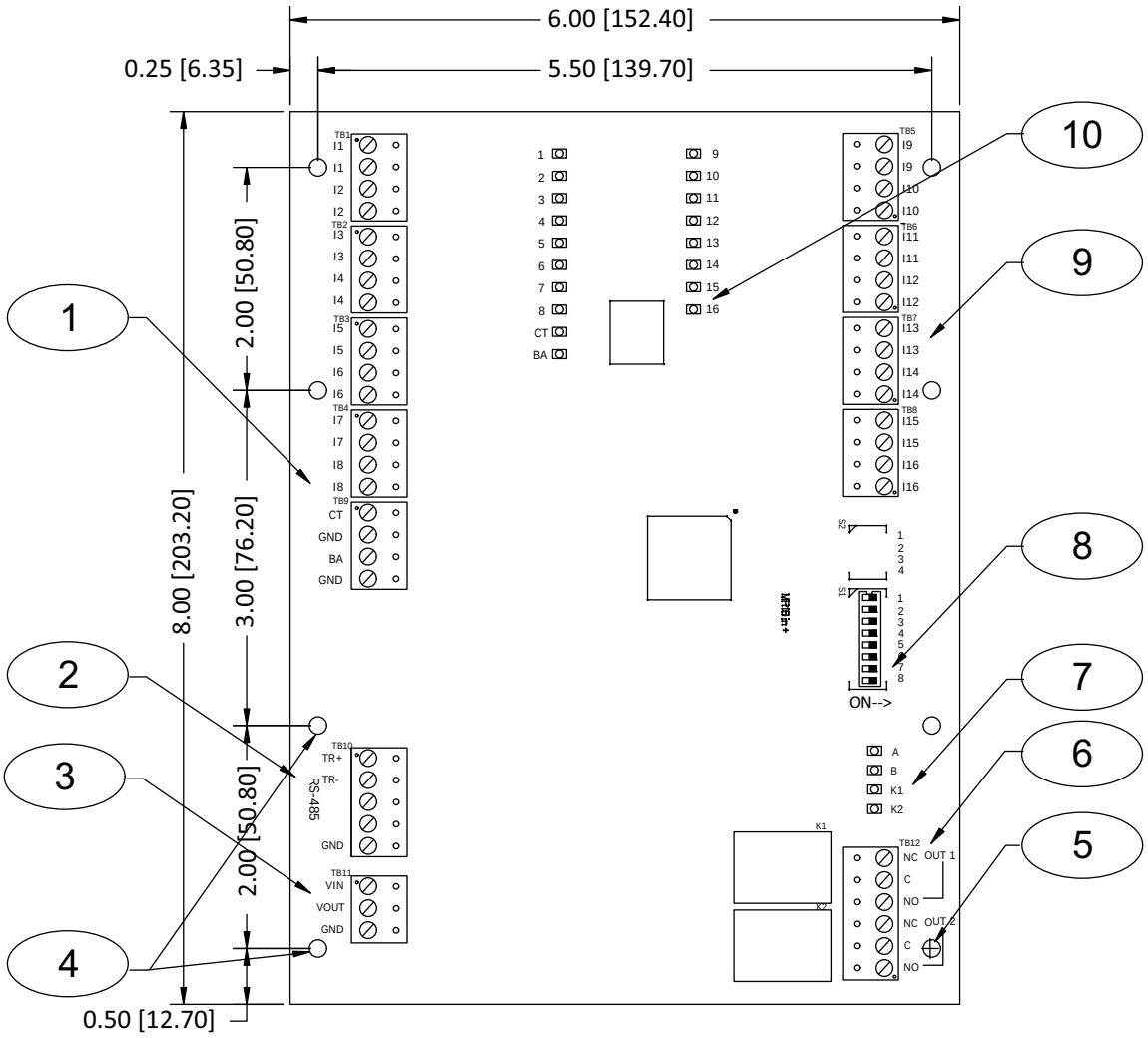
42.1 Interfaces

For more information, refer to Interfaces on page 271.

42.2 LNL-1100 Input Control Module (Series 3) Board Components

The series 3 Input Control Module board contains the following components: sixteen (16) software configurable alarm inputs, two (2) non-supervised alarm inputs, two (2) alarm output relays, one (1) RS-485 interface, one (1) power input, eight (8) DIP switches, jumpers, and status LEDs.

Input Control Module



Input Control Module Callouts

Callout	Description
1	Inputs
2	Serial I/O communication port, RS-485
3	Power in 12-24 VDC
4	Earth ground (connection not required)

Input Control Module Callouts

Callout	Description
5	Eight (8) mounting holes (Ø0.16 [Ø3.96])
6	Outputs
7	Status LEDs
8	DIP switches
9	Inputs
10	Input Status LEDs

42.2.1 Status LEDs

The series 3 Input Control Module board contains LEDs that can be used to verify correct installation after power up.

Power-up: All LEDs OFF.

Initialization: Once power is applied, initialization of the module begins.

When initialization is completed, LEDs 1 through 16, CT and BA, A, and B are briefly sequenced **ON** then OFF.

Run time: After the above sequence, the LEDs have the following meanings:

A LED: Heartbeat and On-Line Status:

- Off-line: 1 second rate, 20% **ON**
- On-line:
  - Non-encrypted communication: 1 second rate, 80% **ON**
  - Encrypted communication: 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.3 sec OFF

A LED Error Indication:
Waiting for application firmware to be downloaded: 0.1 sec **ON**, 0.1 sec OFF.

B LED: Communication Port Status:
Indicates communication activity on the communication port:

1 LED: Input Status: 1
2 LED: Input Status: 2
3 LED: Input Status: 3
4 LED: Input Status: 4
5 LED: Input Status: 5
6 LED: Input Status: 6
7 LED: Input Status: 7
8 LED: Input Status: 8
9 LED: Input Status: 9
10 LED: Input Status: 10
11 LED: Input Status: 11

12 LED: Input Status: 12
13 LED: Input Status: 13
14 LED: Input Status: 14
15 LED: Input Status: 15
16 LED: Input Status: 16
CT: Cabinet Tamper
BA: Power Fault

Input in the inactive state: OFF (briefly flashes ON every 3 seconds)
Input in the active state: ON (briefly flashes OFF every 3 seconds)
Input in a fault state: Rapid Flash
LED K1 and K2: Illuminates when output relay RLY 1 (K1) or RLY 2 (K2) is energized.

43 Installation

To install the Input Control Module, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the non-supervised alarm inputs for power fault and cabinet tamper monitoring.
3. Wire the software configurable alarm inputs.
4. Wire the upstream host communication.
5. Wire the relay outputs.
6. Wire the power input.
7. Configure the correct settings using the jumpers and DIP switches.

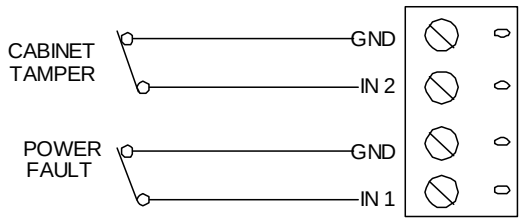
43.1 Wiring

Note: Previous versions of this board may be wired differently. Use the Quick Reference for the correct version.

43.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

Wire the BA (power fault) and CT (cabinet tamper) inputs using a twisted pair cable, 30 ohms maximum (no EOL resistors required).

Non-supervised Alarm Input Wiring (BA and CT Contacts)



Note: If either of these inputs is not used, a shorting wire should be installed.

43.1.2 Software Configurable Alarm Inputs

The Input Control Module contains sixteen (16) software configurable alarm inputs that can be used for alarm device monitoring. Each of these inputs can be configured, via the Access Control software, as either N/O (normally open) or N/C (normally closed) in combination with either supervised or non-supervised wiring.

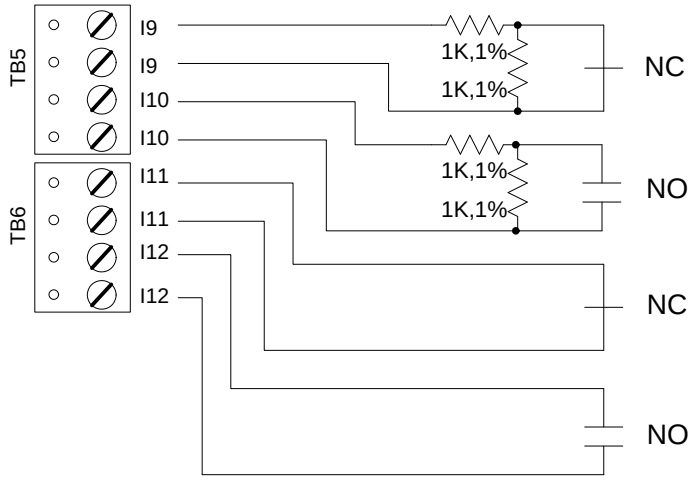
These alarm inputs are connected using Inputs 1-16.

Wire the Inputs 1-16 contacts using twisted pair cable, 30 ohms maximum, 24 AWG minimum. The gauge of the wire may vary, depending on distance and line resistance.

Each input that is configured as a supervised alarm must also be terminated with two (2) 1000-ohm resistors (1% tolerance - 0.25 watt. N/O and N/C alarms are terminated identically).

	Alarm Zone Contact N/C	**Alarm Zone Contact N/O**
Normal	1K ± 25%	2K ± 25%
Alarm	2K ± 25%	1K ± 25%
Fault – Line Short	0 – 50	0 – 50
Fault – Line Open	15K – ∞	15K – ∞
Fault – Foreign Voltage	50 – 750 1250 – 1500 2500 – 15K	50 – 750 1250 – 1500 2500 – 15K

Software Configurable Alarm Input Wiring (Inputs 1-16)



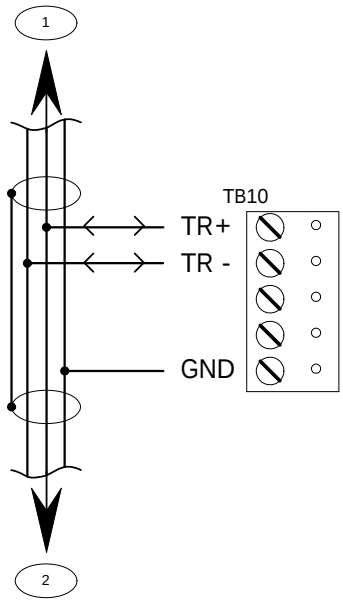
43.1.3 Upstream Controller Communication

The controller communication port is an RS-485 interface that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used for series 1. Only 2-wire RS-485 cable configuration can be used for series 2 and series 3. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than Ten (10) feet (Belden 9502 or equivalent).

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

Note: **For the LNL-1100 Series 3:** Install RS-485 termination jumper, J3, on the interface boards at each end of the communication line, only.

LNL-1100 Series 2 and Series 3 Upstream Controller Communication: 2-Wire



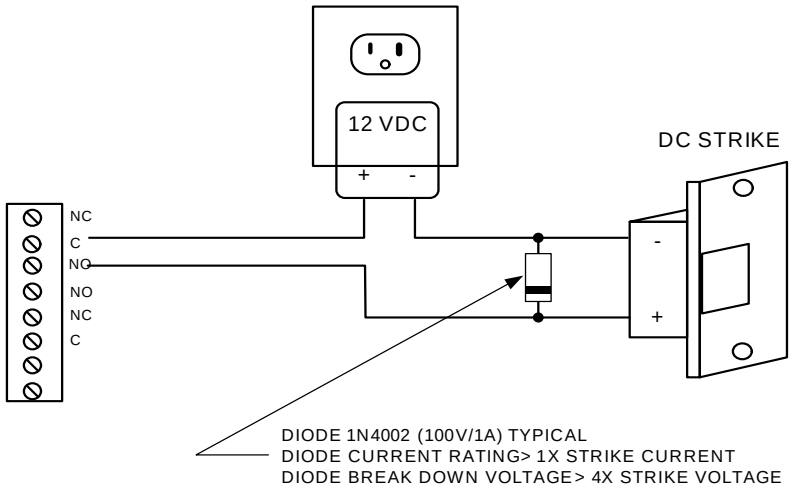
Upstream Controller Communication Callouts

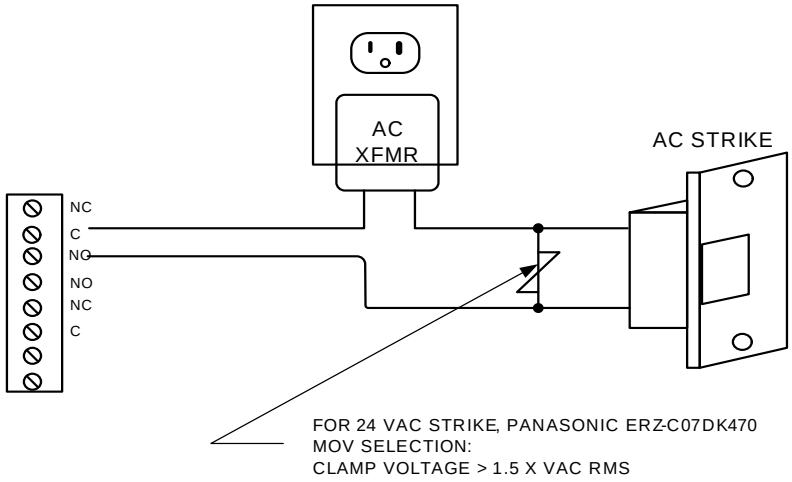
Callout	Description
1	To all other devices on the bus
2	To all other devices on the bus
	ONLY 2-WIRE RS-485 IS SUPPORTED.

43.1.4 Relay Outputs

Two (2) form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, a contact protection circuit must be used. The following two (2) circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]) as the effectiveness of the circuit will decrease if it is located farther away.

Use sufficiently large gauge of wires for the load current as to avoid excessive voltage drop.





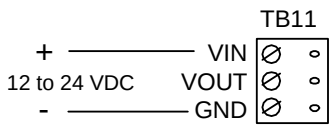
43.1.5 Power

For the LNL-1100, the power source should be located as close to the module as possible.

Wire the power input with an 18 AWG (minimum) twisted pair cable.

Note: Be sure to observe polarity on VIN!

The VOUT terminal on TB11 is the same as VIN.



43.2 Elevator Control

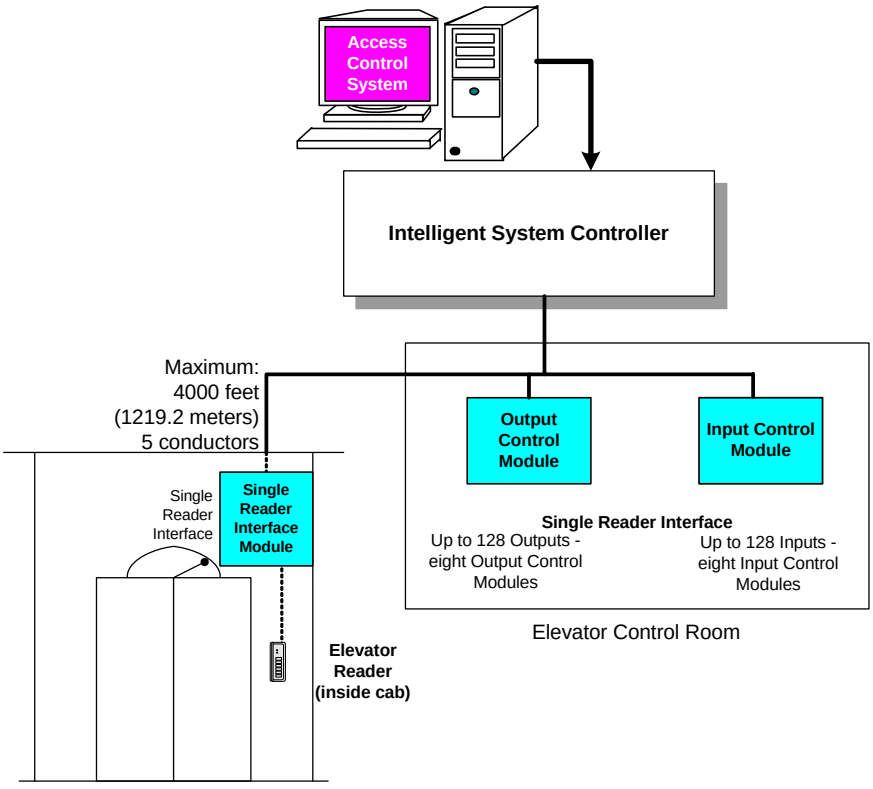
OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The application software must be configured for elevator control. This can be done on the Elevator Hardware tab in the Readers window of the System Administration software. The “Elevator” box should be checked. The reader’s type, name, port, address, access panel, can all be defined here.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) has been disabled.

Addresses assigned to input/output panels do not have to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control



44 Configuration

The Input Control Module board contains 8 DIP switches and, on Series 3 boards, 1 jumper that must be configured for your system.

44.1 DIP Switches

DIP switch settings are described in the General Control Module Configuration chapter.

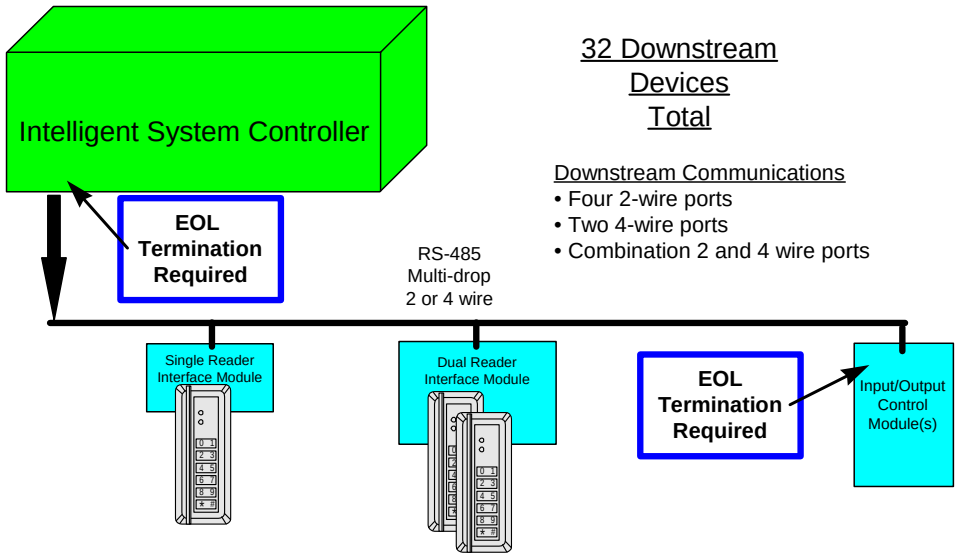
- Setting DIP Switches on Control Modules
- Device Address
- Communication Baud Rate
- Bus Encryption

44.2 Jumper J3 for the LNL-1100 Series 3

Jumper	Description
J3	RS-485 termination; install in first and last units, only

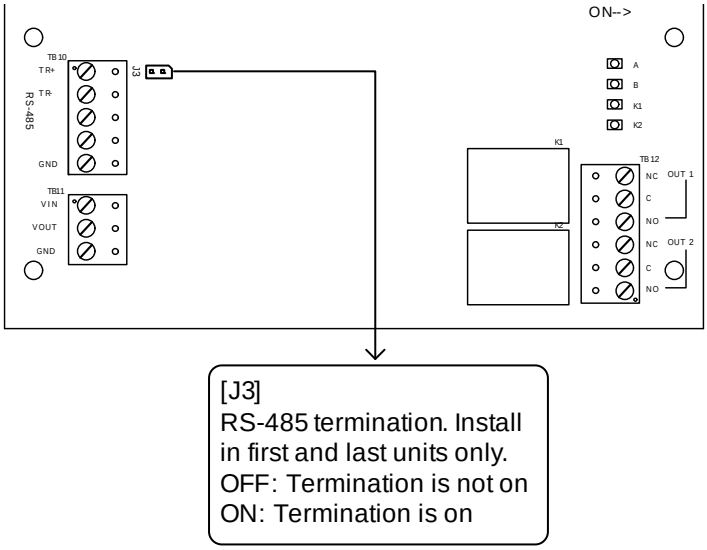
All other jumpers are factory use, only.

EOL Termination



44.2.1 Installing the Jumper

The following diagram describes the use of J3 on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

45 Specifications for the LNL-1100 Series 3

**The LNL-1100 Series 3 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.

- Primary power: 12 to 24 VDC ± 10%, 350 mA maximum
- Outputs: Two (2) Form-C relays:
  - Normally Open contact (NO) contact: 5 A @ 30 VDC resistive
  - Normally Closed contact (NC) contact: 3 A @ 30 VDC resistive
- Inputs:
  - 16 unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, 1/4 watt
  - Two (2) unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- Communication: RS-485, 2-wire. 9600, 19200, 38400, or 115200 bps

- Cable requirements:
  - Power: 18 AWG, 1 twisted pair
  - RS-485: 24 AWG, 120 ohm impedance, twisted pair with drain wire and shield, 4000 feet (1219 m) maximum
  - Alarm inputs: 1 twisted pair, 30 ohms maximum
  - Output: As required for the load
- Mechanical:
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25.4 mm)
  - Weight: 9 oz. (250 g) nominal
- Environment:
  - Temperature: -55°C to +85°C storage, 0°C to +70°C operating
  - Humidity: 5% to 95% RHNC

UL 294, 6th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

46 Regulatory Information

46.1 Certifications

- UL 294 & UL1076 Listed
- ULC Listed
- FCC Part 15
- C-Tick
- CE marking
- RoHS compliant
- WEEE

LNL-1200 Output Control Module

47 Overview of the LNL-1200

The Output Control Module (OCM) communicates directly with the Intelligent System Controller (ISC) by RS-485 communication. Each OCM is an individually addressed device, with a maximum of sixteen OCMs on each ISC.

The OCM, like most other LenelS2 hardware products, can be powered by 12 to 24 VDC power. Dedicated tamper and power failure input contacts are included with every OCM.

The OCM has 16 programmable output relays that can be configured for fail-safe or fail-secure. Each relay supports “On,” “Off,” and “Pulse” software commands.

The series 2 and series 3 boards differ slightly from the series 1 boards. Where series 3 is indicated, the information only applies to series 3 boards. The same applies for series 2 boards. Otherwise, the information applies to all boards.

The following table list the differences between series 1, series 2, and series 3 boards:

Feature	Series 3	Series 2	Series 1
Serial number	greater than 2,000,000 (revision E)	520,000 or greater (revision C)	less than 520,000
Input power	12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 VDC ±10% or 12 VAC ±15%
ISC communication	2-wire RS-485 only	2-wire RS-485 only	2-wire or 4-wire RS-485
Color	red	green	green
Status LEDs	2 for board status, 16 for relay status, 2 for tamper/ power fault status	2 for board status, 16 for relay status, 2 for tamper/ power fault status	2 for board status

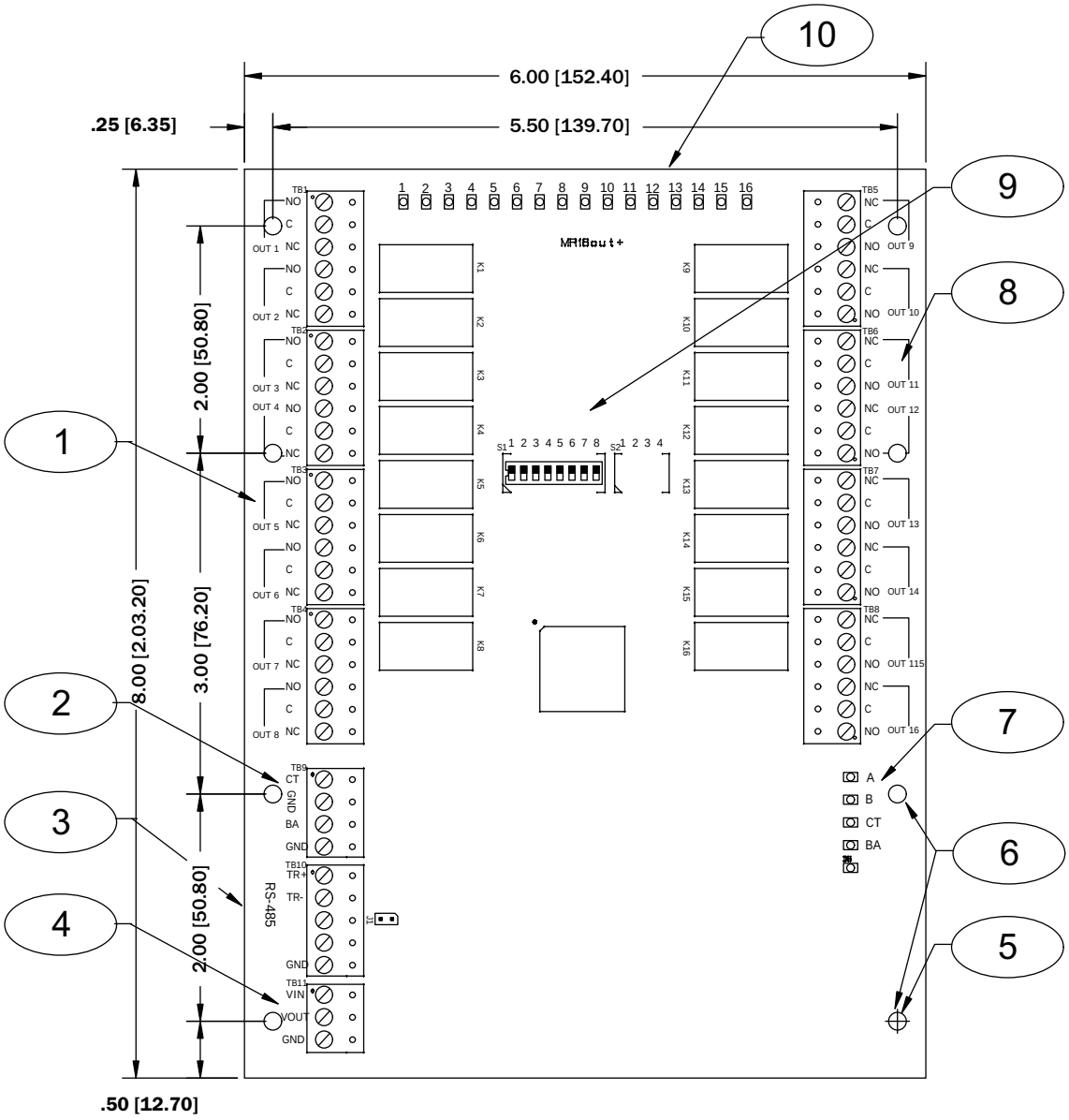
47.1 Interfaces

For more information, refer to Interfaces on page 271.

47.2 LNL-1200 Output Control Module (Series 3) Board Components

The series 3 Output Control Module board contains the following components: sixteen (16) alarm output relays with sixteen (16) corresponding status LEDs, two (2) unsupervised alarm inputs, one (1) RS-485 interface, one (1) power input, eight (8) DIP switches, and jumpers.

Output Control Module



Output Control Module Callouts

Callout	Description
1	Outputs
2	Tamper and power monitor inputs
3	Serial I/O communication port, RS-485
4	Power in 12 to 24 VDC
5	Eight (8) mounting holes (Ø0.156 [Ø4.0])
6	Earth ground (connection not required)
7	Status LEDs
8	Outputs
9	DIP switches
10	Relay status LEDs

47.2.1 Status LEDs

The series 3 Output Control Module board contains LEDs that can be used to verify correct installation after power up.

Power-up: All LED's OFF.

Initialization: Once power is applied, initialization of the module begins.

When initialization is completed, LEDs A. B, CT, and BA are briefly sequenced **ON** then OFF.

Run time: After the above sequence, the LEDs have the following meanings:

A LED: Heartbeat and Online Status:

- Offline: 1 second rate, 20% **ON**.
- Online:
  - Non-encrypted communication: 1 second rate, 80% **ON**
  - Encrypted communication: 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.3 sec OFF

B LED: Serial I/O Communication Port Status:

- Indicates communication activity on the communication port:

CT: Cabinet Tamper

BA: Power Fault

LED 1 through 16: Illuminate when output relay OUT 1 (K1), OUT 2 (K2) is energized and so on.

48 Installation

To install the Output Control Module, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the non-supervised alarm inputs for power fault and cabinet tamper monitoring.
3. Wire the upstream host communication.
4. Wire the relay outputs.
5. Wire the power input.
6. Configure the correct settings using the jumpers and DIP switches.

48.1 Wiring

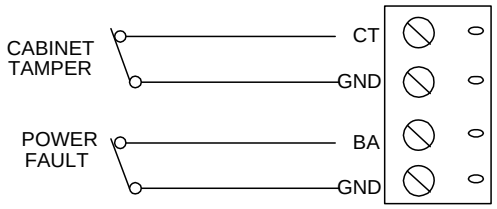
48.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The Output Control Module features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the BA (power fault) and CT (cabinet tamper) contact terminals located on the Output Control Module.

The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum (No EOL resistors are required).

Unsupervised Alarm Input Wiring (BA and CT contacts)



Note: If either of these inputs is not used, a shorting wire should be installed.

48.1.2 Upstream Controller Communication

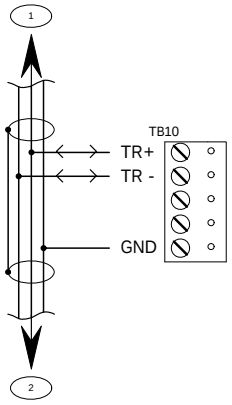
The controller communication port is an RS-485 interface that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used for series 1. Only 2-wire RS-485 cable configuration can be used for series 2 and series 3. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842, West Penn,

or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than Ten (10) feet (Belden 9502 or equivalent).

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

Note: **For the LNL-1200 Series 3:** Install the RS-485 termination jumper, J1, on the interface boards at each end of the communication line, only.

LNL-1200 Series 2 and Series 3 upstream controller communication wiring: 2-wire



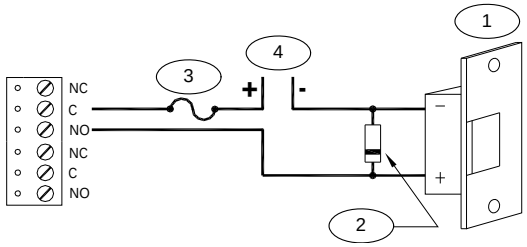
Upstream Controller Communication Callouts

Callout	Description
1	To all other devices on the bus
2	To all other devices on the bus
ONLY 2-WIRE RS-485 IS SUPPORTED.	

48.1.3 Output Relay Wiring

16 Form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, a contact protection circuit must be used. The following two (2) circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30 cm]), as the effectiveness of the circuit will decrease if it is located farther away.

Use sufficiently large gauge of wires for the load current to avoid voltage loss.



Output Relay Wiring Callouts

Callout	Description
1	DC strike
2	Diode
3	Fuse
4	To DC power source

48.1.4 Power

For its power input, the Output Control Module accepts a 12 to 24 VDC ± 10% power source on TB11. The power source should be located as close to the Output Control Module as possible.

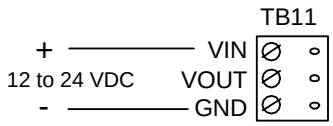
Wire the Power In input with 18 AWG (minimum) twisted pair cable.

Power Source	Requirements	Current
DC power source	Isolated, non-switching, regulated DC power	500 mA

Note: Be sure to observe polarity.

The VOUT terminal on TB11 is the same as VIN.

Power Source Wiring.



48.2 Elevator Control

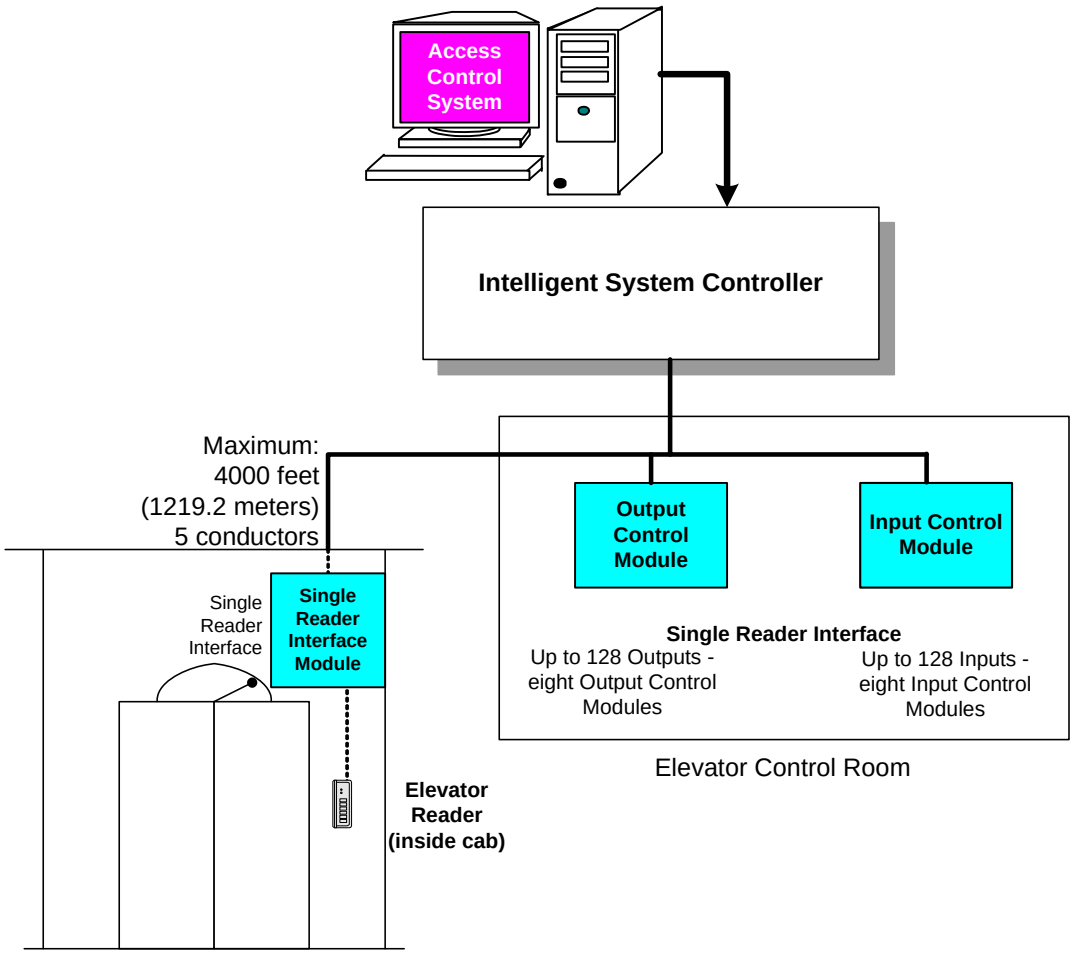
OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The application software must be configured for elevator control. This can be done on the Elevator Hardware tab in the Readers window of the System Administration software. The “Elevator” box should be checked. The reader’s type, name, port, address, access panel, can all be defined here.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) has been disabled.

Addresses assigned to input/output panels do not have to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control



49 Configuration

The Output Control Module board contains 8 DIP switches and, on Series 3 boards, 1 jumper that *must be configured* for your system.

49.1 DIP Switches

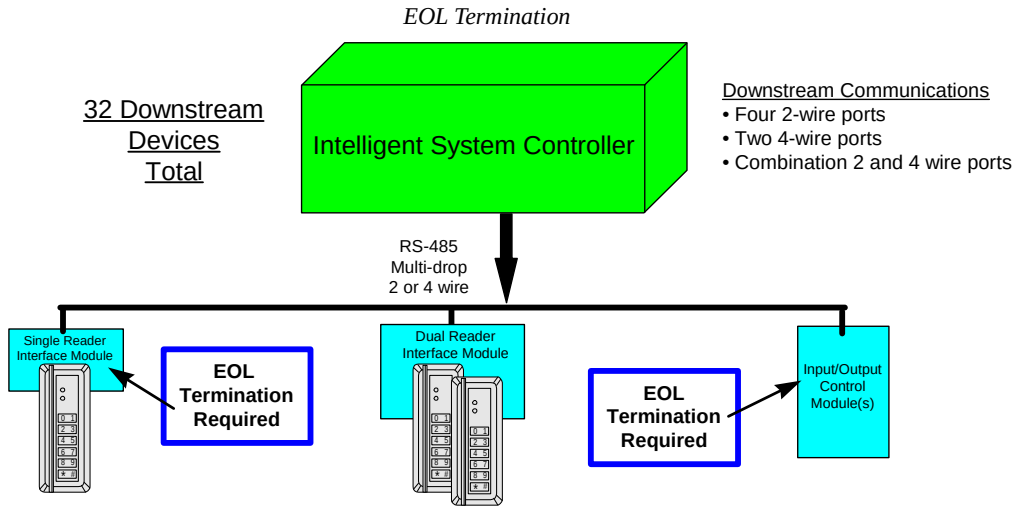
DIP switch settings are described in the General Control Module Configuration chapter.

- Setting DIP Switches on Control Modules
- Device Address
- Communication Baud Rate
- Bus Encryption

49.2 Jumper J1 for the LNL-1200 Series 3

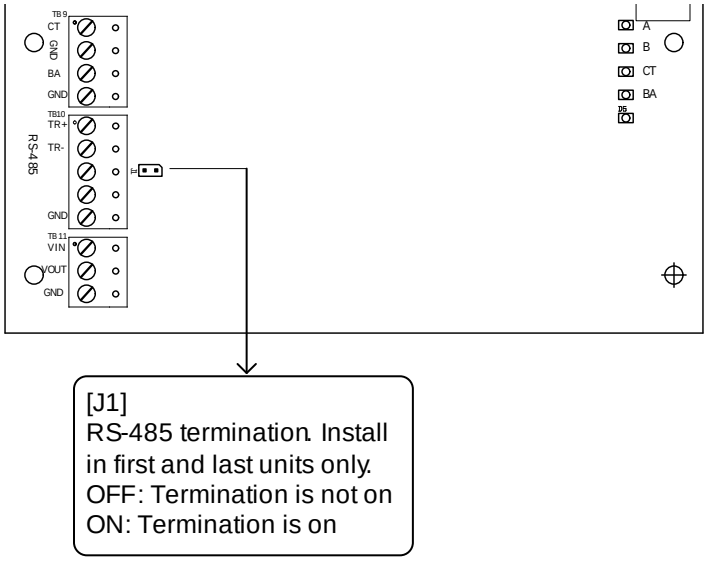
Jumper	Description
J1	RS-485 termination; install in first and last units, only

All other jumpers are factory use, only.



49.2.1 Installing the Jumper

The following diagram describes the use of J1 on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has on-board terminators. The installer should determine which devices are at the end of the communication line.

50 Specifications for LNL-1200 Series 3

** The LNL-1200 Series 3 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.

- Primary Power:
  - 12 to 24 VDC ± 10%, 1100mA maximum
  - 12 VDC @ 850mA nominal
  - 24 VDC @ 450mA nominal
- Relay contacts: 16 Form-C:
  - Normally Open (NO) contact: 5 A @ 30 VDC resistive
  - Normally Closed (NC) contact: 3 A @ 30 VDC resistive
- Inputs: 2 unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- Communication: RS-485, 2-wire: 9600, 19200, 38400, or 115200 bps

- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG, 120 ohm impedance, twisted pair with drain wire and shield, 4000 feet (1219 m) maximum
  - Inputs: stranded twisted pair, 30 ohms maximum
  - Outputs: as required for the load
- Mechanical:
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25.4 mm)
  - Weight: 14 oz. (400 g) nominal
- Environmental:
  - Temperature: -55 to +85° C storage, 0 to +70° C operating
  - Humidity: 5 to 95% RHNC

UL 294, 6th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

51 Regulatory Information

51.1 Certifications

- UL 294 & UL1076 Listed
- ULC Listed
- FCC Part 15
- C-Tick
- CE marking
- RoHS compliant
- WEEE

LNL-1300 Single Reader Interface Module

52 Overview of the LNL-1300

LenelS2 offers a Single Reader Interface (SRI) module for business access control solutions. Access control card readers, keypads, or readers with keypads that use standard data1/data0 and clock/data Wiegand communications are supported. Lock/unlock and facility code, off-line access modes are supported on all readers connected to the SRI. Each SRI supports up to 8 different card formats as well as issue codes for both magnetic and Wiegand card formats.

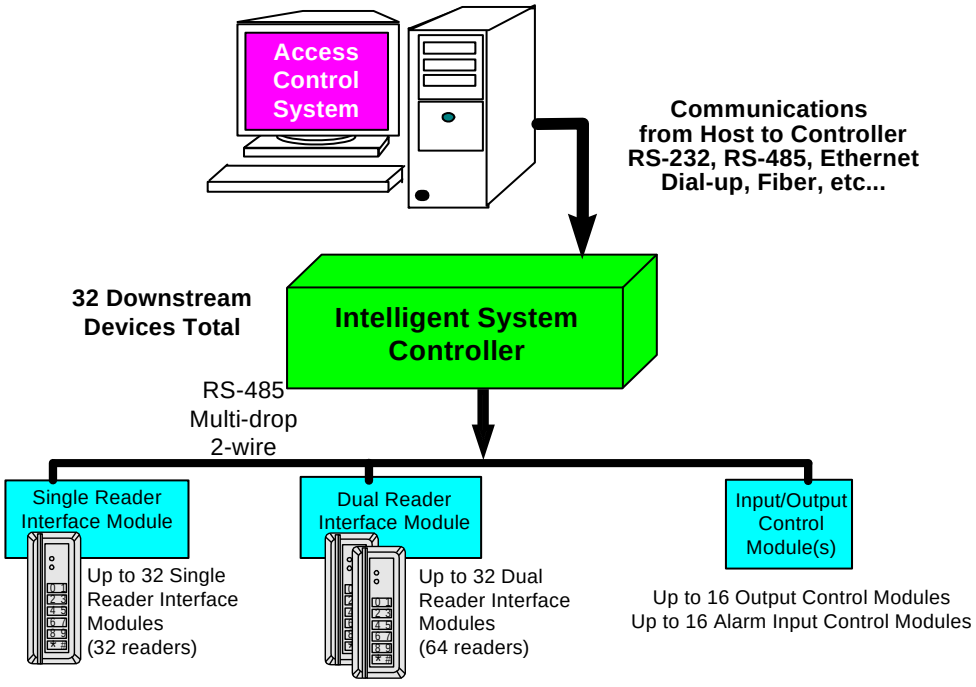
The SRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 SRI modules can be multi-dropped using RS-485 two-wire communication up to 16,000 feet (4000 per port) away from the ISC. Each SRI module is individually addressed for increased reporting capabilities with Access Control software applications. The SRI includes two (2) programmable inputs that support normally open, normally closed, supervised and non-supervised circuits and two (2) output relays support fail-safe or fail-secure operation.

The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

52.1 Interfaces

The Single Reader Interface Module interfaces upstream with the Intelligent System Controller, and downstream with a card reader.

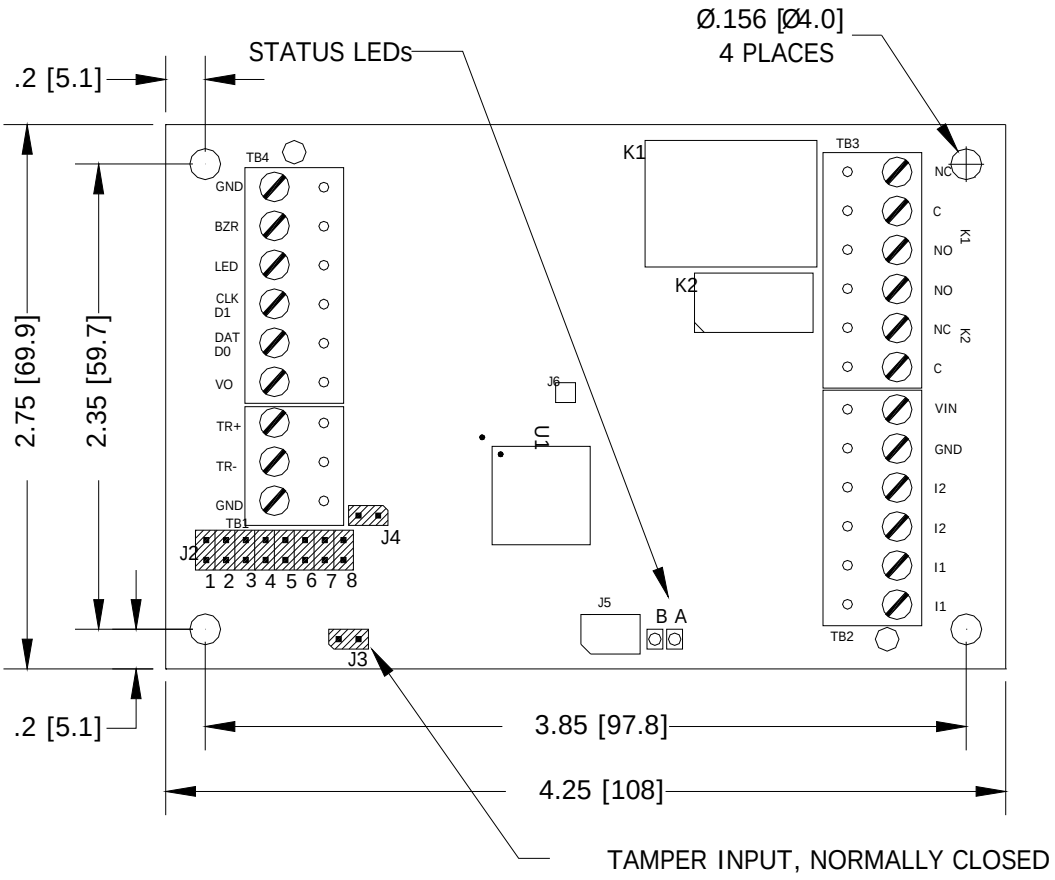
Intelligent System Controller Communications Overview



52.2 The Single Reader Interface Module Board (Series 2)

The series 2 Single Reader Interface Module board contains the following components: two (2) supervised alarm inputs, one (1) RS-485 two-wire interface, two (2) relay outputs, one (1) power input, and nine (9) jumpers. It also contains two (2) status LEDs. In older models of this board, there is one (1) TTL modular jack for reader interface.

Single Reader Interface Module



52.2.1 Status LEDs

The series 2 Single Reader Interface Module board contains two (2) status LEDs.

Power-up: All LEDs off.

Initialization: Once power is applied, initialization of the module begins.

The A LED is turned ON at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The hardware is waiting for firmware to be down loaded.

Run time: After a successful initialization, the LEDs have the following meanings:

A LED: Heartbeat and On-Line Status:

- Offline: 1 second rate, 20% ON
- Online: 1 second rate, 80% ON

B LED: Communication Port Status:

- Indicates communication activity on the communication port.

52.2.2 Series 1 and Series 2

The following tables list the differences between series 1 and series 2 hardware.

Single Reader Interface Module

Feature	Series 1	Series 2
Serial number	less than 650,000	650,000 or greater (revision D)
Input power	12 VDC ±10%	12 to 24 VDC ±10%
Firmware updates	Replace chip	Download firmware into flash memory in the field supported
RS-485 reader interface	Not supported	Supported
Command keypad	Not supported	Supported, currently defaults to RS-485, address 0, 9600 baud

53 Installation

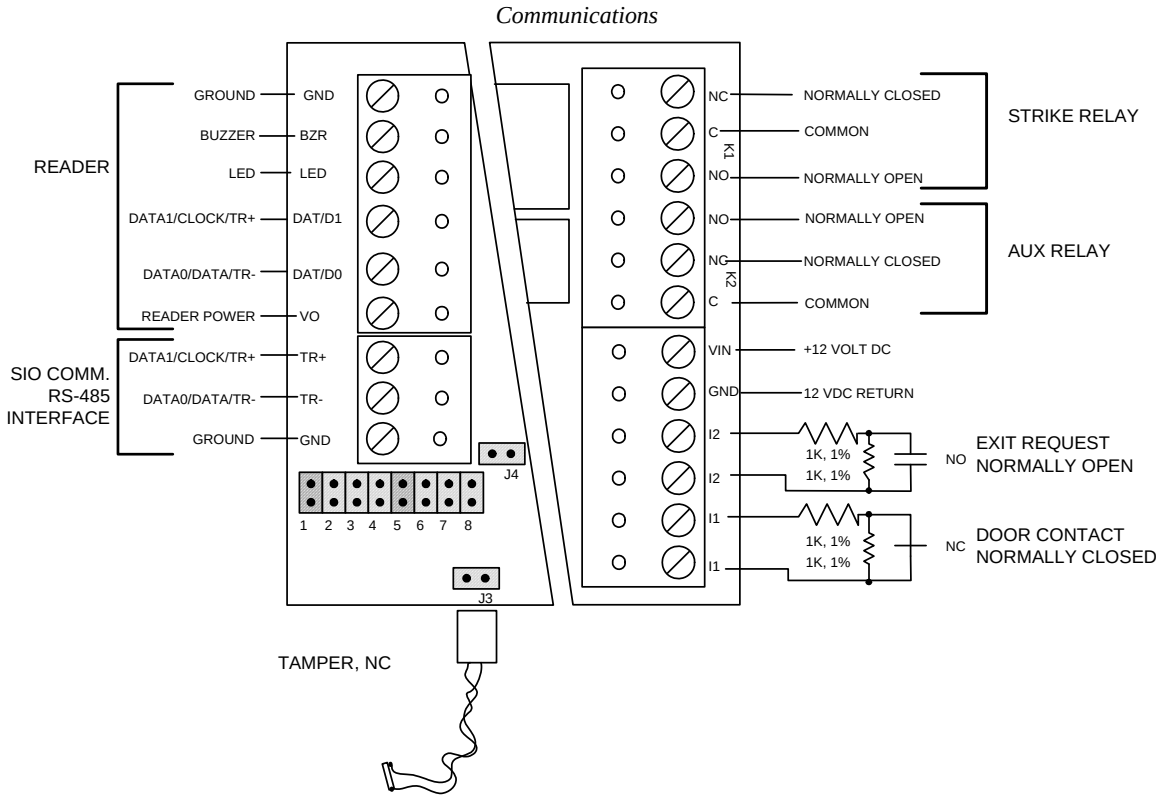
To install the SRI, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the supervised alarm inputs for door position and REX exit push button monitoring.
2. Wire the upstream host communication.
3. Wire the relay outputs.
4. Wire the downstream interface for the keypad or card reader (for older models of the SRI, a TTL interface is used).
5. Wire the power input.

53.1 Wiring

53.1.1 Supervised Alarm Inputs

The Single Reader Interface Module contains two (2) supervised alarm inputs that can be used for door position and REX exit push button monitoring. These alarm inputs are connected using the I1 and I2 inputs. Wire the I1 and I2 inputs using twisted pair cable, 30 ohms maximum. Terminate each of these inputs with two (2) 1000-ohm resistors (1% tolerance – 0.25 watt).



Door contact and REx are selectable through the access control software (by default, door contact is normally closed and REX is normally open).

53.1.2 Upstream Communication

The Single Reader Interface Module uses Port 1 to communicate to the Intelligent System Controller.

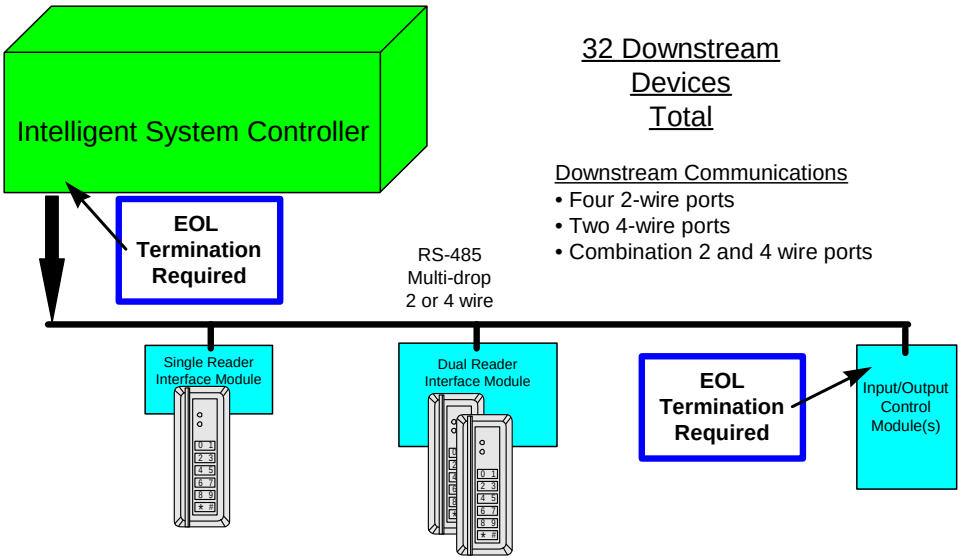
Port 1 is a 2-wire RS-485 interface, that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9841, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet.

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

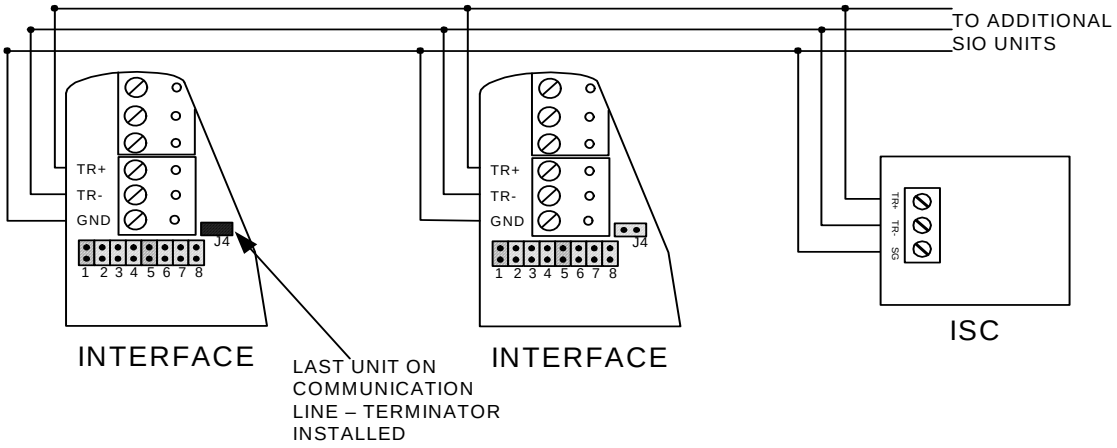
RS-485 must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

EOL Termination



Note: If the Single Reader Interface Module is at the end of the RS-485 line, the J4 termination jumper must be set.

Controller Communication



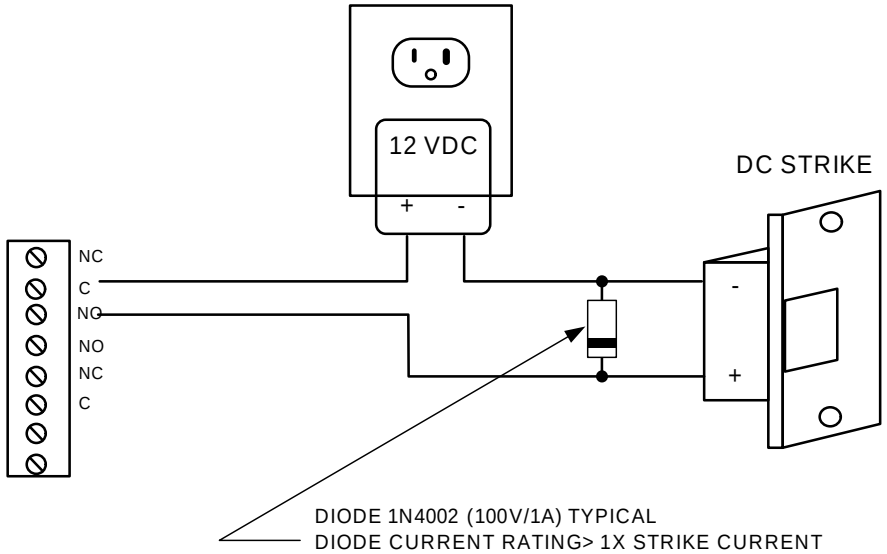
53.1.3 Relay Outputs

The Single Reader Interface Module contains two (2) form-C dry-contact relay outputs, K1 and K2. K1 provides up to 5A 30 VDC; K2 provides up to 1A 30 VDC.

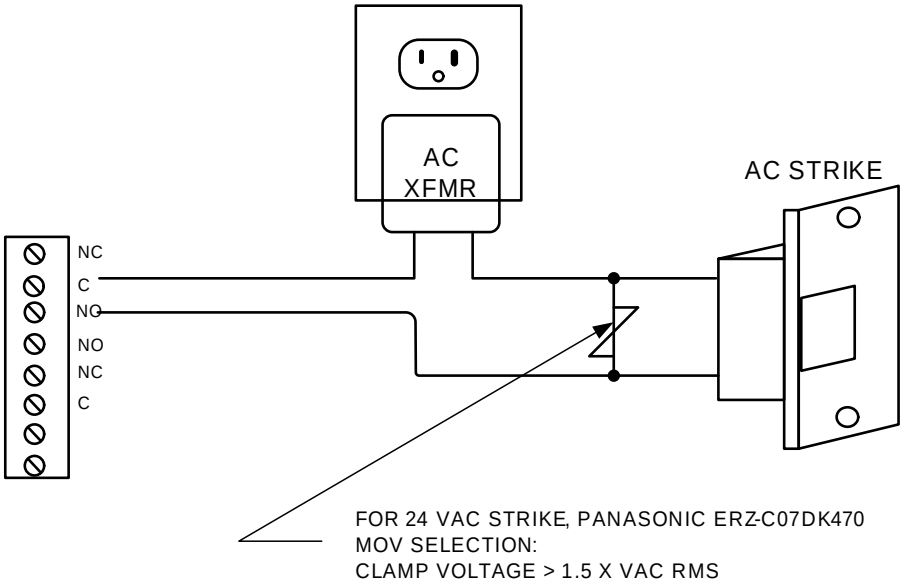
To wire the K1 and K2 outputs, use sufficiently large wires for the load to avoid voltage loss.

Transient clamping must be provided to protect the output contacts and to reduce EMI emissions. For AC-powered devices, use MOV across the load. For DC-powered devices, use a diode across the load.

Relay Contact (DC Strike)



Relay Contact (AC Strike)



53.1.4 Downstream Reader Communication

The Single Reader Interface Module can communicate downstream with one (1) keypad or card reader. The J1 interface is a six-wire interface that includes a buzzer control wire and an LED control wire. The buzzer wire is an open collector that produces 5 VDC open circuit maximum, and 10 mA sink maximum. The LED wire provides between 0.05 and 3 V, 5 mA source/sink maximum.

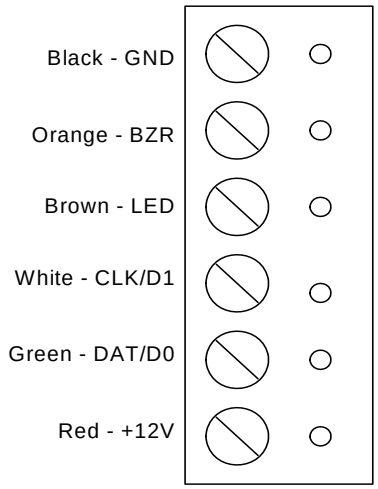
Wire the J1 interface using a 24 AWG (minimum) cable at a maximum of 500 feet.

The reader power is a maximum of 80 mA. If the reader requires additional current, connect the reader power to a +12 VDC terminal on the Single Reader Interface Module.

If you are connecting the reader to a dual reader interface module, each wire should be attached to the associated connection on the Dual Reader Interface Module board (LNL-1320).

All readers that have a buzzer will beep during pre-alarm when in extended held open mode. This includes primary and alternate readers. If the reader has two-wire LED control, this feature is disabled. The reader starts beeping at pre-alarm time and continues to do so until the door is closed or the held open time is hit.

Reader/Single Interface Module Downstream Wiring



53.1.5 F/2F Protocol

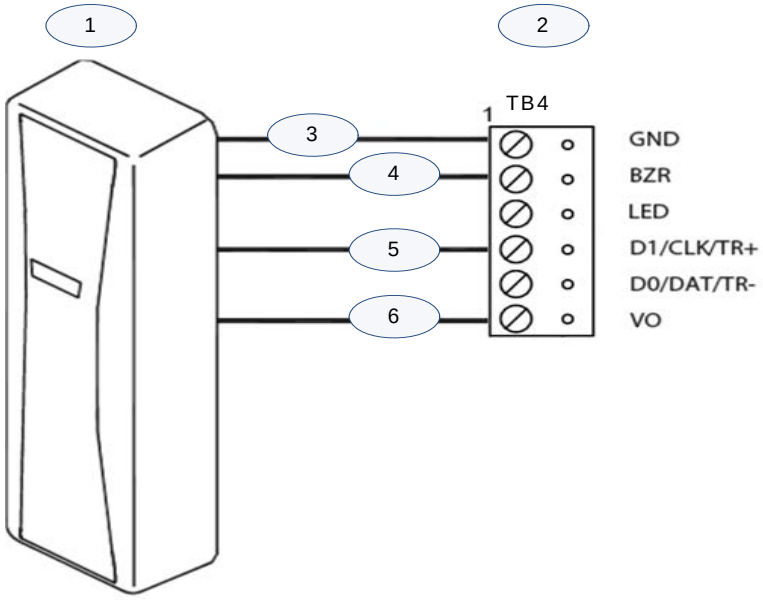
The LNL-1300 accepts data from readers with F/2F and supervised F/2F signaling and door hardware.

Supervised F/2F is available for readers connected to Series 2 LNL-1300 modules with firmware version 1.52.13 or later.

Typical Unsupervised F/2F Reader

When the "F/2F Format" **Output** type is configured in System Administration, door monitor contact and REX are terminated on the LNL-1300 inputs. See the reader manufacturer documentation for the proper connection terminals. End-Of-Line (EOL) resistors are not required.

Unsupervised F/2F Reader Wiring



Unsupervised F/2F Reader Wiring Callouts

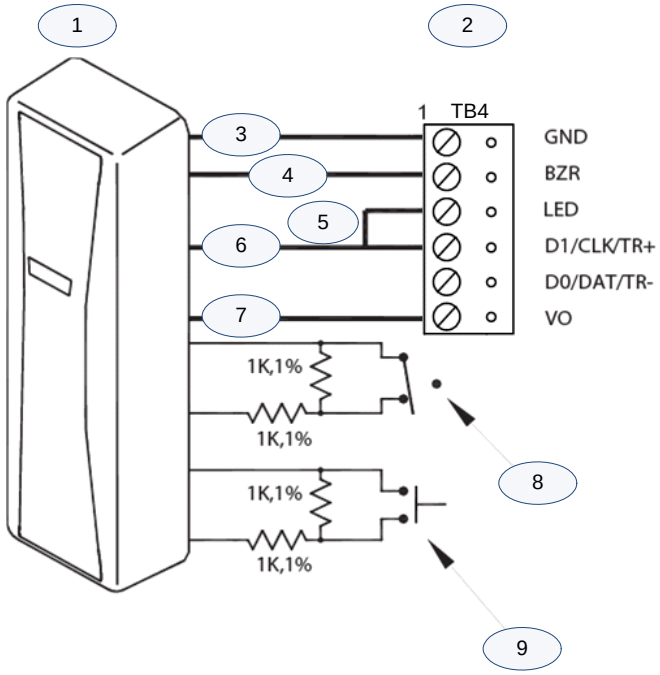
Callout	Description
1	Unsupervised F/2F reader
2	TB4 on LNL-1300
3	TB4-1: Ground connection
4	TB4-3: LED terminal to Reader DO (GREEN LED) connection
5	TB4-4: Reader Data 1 connection
6	TB4-6: +12 VDC connections

Typical Supervised F/2F Reader Edge Inputs

Inputs for the door position monitor and REX switches are wired directly to the F/2F reader, and can be configured for either 2-State or 4-State Supervision: open, closed, short, and cut. See the reader manufacturer documentation for the proper connection terminals. EOL resistors typically require two 1K ohm resistors as shown in the 4-State example. Install the EOL resistors as close to the switch as possible.

When the "Supervised F/2F Remote Inputs" **Output** type is configured in System Administration, door contact and REX are sent to the reader device (e.g. T 500 or CASI 940).

Supervised 4-State F/2F Reader Edge Wiring



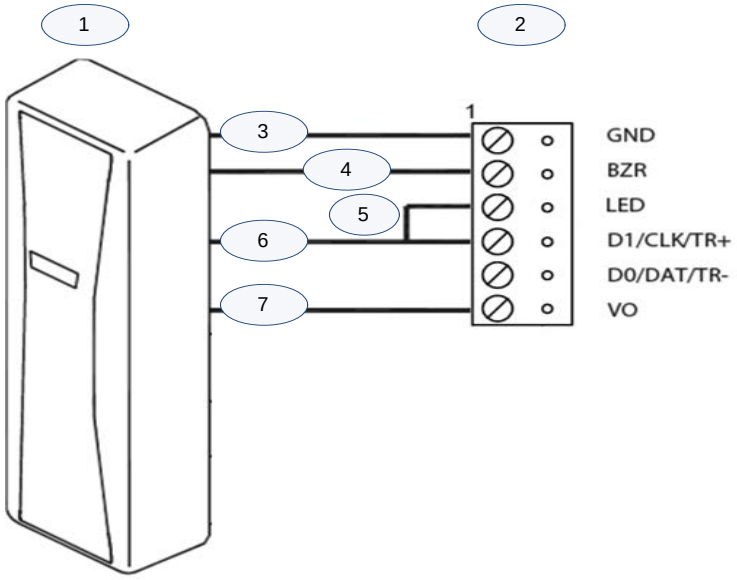
Supervised 4-State F/2F Reader Edge Wiring Callouts

Callout	Description
1	Supervised F/2F reader
2	TB4 on LNL-1300
3	TB4-1: Ground connection
4	TB4-2: Buzzer terminal to Reader DO (GREEN LED) connection
5	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
6	TB4-4: Reader Data 1 connection
7	TB4-6: +12 VDC connection
8	Normally Closed contact for door monitor switch
9	Normally Open contact for REX switch

Typical Supervised F/2F Board Edge Inputs

When the "Supervised F/2F Board Edge Inputs" **Output** type is configured, the door contact and REX are terminated on the LNL-1300 inputs.

Supervised F/2F Board Edge Wiring



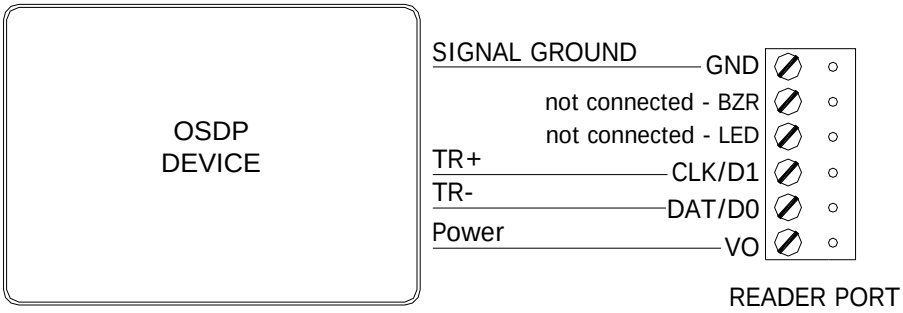
Supervised F/2F Board Edge Wiring Callouts

Callout	Description
1	Supervised F/2F reader
2	TB4 on LNL-1300
3	TB4-1: Ground connection
4	TB4-2: Buzzer terminal to Reader DO (GREEN LED) connection
5	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
6	TB4-4: Reader Data 1 connection
7	TB4-6: +12 VDC connection

53.1.6 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control. For OSDP, set the baud rate to 9600 bps.

Wiring for OSDP readers



53.1.7 Power

The Single Reader Interface Module requires a filtered 12 VDC ± 15% power source for its power input. The power source must provide isolated and non-switching, linear regulated DC power, with 125 mA current.

Wire the power input with 18 AWG (minimum) twisted pair cable.

Notes:
- Be sure to observe polarity.
- Do not use an AC transformer to directly power the Single Reader Interface Module.
- In older models of this hardware, the 12 VDC is passed to the TTL modular jack and is available for powering a keypad or reader (80 mA maximum).

53.2 Elevator Control

OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

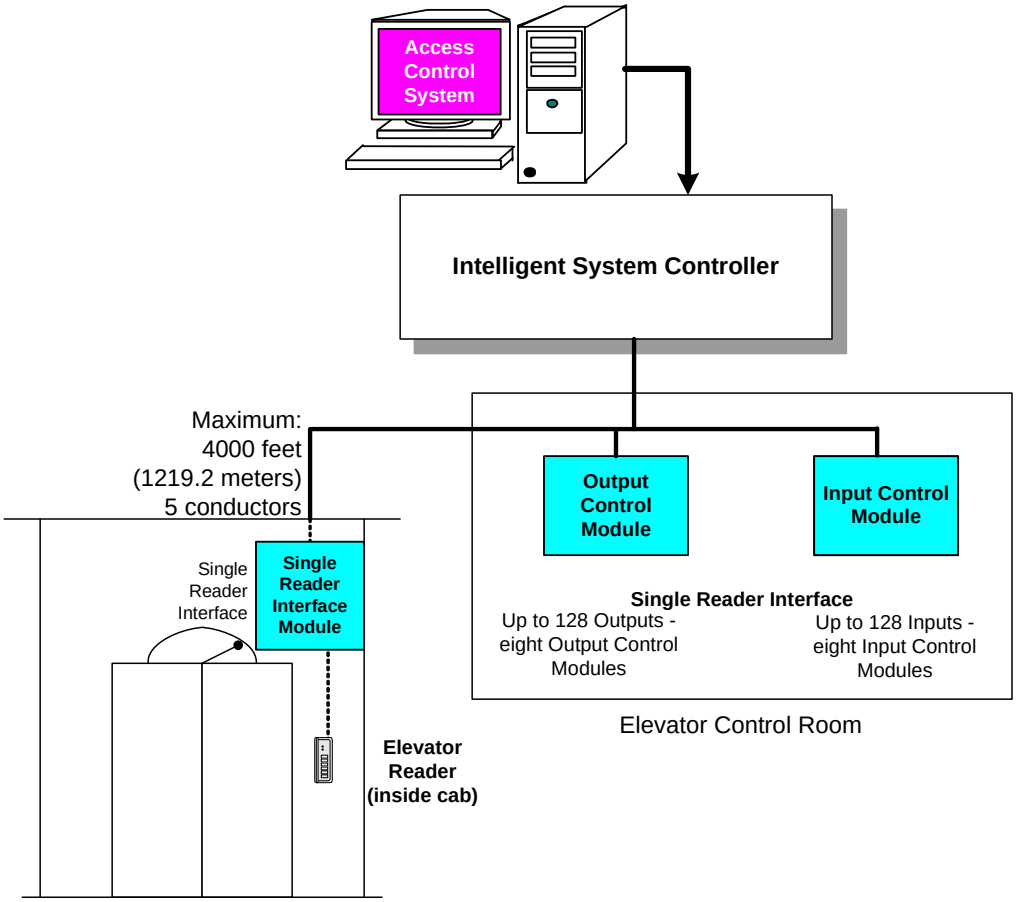
The OnGuard software must be configured for elevator control. This can be done from System Administration by selecting the **Elevator** check box on the General tab in the Readers and Doors form. The reader's type, name, port, address, and access panel can all be defined here as well.

Note: In order for this check box to be available, the access panel to which this reader module is connected must have **Elevator support** enabled on the Options tab.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) is disabled.

Addresses assigned to input/output panels do not need to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control



54 Configuration

The Single Reader Interface Module board contains 9 jumpers that must be configured for your system.

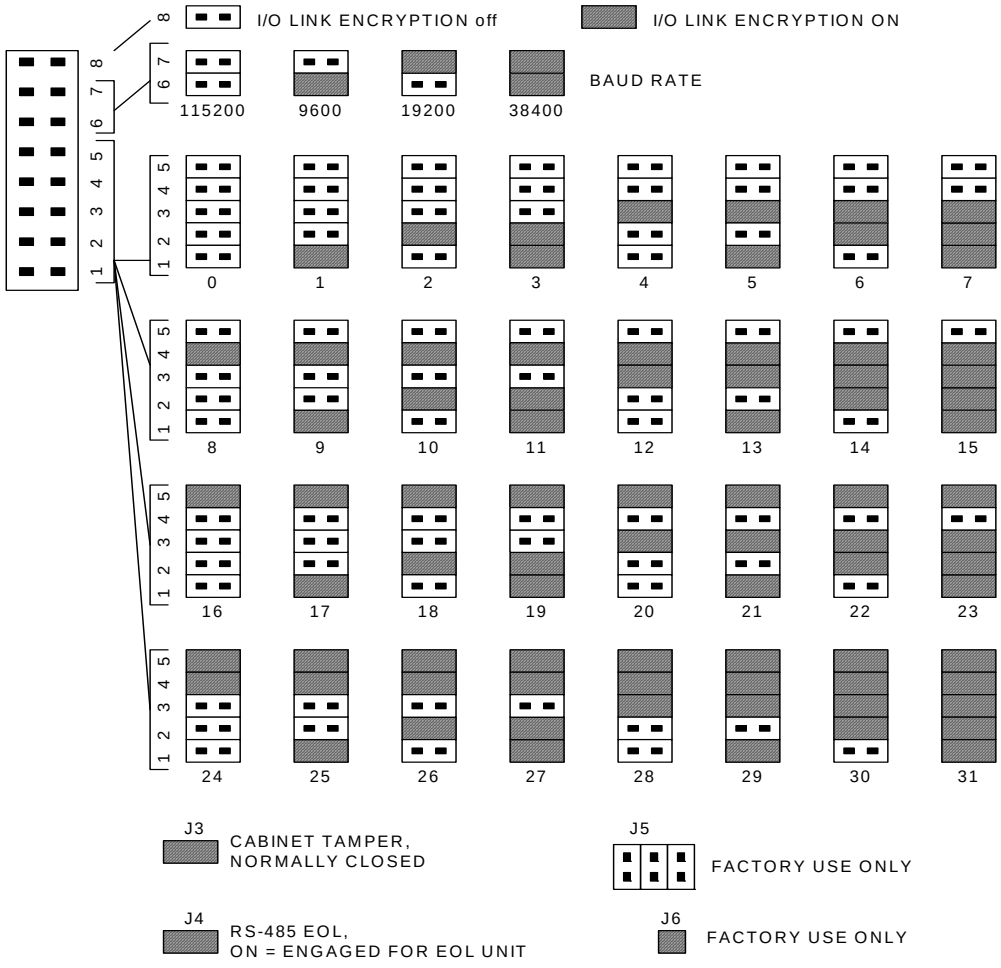
54.1 Installing Jumpers

The following chart describes the use of each jumper.

JUMPER(S)	USED TO CONFIGURE:
1,2,3,4,5	Device communication address (0 - 31)
6,7	Communication baud rate (38400, 19200, 9600, or 2400 bps)
8	Downstream encryption (available with OnGuard 2009 or later)

The diagram below shows the Jumper(s) configuration for the device communication address, communication baud rate, and RS-485 termination status.

Jumper Configurations



54.1.1 Device Address

To configure the device communication address, set jumpers 1, 2, 3, 4, and 5 according to the following table.

ADDRESS	JUMPER				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON

ADDRESS	JUMPER				
	1:	2:	3:	4:	5:
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

54.1.2 Communication Baud Rate

To configure the communication baud rate, set jumpers 6 and 7 according to the following table.

BAUD RATE:	JUMPER	
	6:	7:
38400 bps	ON	ON
19200 bps	off	ON
9600 bps	ON	off
2400 bps	off	off

Currently, OnGuard only supports a baud rate of 38400 bps, so be sure to set both 6 and 7 to the ON position.

54.1.3 Communication Password Status

Jumper 8 controls the utilization of encryption.

PASSWORD STATUS	DIP SWITCH 8: (OnGuard 2009 or later)	DIP SWITCH 8: (prior to OnGuard 2009)
Encryption is optional	off	Normal operation
Encryption is required	ON	Not allowed

When jumper 8 is ON, communication will not be allowed unless the access panel supports downstream encryption and is configured to enable encryption to this device.

When jumper 8 is off, the device will accept either encrypted or unencrypted communication. It must be off if the access panel does not support downstream encryption, or if downstream encryption is disabled for this device.

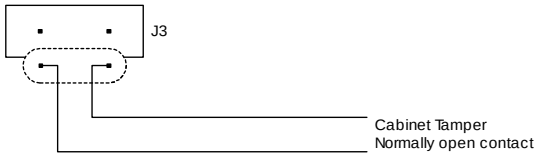
54.1.4 Cabinet Tamper

Jumper J3 is used to configure cabinet tamper. There are two possible configuration options: On or Off. When J3 is on, cabinet tamper is bypassed. When it is off, it must be wired in order to work.

J3 in ON position (Cabinet Tamper is bypassed)



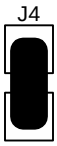
J3 in OFF position (requires wiring)



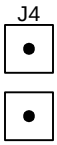
54.1.5 EOL Termination

Jumper J4 is used to configure the EOL termination status the Single Reader Interface Module board. There are two possible configuration options that can be used to install this jumper: “On” and “Not On.”

Termination ON position for J4



Termination OFF position for J4



55 Specifications

The LNL-1300 series 2 is for use in low voltage, class 2 circuits only.

- Primary power: 12 to 24 VDC + 10%, 150mA maximum (plus reader current)
  - 12 VDC @ 110mA (plus reader current) nominal
  - 24 VDC@ 60mA (plus reader current) nominal
- Outputs: Form-C contacts: K1: 5A @ 28 VDC, K2: 1A @ 28 VDC

- Inputs:
  - 2 supervised, End of Line resistors, 1k/1k ohm, 1% 1/4 watt standard
  - 1 unsupervised, dedicated for cabinet tamper
- Reader Interface:
  - Reader power: 12 to 24 VDC ± 10% (input voltage passed through)
  - Reader LED output: TTL compatible, high > 3V, low < 0.5V, 5mA source/sink maximum
  - Buzzer output: Open collector, 5 VDC open circuit maximum, 10mA sink maximum
  - Reader data inputs: TTL compatible inputs or 2-wire RS-485
- Communication: RS-485, 2-wire. 9600, 19200, 38400, or 115200 bps
- Cable requirements:
  - Power: 18 AWG, 1 stranded twisted pair
  - RS-485: 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet (1219 m) maximum
  - Alarm Inputs: 1 stranded twisted pair per input, 30 ohms maximum
  - Outputs: As required for the load
  - Reader data (TTL): 18 AWG stranded, 6 conductor, 500 feet (150 m) maximum
  - Reader data (RS-485): 24 AWG stranded, 120 ohm impedance, twisted pair with shield, 2000 (609.6 m) maximum
- Mechanical:
  - Dimension: 4.25 x 2.75 x 1.4 in. (108 x 74 x 36 mm)
  - Weight: 4 oz. (120 g) nominal
- Environmental:
  - Temperature: -55 to +85° C storage, -35 to +75° C operating
  - Humidity: 0 to 95% RHNC
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - CE marking
  - RoHS compliant
  - WEEE

These specifications are subject to change without notice.

LNL-1300 Series 3 Single Reader Interface Module

56 LNL-1300 Series 3 Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-1300 Series 3 Reference section.

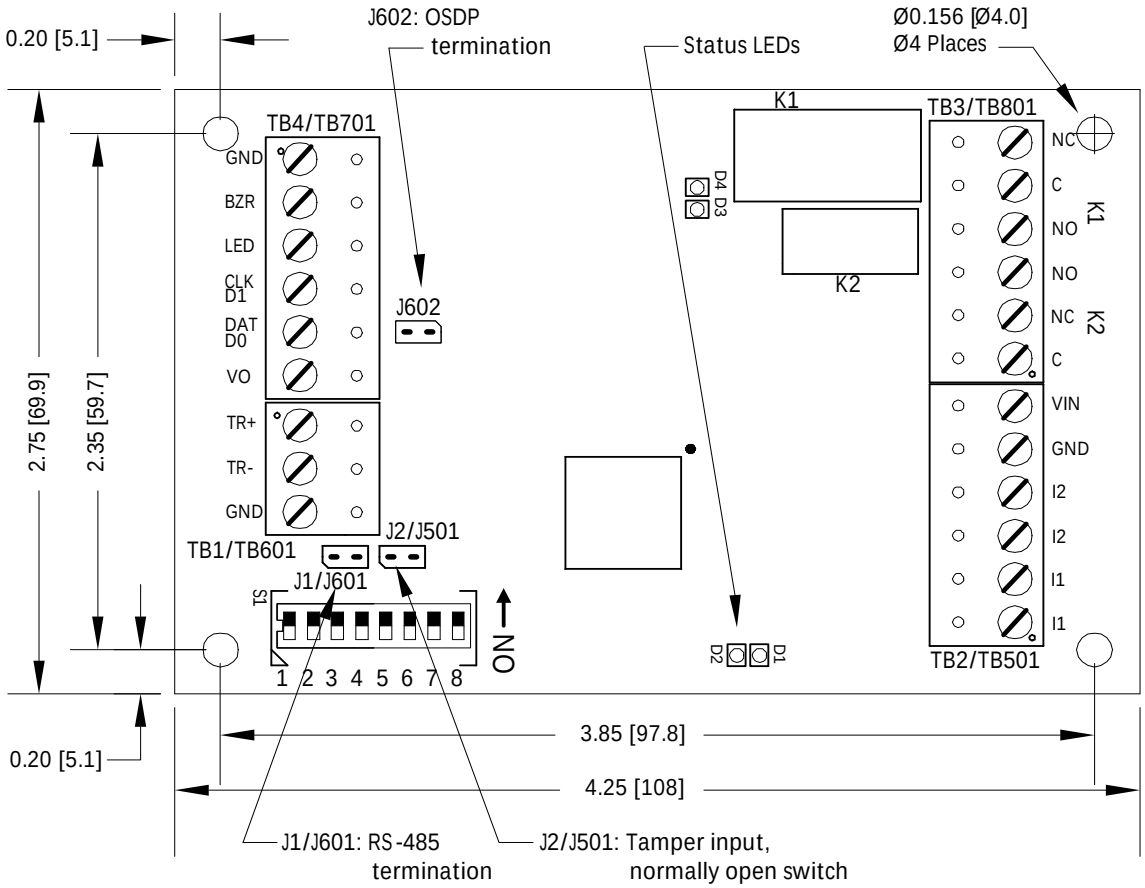
1. Mount the device in the appropriate enclosure.
2. Wire the supervised alarm inputs for door position and REX exit push button monitoring.
3. Wire the upstream host communication.
4. Wire the relay outputs.
5. Wire the downstream interface for the keypad or card reader (for older models of the SRI, a TTL interface is used).
6. Wire the power input.
7. Configure the correct settings using the jumpers and DIP switches.

57 LNL-1300 Series 3 Reference

57.1 General

The LNL-1300 reader interface provides a solution to the host system integrator for interfacing to a TTL (D1/D0, Clock/Data), F/2F or RS-485 device, and door hardware. It also provides a tri-stated LED control and buzzer control. Two (2) Form-C contact relay outputs may be used for strike control or alarm signaling. Two (2) inputs are provided that can be used for monitoring the door contact and request to exit push button. Input circuits can be configured as unsupervised or supervised. Communication to the controller is accomplished via a 2-wire RS-485 interface. The LNL-1300 requires 12 to 24 VDC for power.

57.2 LNL-1300 Series 3 Hardware



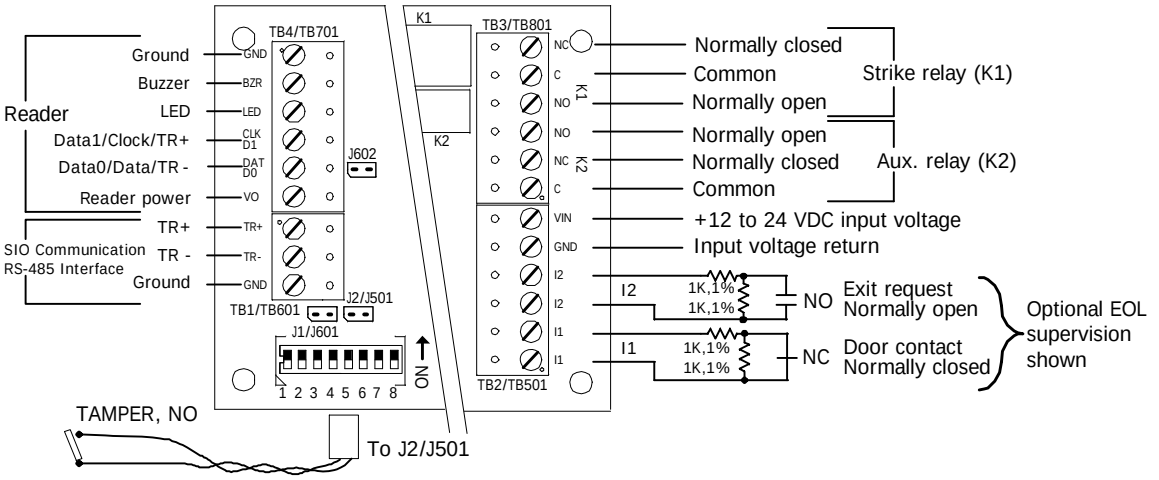
Notes:
- Older versions of the LNL-1300 Series 3 do not include the OSDP termination jumper J602.
- Diagrams include jumper and terminal block labels for all versions such as: J1/J601, TB2/TB501.

57.3 Supplying Power to the LNL-1300 Series 3

The LNL-1300 requires filtered 12 to 24 VDC ± 10% for power. Two (2) inputs are typically used for door contact and exit push button monitoring. End of line resistors are required input supervision, shown below.

Note: For UL compliance, only 12 VDC was evaluated.

Note: The input power is passed through to the reader terminal strip and is available for powering a reader. Readers that require different voltage requirements must be powered separately. Care must be taken to insure the input voltage is within the voltage range of the reader. The reader power output terminal, TB4-6/TB701-6 (VO), is not current-limited.



57.3.1 J602 OSDP Termination Jumper

The J602 jumper is located next to the reader port and controls OSDP termination. This jumper should be closed when an OSDP reader is used. When using a non-OSDP reader, the jumper should be open.

Important: Failure to properly set the OSDP termination jumper could cause reader communication issues.

Note: Older versions of the LNL-1300 Series 3 do not include the OSDP termination jumper J602.

57.4 Reader Wiring

The reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 signaling. (Refer to the reader manufacture specifications for cabling requirements.) In the 2-wire LED mode the buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

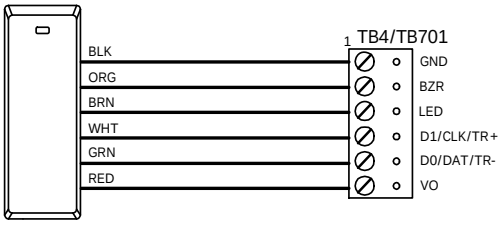
Notes:

For OSDP cable lengths greater than 200 ft (61 m) or EMF interference close jumper J602.

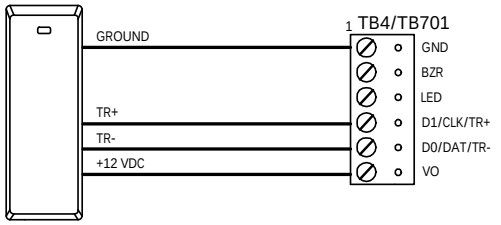
For older versions of the LNL-1300-S3 that do not include jumper J602, install a 120Ω +/- 2Ω resistor across RS-485 termination ends.

Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cable works best on shorter cable lengths at lower data rates.

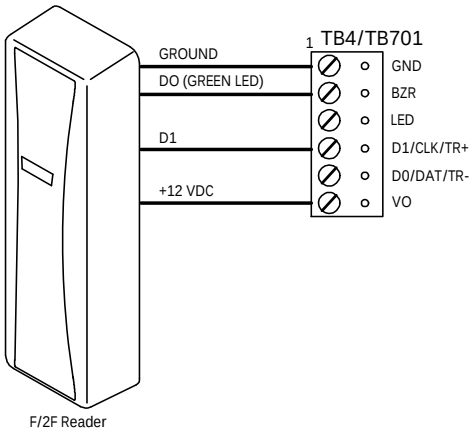
Typical D1/D0 or Clock/Data Reader



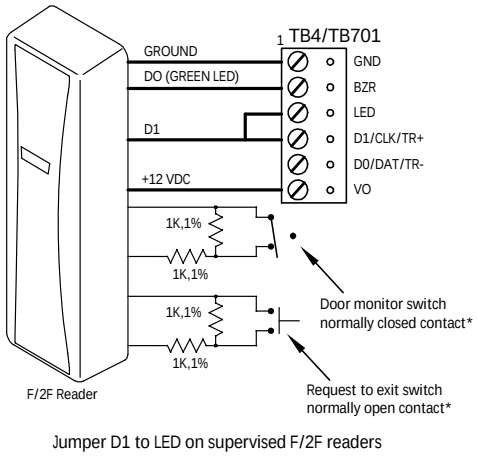
Typical RS-485 Device (such as OSDP Reader)



Typical Unsupervised F/2F Reader



Typical Supervised F/2F Reader



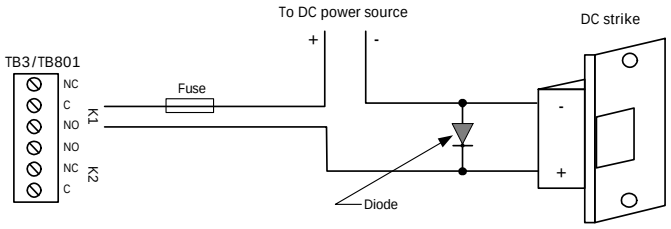
Jumper D1 to LED on supervised F/2F readers

*Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).

57.5 Door Strike Relay Wiring

Two (2) Form-C contact relays are provided for controlling door strike or other devices. See "Specifications" on page 322 for the relay contact ratings. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, a contact protection circuit must be used. The following circuit is recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30 cm]), as the effectiveness of the circuit will decrease if it is located far away.

Typical DC Door Strike Wiring

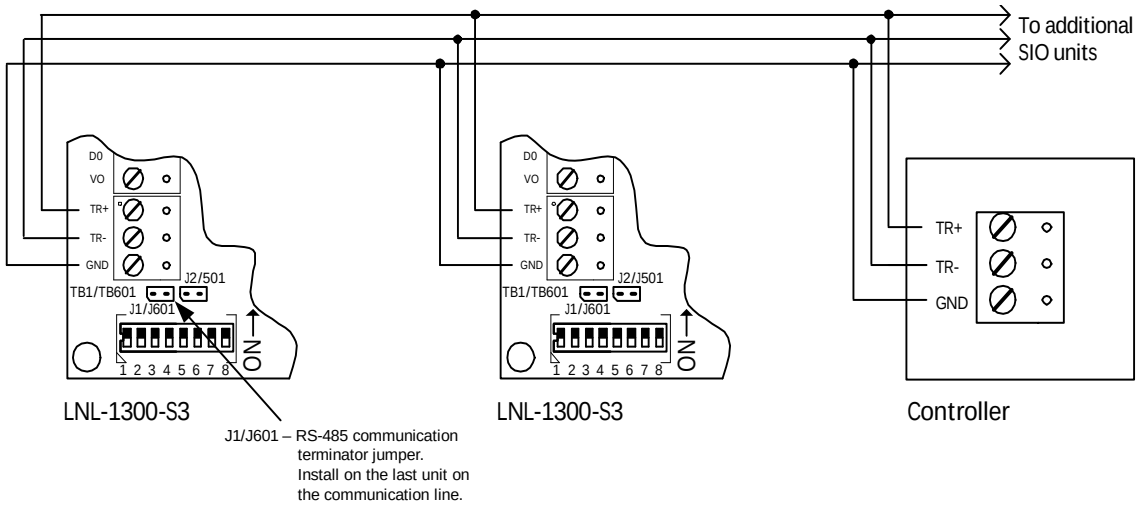


Diode Selection:

- Diode current rating: greater than 1x strike current.
- Diode breakdown voltage: 4x strike voltage.
- For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.

57.6 Communication Wiring

The LNL-1300 communicates with a LenelS2 intelligent controller (LNL-3300, for example) via a half-duplex, multi-drop 2-wire RS-485 interface. The total cable length is limited to 4000 feet (1219 m). A shielded cable of 24 AWG with characteristic impedance of 120 ohm is specified for the 2-wire RS-485 interface. The last device on each end of the communication line should have the terminator installed (install jumper J1/J601).



57.7 Address, Baud Rate, and Encryption Configuration Switch

Switches 1 to 5 select the device address. Switches 6 and 7 select the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are set via the host software.

Device Address

Address	DIP switch				
	5:	4:	3:	2:	1:
0	off	off	off	off	off
1	off	off	off	off	ON
2	off	off	off	ON	off
3	off	off	off	ON	ON
4	off	off	ON	off	off
5	off	off	ON	off	ON
6	off	off	ON	ON	off
7	off	off	ON	ON	ON
8	off	ON	off	off	off
9	off	ON	off	off	ON
10	off	ON	off	ON	off
11	off	ON	off	ON	ON
12	off	ON	ON	off	off
13	off	ON	ON	off	ON
14	off	ON	ON	ON	off
15	off	ON	ON	ON	ON
16	ON	off	off	off	off
17	ON	off	off	off	ON
18	ON	off	off	ON	off
19	ON	off	off	ON	ON
20	ON	off	ON	off	off
21	ON	off	ON	off	ON
22	ON	off	ON	ON	off
23	ON	off	ON	ON	ON
24	ON	ON	off	off	off
25	ON	ON	off	off	ON

Address	DIP switch				
	5:	4:	3:	2:	1:
26	ON	ON	off	ON	off
27	ON	ON	off	ON	ON
28	ON	ON	ON	off	off
29	ON	ON	ON	off	ON
30	ON	ON	ON	ON	off
31	ON	ON	ON	ON	ON

Communication

Baud rate	DIP switch 7:	DIP switch 6:
38,400 bps	ON	ON
19,200 bps	ON	off
9,600 bps	off	ON
115,200 bps (Firmware revisions prior to 1.38.1, this setting is 2,400 BPS.)	off	off

Bus communications	DIP switch 8: (OnGuard 2009 or later)	DIP switch 8: (prior to OnGuard 2009)
Encryption is not required	off	Normal operation
Encryption is required	ON	Not allowed

57.8 Status LEDs

Power-up: All LEDs are OFF

Initialization: Once power is applied, initialization of the module begins. The D1 LED is turned ON at the beginning of initialization

Run time: After the above sequence, the LEDs have the following meanings:

LED	Description
D1 LED heartbeat and on- line status	Off-line: 1 sec rate, 20% ON, 80% OFF
	On-line: Non-encrypted communication: 1 sec rate, 80% ON, 20% OFF Encrypted communication: .1 sec ON, .1 sec OFF, .1 sec ON, .1 sec OFF, .1 sec ON, .1 sec OFF, .1 sec ON, .3 sec OFF

LED	Description
D1 LED	Error Indication: Waiting for application firmware to be downloaded: .1 sec ON, .1 sec OFF.
D2 LED	SIO Communication Port Status: Indicates communication activity on the SIO communication port.

57.9 Specifications

The LNL-1300 Series 3 is for use in low voltage, Class 2 circuits only. All output circuits are Class2/Power Limited.

The installation of this device must comply with all local fire and electrical codes.

Note: Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.

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Primary Power:	12 to 24 VDC ± 10%, 150 mA maximum (reader current not included)
Outputs:	Two (2) Form-C relays: K1: Normally open (NO) contact: 5 A @ 30 VDC resistive Normally closed (NC) contact: 3 A @ 30 VDC resistive K2: 1 A @ 30 VDC resistive
Inputs:	Two (2) unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, ¼ watt One (1) unsupervised, dedicated for cabinet tamper
Reader Interface:	
Power:	12 to 24 VDC ± 10% (input voltage (VIN) passed through)
Data Inputs:	TTL compatible, F/2F or 2-wire RS-485
LED Output:	TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
Communication:	2-wire RS-485:9600, 19200, 38400 or 115200 bps
Cable Requirements:	
Power:	1 twisted pair, 18 AWG
RS-485 I/O Devices:	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 4000 feet (1219 m) maximum
Alarm Input:	1 twisted pair per input, 30 ohm maximum
Outputs:	As required for the load
Reader data (TTL):	6-conductor, 18 AWG, 500 feet (150 m) maximum

Reader data (F/2F):	4-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (RS-485):	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 2000 feet (610 m) maximum
Mechanical:	
Dimension:	4.25in. (108 mm) W x 2.75 in. (70 mm) L x 1 in. (25.4 mm) H
Weight:	4 oz. (120 g) nominal
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: -40 to +70 °C (40° to 158° F)
Humidity:	5 to 95% RHNC

UL 294, 7th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX or LNL-AL600ULX-4CB6.

These specifications are subject to change without notice.

FOR MORE INFORMATION ON PRODUCT WARNINGS AND DISCLAIMERS, SEE THE "LENELS2 PRODUCT WARNINGS AND DISCLAIMERS" KNOWLEDGE BASE ARTICLE IN THE LENELS2 KNOWLEDGE BASE. THIS INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE.

57.10 Regulatory Information

57.10.1 Certifications

- UL 294 & UL 1076 Listed
- ULC Listed
- FCC Part 15
- C-Tick
- CE marking
- RoHS compliant

- WEEE

LNL-1300e Single Door IP Interface Module

58 Overview of the LNL-1300e

This reader IP interface provides a network-connected, single door, PoE-based solution using single or paired readers for ingress/egress operation. The first reader port can accommodate a read head that utilizes Wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling standards, one or two wire LED controls, and buzzer control (one-wire LED mode, only).

The second reader port can accommodate a read head that utilizes Wiegand or magnetic stripe signaling, one or two-wire LED controls, and buzzer control (one-wire LED mode, only). Two Form-C relay outputs may be used for door strike control or alarm signaling. The relay contacts are rated at a 5 Amp @ 30 VDC, dry contact configuration. Four (4) inputs are provided for monitoring the door contacts, exit push buttons, and alarm contacts. The LNL-1300e requires power from PoE or local 12 VDC.

Notes:
An alternative configuration of the LNL-1300e is available where no reader ports are used, and the device is deployed as an alarm panel with 4 inputs and 2 relay outputs.

This product has been evaluated by UL for access control applications only.

The LNL-1300e may be mounted in a UL Listed 3-gang switch box (a mounting plate is supplied with the unit). The controller may be mounted in an enclosure; the supplied mounting plate has mounting holes that match the LNL-1300 mounting footprint.

58.1 LNL-1300e IP Interface Board Components

The board contains the following components: one (1) host Ethernet interface, one (1) power-in input, four (4) unsupervised/supervised inputs, two (2) reader interfaces, two (2) output relays, four (4) DIP switches, seven (7) jumpers, six (6) status LEDs, and one (1) reset switch.

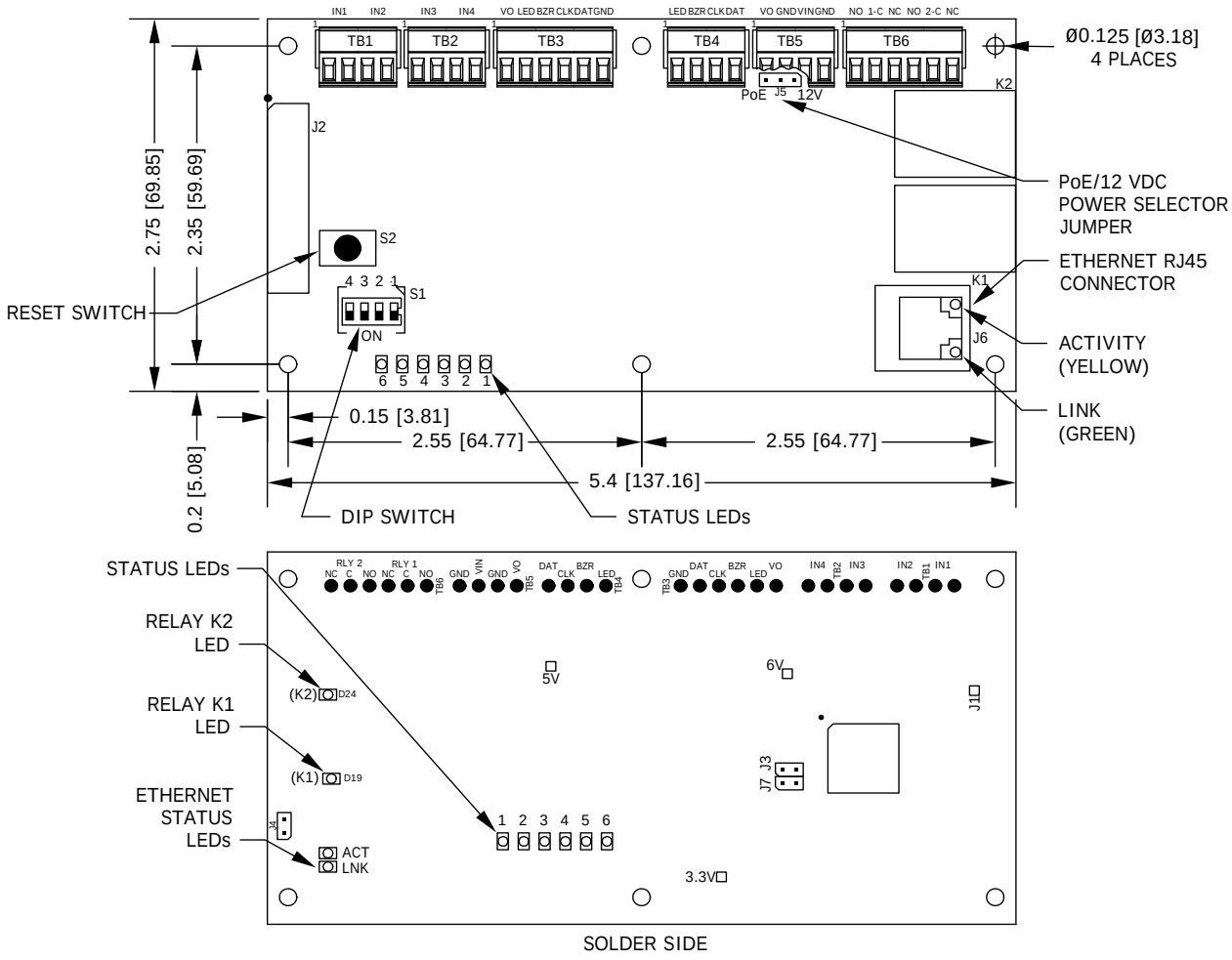
58.1.1 Support for LNL-1300e

Access panel support for the LNL-1300e includes the LNL-2210, LNL-2220, LNL-3300, LNL-3300-M5, LNL-4420, and the LNL-X series. Access panels must be configured for IPv4 communication mode.

Maximum number of LNL-1300e addressable devices allowed per port:

- 8 for the LNL-2210
- 32 for the LNL-2220, LNL-3300, LNL-3300-M5, LNL-4420, and LNL-X series

The LNL-1300e board



SOLDER SIDE

59 Installation

To install the intelligent single door controller, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.
7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.

Important: In order to help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. Your grounding connection must be made at this point. The system should be connected to earth ground at one point and one point only.

59.1 Wiring and Setup

Refer to the following table for wiring and setup of the LNL-1300e.

Connections		
TB1-1	IN1	Input 1 (typically door contact)
TB1-2	IN1	
TB1-3	IN2	Input 2 (typically request to exit)
TB1-4	IN2	
TB2-1	IN3	Input 3
TB2-2	IN3	
TB2-3	IN4	Input 4
TB2-4	IN4	
TB3-1	VO	Reader 1 Power Output – 12 VDC
TB3-2	LED	Reader 1 LED Output
TB3-3	BZR	Reader 1 Buzzer Output
TB3-4	CLK	Reader 1 CLK/Data 1/TR+
TB3-5	DAT	Reader 1 DAT/Data 0/TR-
TB3-6	GND	Reader 1 Ground
TB4-1	LED	Reader 2 LED Output
TB4-2	BZR	Reader 2 Buzzer Output
TB4-3	CLK	Reader 2 CLK/Data 1
TB4-4	DAT	Reader 2 DAT/Data 0
TB5-1	VO	Auxiliary Power Output - 12 VDC
TB5-2	GND	Auxiliary Power Output Ground

Connections		
TB5-3	VIN	Input Power - 12 VDC (from local power supply)
TB5-4	GND	Input Power Ground
TB6-1	NO	Relay K1 - Normally Open Contact
TB6-2	1-C	Relay K1 - Common Contact
TB6-3	NC	Relay K1 - Normally Closed Contact
TB6-4	NO	Relay K2 - Normally Open Contact
TB6-5	2-C	Relay K2 - Common Contact
TB6-6	NC	Relay K2 - Normally Closed Contact

59.1.1 Input Power

The LNL-1300e can be powered using either of the following (jumper-selected) methods:

- An Ethernet connection using PoE, fully compliant to IEEE 802.3af.
- A local 12 VDC power supply, TB5-3 (VIN), TB5-4 (GND).

Note: Jumper 5 sets the source of power for the device. For more information, refer to Install Jumpers on page 337.

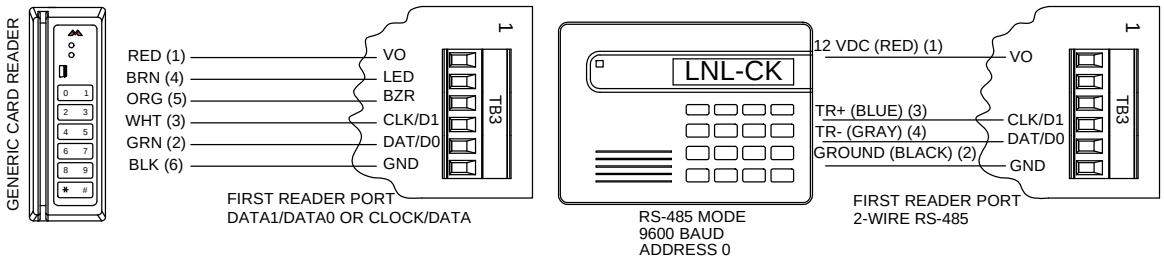
59.1.2 Communication Wiring

The LNL-1300e communicates to the controller via the on-board 10-Base-T/100Base-TX Ethernet interface (port 0).

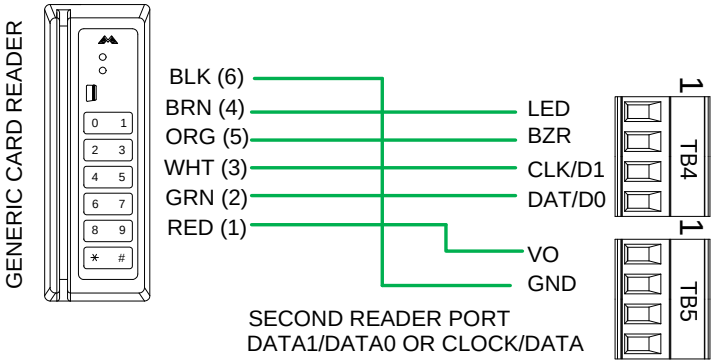
59.1.3 Reader Wiring

The first reader port supports Wiegand, magnetic stripe, and 2-wire RS-485 electrical interfaces. The second reader port supports Wiegand and magnetic stripe electrical interfaces. Power to the first reader is 12 VDC and is current limited to 150 mA. The second reader may be powered from the auxiliary power output on TB5-1 and TB5-2. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacture specifications for cabling requirements. In the 2-wire LED mode, the Buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

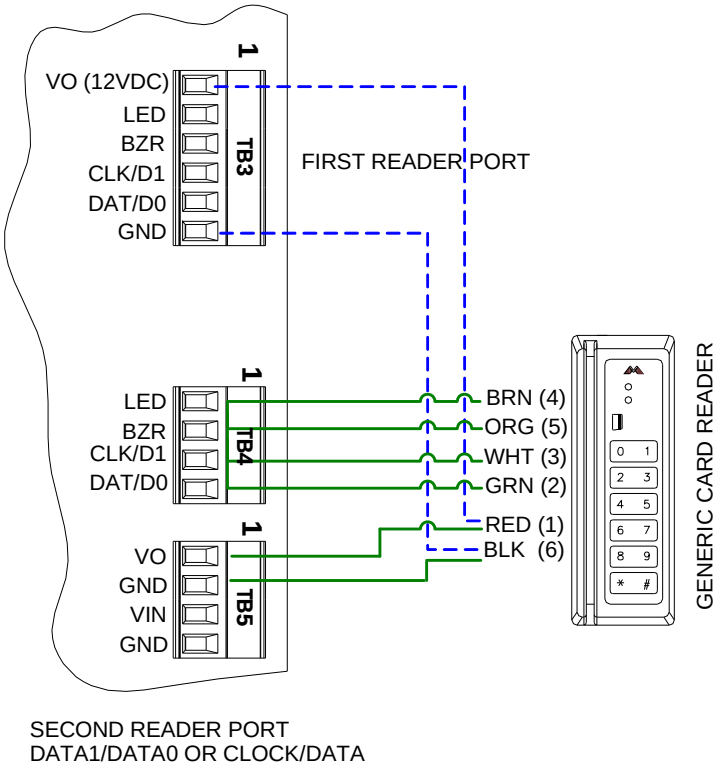
Reader 1 wiring



Reader 2 wiring



Reader 2 wiring with optional wiring to reader port 1



Note: For configurations with two readers, the power and ground may be wired to reader port 1.

Important: If the power requirements exceed the power output limit of either reader port, an external power supply should be used.

Each OSDP device must be configured with a unique communication address. The LNL-1300e supports (1) one OSDP device on reader port 1.

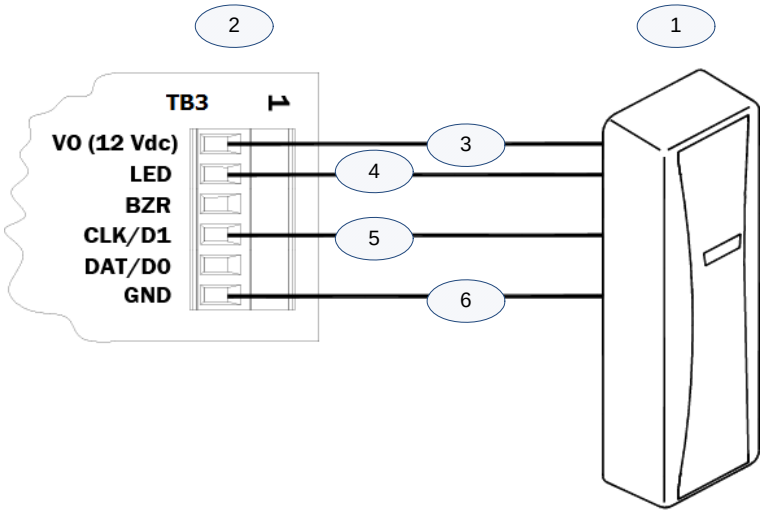
59.1.4 F/2F Protocol

The LNL-1300e accepts data from readers with unsupervised F/2F and supervised F/2F signaling and door hardware. Supervised F/2F is available for Onboard readers 1 and 2 connected to LNL-1300e modules with firmware version 1.5.9 or later.

Typical Unsupervised F/2F Reader

When the "F/2F Format" **Output** type is configured in System Administration, then door monitor contact and REX are terminated on the LNL-1300e inputs. See the reader manufacturer documentation for the proper connection terminals. End-Of-Line (EOL) resistors are not required.

Unsupervised F/2F Wiring (Reader Port 1)



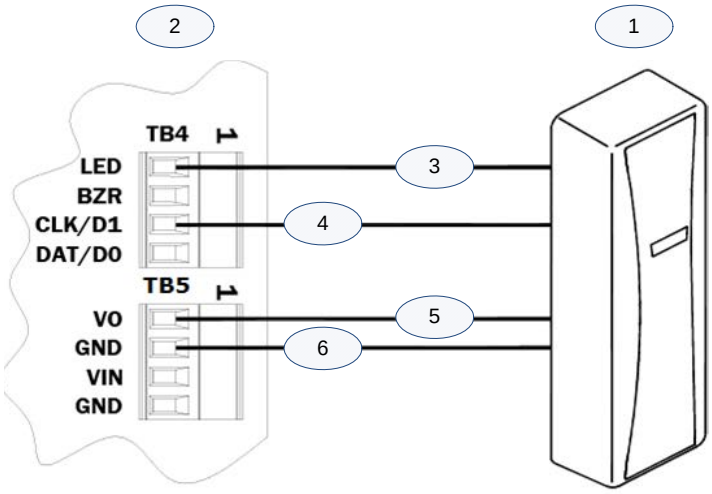
Unsupervised F/2F Wiring (Reader Port 1) Callouts

Callout	Description
1	Unsupervised F/2F reader
2	TB3 on LNL-1300e

Unsupervised F/2F Wiring (Reader Port 1) Callouts

Callout	Description
3	TB3-1: +12 VDC connections
4	TB3-2: LED terminal to Reader DO (GREEN LED) connection
5	TB3-4: Reader Data 1 connection
6	TB3-6: Ground connection

Unsupervised F/2F Wiring (Reader Port 2)



Unsupervised F/2F Wiring (Reader Port 2) Callouts

Callout	Description
1	Unsupervised F/2F reader
2	TB4 and TB5 on LNL-1300e
3	TB4-1: LED terminal to Reader DO (GREEN LED) connection
4	TB4-3: Reader Data 1 connection
5	TB5-1: +12 VDC connections
6	TB5-2: Ground connection

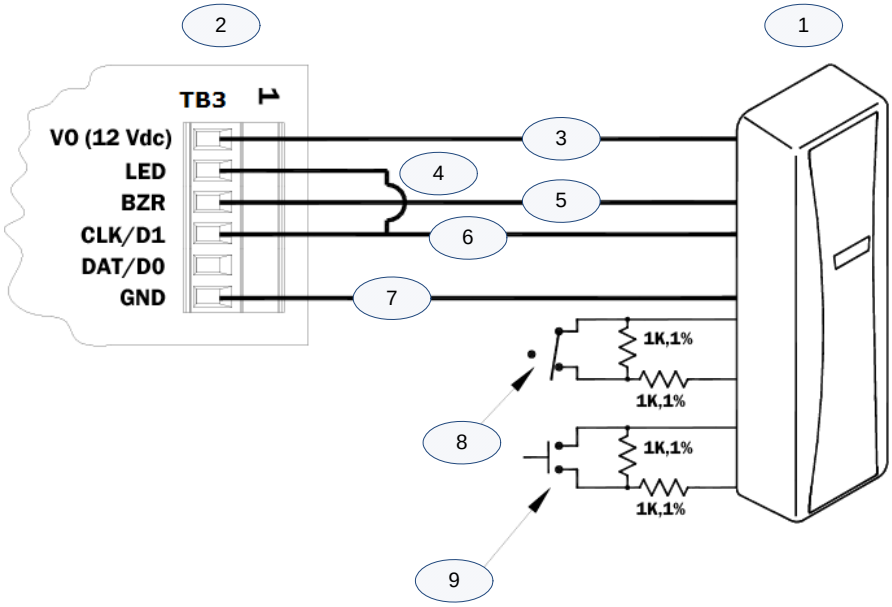
Typical Supervised F/2F Reader Edge Inputs

Inputs for the door position monitor and REX switches are wired directly to the F/2F reader, and can be configured for either 2-State or 4-State Supervision: open, closed, short, and cut. See the reader manufacturer documentation for the proper connection terminals. EOL resistors typically require two 1K ohm resistors as shown in the 4-State example. Install the EOL resistors as close to the switch as possible.

When the "Supervised F/2F Remote Inputs" **Output** type is configured in System Administration, then door contact and REX are sent to the reader device (e.g. T 500).

Note: Because the LNL-1300e is a single door interface, Reader Port 1 supports both Reader Edge and Board Edge connections. Reader Port 2 supports supervised F/2F but maps to the Reader Port 1 door controls.

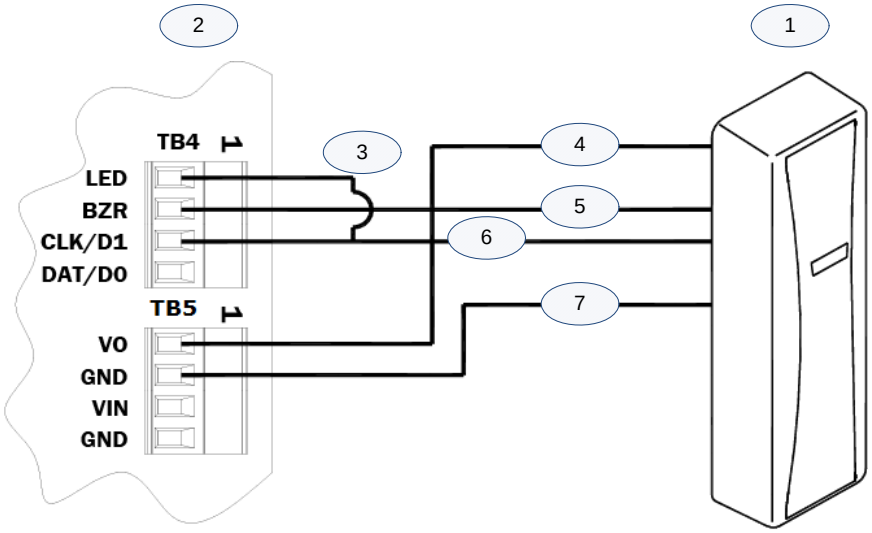
Supervised 4-State F/2F Reader Edge Wiring (Reader Port 1)



Supervised 4-State F/2F Reader Edge Wiring (Reader Port 1) Callouts

Callout	Description
1	Supervised F/2F reader
2	TB3 on LNL-1300e
3	TB3-1: +12 VDC connections
4	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
5	TB3-3: Buzzer terminal to Reader DO (GREEN LED) connection
6	TB3-4: Reader Data 1 connection
7	TB3-6: Ground connection
8	Normally Closed contact for door monitor switch
9	Normally Open contact for REX switch

Supervised F/2F Wiring (Reader Port 2)



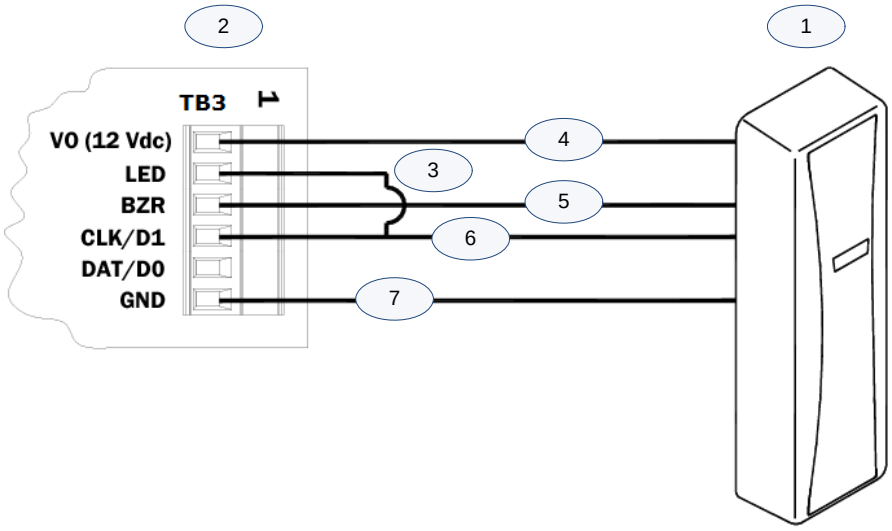
Supervised F/2F Wiring (Reader Port 2) Callouts

Callout	Description
1	Supervised F/2F reader
2	TB4 and TB5 on LNL-1300e
3	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
4	TB5-1: +12 VDC connections
5	TB4-2: Buzzer terminal to Reader DO (GREEN LED) connection
6	TB4-3: Reader Data 1 connection
7	TB5-2: Ground connection

Typical Supervised F/2F Board Edge Inputs

When the "Supervised F/2F Board Edge Inputs" **Output** type is configured in System Administration, then door contact and REX are terminated on the LNL-1300e inputs.

Supervised Board Edge Wiring (Reader Port 1)



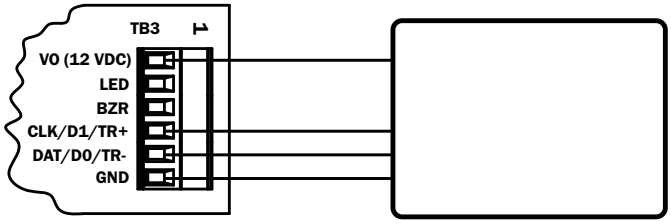
Supervised Board Edge Wiring (Reader Port 1) Callouts

Callout	Description
1	Supervised F/2F reader
2	TB3 on LNL-1300e
3	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
4	TB3-1: +12 VDC connections
5	TB3-3: Buzzer terminal to Reader DO (GREEN LED) connection
6	TB3-4: Reader Data 1 connection
7	TB3-6: Ground connection

Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control. For OSDP, set the baud rate to 9600 bps.

Wiring for OSDP readers



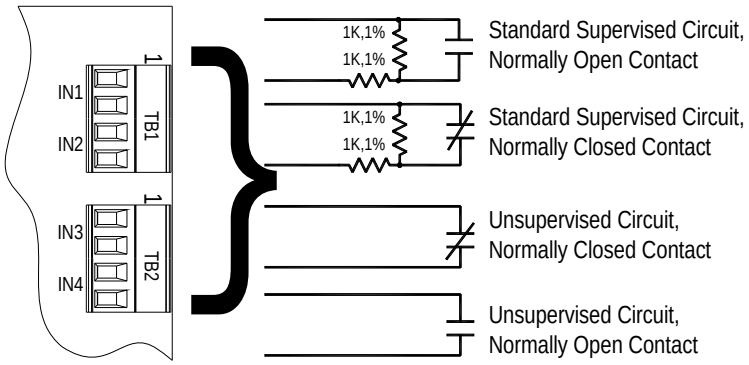
59.1.5 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states.

When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded*, and foreign voltage*. A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K Ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical:

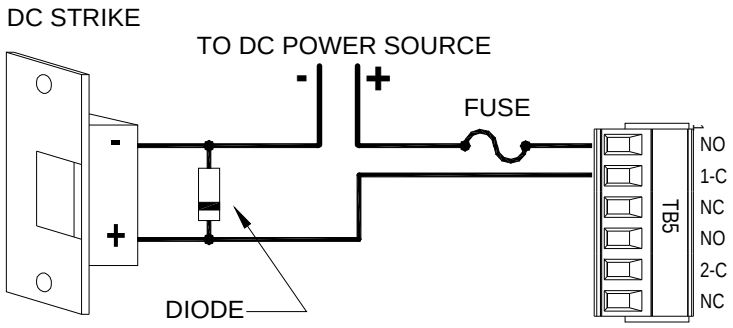


59.1.6 Relay Circuit Wiring

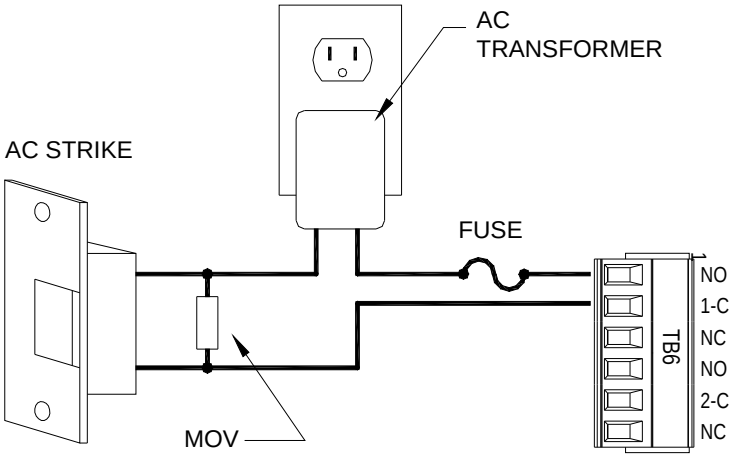
Two (2) Form-C contact relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 5 Amp @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation. Check with local building codes for proper egress door installation.

Inductive door locking devices may induce relay contact arcing as the contact opens that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

Note: It is possible for the LNL-1300e to provide power for a 12 VDC door strike providing the maximum current is not exceeded, see Specifications section.



- **Diode Selection:** Diode current rating: 1x strike current. Diode breakdown voltage 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



- **MOV Selection:** Clamp voltage: 1.5x VAC RMS. For 24 VAC strike, Panasonic ERZ-C07DK470 typical.

59.1.7 Power

Note: UL certified power supplies are described in section UL/ULC Certified Installations on page 50.

The LNL-1300e is powered by using one of the following methods:

- Power can be supplied via an Ethernet connection using PoE, fully compliant to IEEE 802.3af.

Notes: Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.

For more information, refer to UL Listed Installations on page 345.

- Or power can be supplied by a local UL 294 or UL 603 Listed power supply, or the LNL-AL400ULX or LNL-AL600ULX-4CB6 Power Supply/Charger (12 VDC). Connect power with a minimum of 18 AWG wire at TB5-3 (VIN) and TB5-4 (GND).

59.2 Recommended Settings for PoE

59.2.1 Network Speed

If the LNL-1300e is PoE-powered, some of the components in the LNL-1300e may cause intermittent communication issues when the device is running at 100 Mb/s, Therefore, it is recommended that the Network switch be configured to 10 Mbps / Half Duplex.

If the LNL-1300e is externally powered, the network switch can be configured to 10/100.

Powering the LNL-1300e via an external power source is another possible solution, but this may not be feasible based on how the LNL-1300e IP Interface board is deployed.

59.2.2 PoE Power Level

The recommended setting for the PoE power level on the Ethernet switch should accommodate a Class 3 device (6.49-12.95 Watts). The power usage of the LNL-1300e will vary depending on its current state so you need to account for this during power budgeting. The power consumption of the device when it is in the process of a door cycle will be much greater than when in it is in the normal idle state.

59.3 Install Jumpers

The following table describes each jumper.

Jumpers	Set at	Description
J1	n/a	Factory use only
J2	n/a	Factory use only
J3	n/a	Factory use only
J4	n/a	Factory use only
J5	PoE	This board is powered from the Ethernet connect
	12V	This board is powered from an external 12 VDC power source connected to TB5-3 (VIN), TB5-4 (GND)
J6	n/a	10Base-T/100Base-Tx Ethernet Connection (Port 0)
J7	n/a	Factory use only

60 Configure Network Address to LNL- 1300e

Two addressing modes are available for the LNL-1300: static IP addresses and public DHCP.

60.1 Set DIP Switches to Addressing Mode

The network addressing mode used is determined by the DIP switch setting on the LNL-1300e:

4	3	2	1	Addressing Mode Description
off	off	off	ON	Public DHCP
off	off	ON	off	Static IP
off	off	ON	ON	Programming Mode for Static IP Address Assignment

Notes:
- **Public DHCP and Static IP Addressing Modes are available with LNL-1300e firmware revisions 1.5.12 or later**.
- All other DIP switch settings are reserved for future use.
- Press S2 to reset the board after the DIP switch settings are changed to a new address mode.

60.2 Using Public DHCP Addressing

Setting the DIP switches to “0001” selects public DHCP addressing. The network device name (host name) of the LNL-1300e is to be “MAC” followed by the 12 characters MAC address.

Example:

LNL-1300e MAC Address	LNL-1300e Network Device Name
00:0F:E5:00:7B:26	MAC000FE5007B26

Note: Use of Public DHCP addressing requires that a DNS server be available on the network to resolve the LNL-1300e network device name into an IP address.

Note: Three (3) labels with the device MAC address for DHCP are included with the LNL-1300e unit. Recommended practice is to place a label on each device as a programming reference: 1 on the device, 1 on the drawing, and 1 on the installation sheet.

60.3 Using Static IP Addressing

Setting the DIP switches to “0010” enables communication to the LNL-1300e via the programmed static IP address. The user can then simply address the LNL-1300e by using the static address.

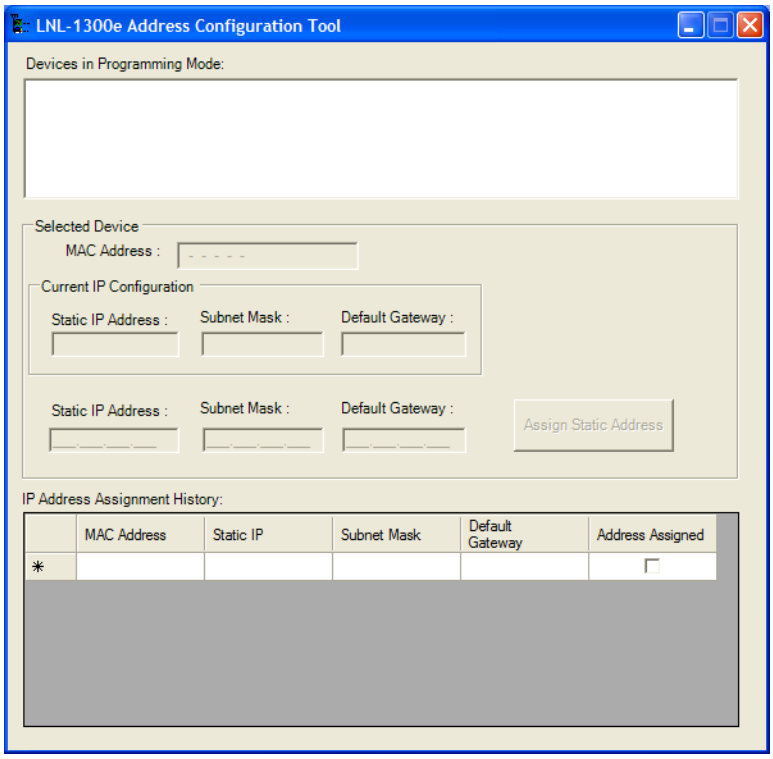
60.3.1 Programming the Static IP Address

Setting the DIP switches to “0011” allows you to program the static IP address. For more information, refer to Set DIP Switches to Addressing Mode on page 338.

The programming of the static IP address is accomplished by a separate utility (Address Configuration Tool version 1.0.5 or later) available on the Supplemental Materials media. This utility is used to leverage the native addressing of the LNL-1300e in order to set a permanent static IP address. This utility is intended to be used in an isolated test setting.

In order to program the LNL-1300e, complete the following steps:

1. Open the address tool.
2. Set the LNL-1300e to the programming mode.
3. Select the LNL-1300e to be programmed from the Devices in Programming Mode listing window.



4. Move the cursor to the beginning of the **Static IP Address** field, and then enter the IP address. Continue with the subnet mask and default gateway.

> **Important:** 3 digits must be entered in the address field, including leading zeros.

5. When the configuration is complete, click [Assign Static Address].
6. If the device was assigned correctly, it will display the information in the “Current IP Configuration” and “IP Address Assignment History” sections.

7. Make a note of the IP address, return the DIP switches to the "0010" setting, and then press S2 to use the LNL-1300e in the static IP addressing mode.

60.4 System Administration Configuration

From System Administration, complete the following steps:

1. From the ***Access Control*** menu, select ***Readers and Doors***.
2. On the General tab:
   a. Enter a **Name** for the LNL-1300e.
   b. Select the **Panel**.
   c. Assign the "LNL-1300e (IP Interface)" **Type** to the panel.
   d. Select the reader **Output** type.
   e. Select the network addressing mode from the **Port** drop-down. Choose either "Static IP" or "DHCP" if the LNL-1300e is using public DHCP addressing.
   f. Based on the selected addressing mode, enter the **IP Address** or **Mac Address**.

> **Important:** Make sure the addressing information in System Administration matches what was configured for the LNL-1300e device on the network.

61 Elevator Control

OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The OnGuard software must be configured for elevator control. This can be done from System Administration by selecting "LNL-1300 (IP Interface)" as the reader **Type**, and then selecting the **Elevator** check box on the General tab in the Readers and Doors form. The reader's output, name, port, address, and access panel can all be defined here as well.

> **Note:** In order for this check box to be available, the access panel to which this reader module is connected must have **Elevator support** enabled on the Options tab.

With elevator control on the LNL-1300e, door strike, door contact, and REX (Request to EXit) are disabled.

Input/output panels (alarm panels) attached to the same controller as the LNL-1300e are used to interface with the elevator controls. In addition, addresses assigned to input/output panels do not need to be consecutive.

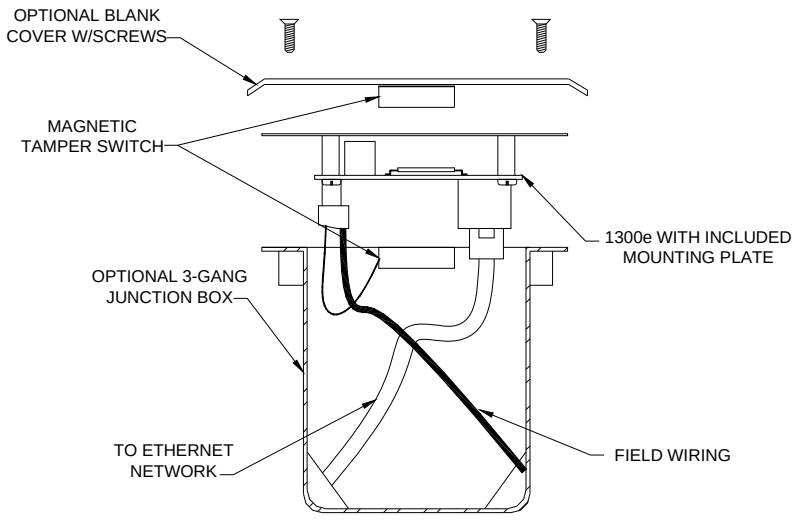
On the first panel, the inputs/outputs represent the first sixteen floors (for example: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

62 Additional Mounting Information

Sources for the items shown below:

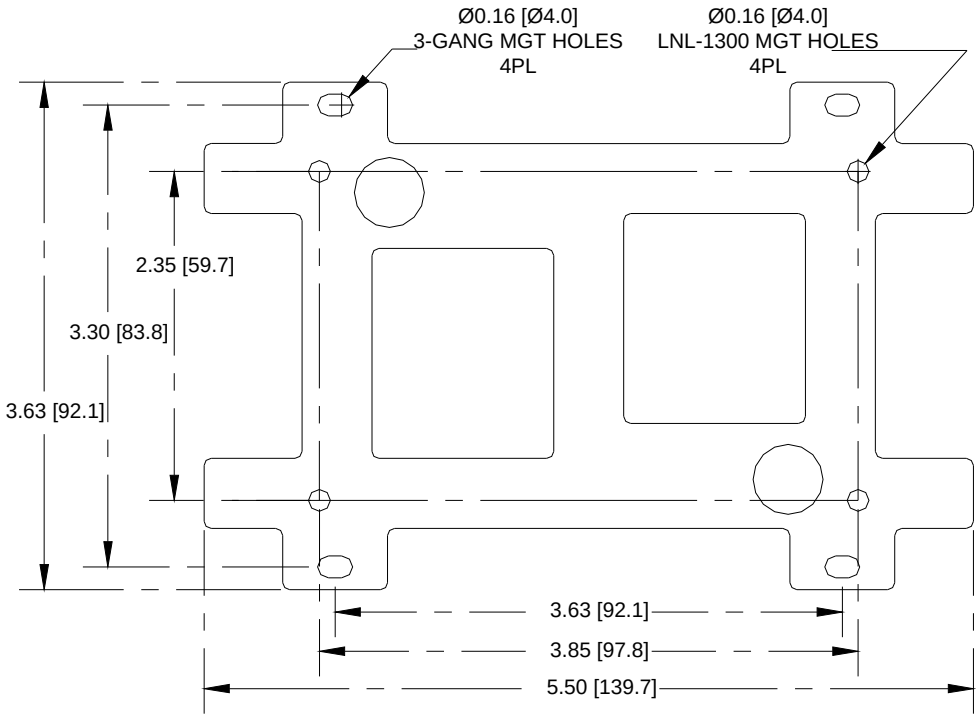
- 3-gang stainless steel blank cover: Leviton part number 84033-40. Available from Graybar, part number 88158404
- Magnetic switch set: G.R.I. part number: 505

Side view



Note: The controller mounting plate requires a separate grounding conductor because the plate does not make positive contact with the earth-grounded main enclosure (J-Box).

Mounting plate dimensions



63 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

63.1 Status LEDs

At power up, LEDs 2-6 are turned ON, and then off in sequence.

After the power up sequence has completed successfully, the LNL-1300e goes to the “Waiting for IP Address” mode, when in the Public DHCP addressing mode.

Waiting for IP Address Mode

LED	Description
1	Off-line = 20% ON, On-line = 80% ON
	Waiting for application firmware to be downloaded: 10% ON, 10% OFF
2	Waiting for IP address: 50% ON, 50% OFF

The following table describes the LED status in the Normal Running mode. If communication is lost, the LNL-1300e reverts back to the “Waiting for IP Address” mode, when in the Public DHCP addressing mode

Normal Running Mode

LED	Description	Note
1	On-line, encryption disabled = 80% ON, 20% OFF	
	On-line, encryption enabled = four pulses; 10% ON, 10% OFF per second	
	Off-line: 20% ON, 80% OFF (Static IP addressing mode, only)	
	Waiting for application firmware to be downloaded: 10% ON, 10% OFF	
2	Host communication activity	
3	Flashes when data is received from either reader/downstream devices	
4	Input IN1 Status: OFF = Inactive, ON = Active, Flashing = Trouble	If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 second, otherwise, the LED is OFF.
5	Input IN2 Status: OFF = Inactive, ON = Active, Flashing = Trouble	
6	Input IN3 Status: OFF = Inactive, ON = Active, Flashing = Trouble	
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S	
GRN	Off = No link, ON = Good link, Flashing = Ethernet Activity	

Note: If input IN1, IN2, or IN3 is defined, every three seconds the LED is pulsed to its opposite state for 0.1 second, otherwise, the LED is OFF.

64 Specifications

The interface is for use in low voltage, Class 2 circuits only.

- Power Input:
  - PoE powered at 12.95 watts, compliant to IEEE 802.3af or
  - 12 VDC ± 10%, 900 mA maximum power supply
- Power Output:
  - 12 VDC @ 650 mA maximum (reader and AUX outputs combined)
  - Reader 1 (TB3) 12 VDC (10.3 through 12.6) @ 150 mA maximum
  - AUX (TB5) 12 VDC (10.7 through 13.0) @ 650 mA maximum

Note: For UL installations, the Power Sourcing Equipment (PSE) such as a PoE-enabled network switch and/or PoE power injectors must be UL Listed under UL 294 or LNL-AL400ULX or LNL-AL600ULX-4CB6 sources (12 VDC).

- Host communication: Ethernet: 10Base-T/100Base-TX, AES 128 bit encrypted
- Outputs: 2 programmable relays, Form-C contacts: K1, K2: 5 Amp @ 30 VDC
- Inputs: 4 unsupervised/supervised, end of line resistors, 1k/2k – ohm, 1% 1/4 watt standard
- Reader interface:
  - Power: See Power Output above.
  - Data inputs: TTL compatible inputs or 2-wire RS-485
  - LED output: TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink maximum
  - Buzzer output: Open collector, 5 VDC open circuit maximum, 10 mA sink maximum
- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - Ethernet: CAT 5 (minimum)
  - Alarm Input: 1 stranded twisted pair per input, 30 ohm maximum loop resistance
  - Reader data (TTL): 18 AWG stranded, 6 conductors, 500 feet (152 m) maximum
  - Reader data (RS-485): 24 AWG, 120-ohm impedance, twisted pair with shield, with drain wire, 2000 foot (609.6 m) maximum
- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F), Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 10 to 95% RHNC
- Mechanical:
  - Dimensions:
    5.5 x 2.75 x 0.96 in. (140 x 70 x 24 mm) H without bracket
    5.5 x 3.63 x 1.33 in. (140 x 92 x 34 mm) H with bracket
  - Weight:
    4.2 oz. (120 g) without bracket
    5.3 oz. (150 g) with bracket

These specifications are subject to change without notice.

64.1 UL 294, 7th edition Performance Levels

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

64.2 UL Listed Installations

- PoE is only for use with Access control-only installations and not for use with burglar installations.
- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/NFPA 70.

For UL installations, the following must be observed:

- PoE power is to be supplied by an Access Control System Unit (ALVY), power limited, PoE injector (PSE) providing 44-57VDC and 15W for maximum output, and PoE+ injector (PSE) providing 42.5 – 57 VDC, 25.5W for maximum output).
- This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.
- Category 5e cabling is the minimum performance category recommended.
- The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG (0.13 mm^2) for patch cords; 24 AWG (0.21 mm^2) for horizontal or riser cable.
- Connected through standard eight-pin RJ-45 connectors.
- Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.
- RS-485 is “Not Evaluated by UL” and therefore cannot be used in UL installations.
- Each field-wiring terminal is suitable for single conductor (wire) only. For detailed mounting instructions, refer to the Hardware Installation Guide (DOC-600).
- For use with separately Listed compatible control units and accessories as indicated in the installation instructions of the end-use application.
- Environmental for UL installations:
  Temperature: -10 to +49°C (14 to 120°F) operating
  Humidity: 85+/-5% at 30+/-2°C (86°F)

LNL-1320 Dual Reader Interface Module

65 Overview of the LNL-1320

You can use a Dual Reader Interface (DRI) module for business access control solutions. Up to 64 access control card readers, keypads, or readers with keypads that use standard data1/data0 and clock/data Wiegand communications are supported. Lock/unlock and facility code, off-line access modes are supported on all readers connected to the DRI. Each DRI supports up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.

The DRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 DRI modules can be multi-dropped using RS-485 2-wire communication up to 4000 feet per port away from the ISC. Each DRI module is individually addressed for increased reporting capabilities with Access Control software applications. The DRI includes eight (8) programmable inputs that support normally open, normally closed, supervised and non-supervised circuits. Six (6) output relays support fail-safe or fail-secure operation.

The series 2 and series 3 boards differ slightly from the series 1 boards. Where series 3 is indicated, the information only applies to series 3 boards. The same applies for series 2 boards. Otherwise, the information applies to all boards.

The following table list the differences between series 1, series 2, and series 3 boards:

Feature	Series 3	Series 2	Series 1
Serial number	greater than 2,000,000 (revision E)	520,000 or greater (revision C)	less than 520,000
Input power	12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 VDC ±10% or 12 VAC ±15%
read head power	12 VDC or input voltage pass-through	12 VDC or input voltage pass-through	5 VDC, 12 VDC or input voltage pass-through
ISC communication	2-wire RS-485 only	2-wire RS-485 only	2-wire or 4-wire RS-485
Color	red	green	green
Supervised F/2F Protocol	yes	yes	no
OSDP secure channel and OSDP Biometric	yes	no	no
Authenticated reader support	yes	no	no

Feature	Series 3	Series 2	Series 1
Command keypad	RS-485, currently defaults to address 0, 9600 baud. TTL signaling is not supported.	RS-485, currently defaults to address 0, 9600 baud. TTL signaling is not supported.	TTL signaling
Handkey reader support	yes	yes for firmware 1.57.0 or greater	no
Tamper and power fault wiring	Separate ground terminal for each	Separate ground terminal for each	Common ground terminal
Status LEDs	2 for boards status, 6 for relay status, 8 for alarm input status, 2 for tamper/ power fault status, 1 for each reader port communication activity	2 for boards status, 6 for relay status, 8 for alarm input status, 2 for tamper/ power fault status, 1 for each reader port communication activity	2 for board status, 6 for relay status

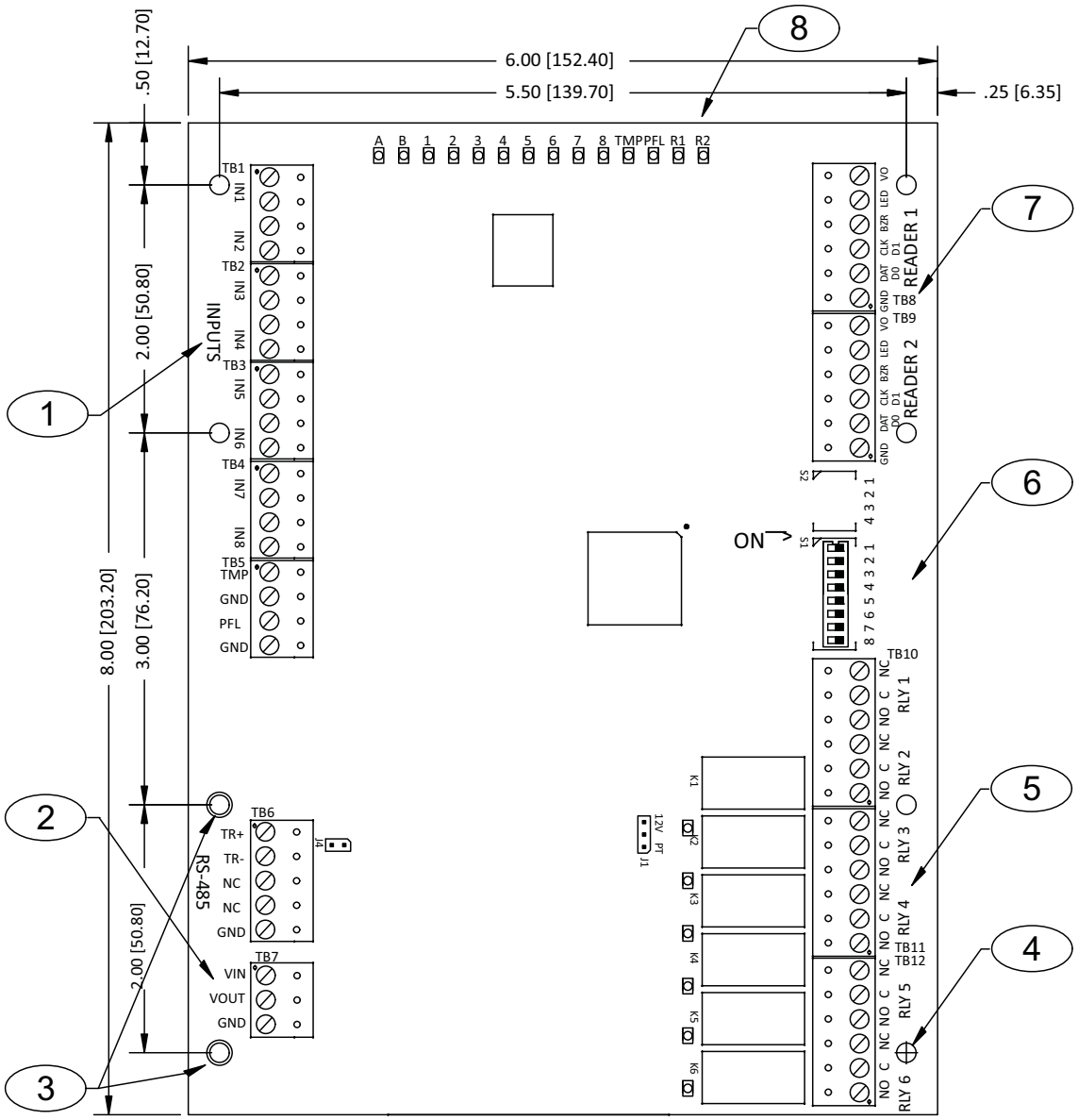
65.1 Interfaces

For more information, refer to Interfaces on page 271.

65.2 LNL-1320 Dual Reader Interface Module (Series 3) Board Components

The series 3 Dual Reader Interface Module board contains the following components: eight (8) supervised/ non-supervised alarm inputs, one (1) RS-485 interface, two (2) reader interfaces, six (6) relay outputs, one (1) power input, one (1) cabinet tamper, jumpers and eight (8) DIP switches. It also contains several status LEDs and six (6) relay LEDs.

Dual Reader Interface Module



Dual Reader Interface Module Callouts

Callout	Description
1	Inputs
2	DC input power
3	Earth ground (connection not required)
4	Eight (8) mounting holes (Ø0.156 [Ø4.0])
5	Output relays
6	DIP switches

Dual Reader Interface Module Callouts

Callout	Description
7	Reader interfaces
8	Status LEDs

65.2.1 Status LEDs

The series 3 Dual Reader Interface Module board contains LEDs that can be used to verify correct installation after power up.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The dual reader interface module is waiting for firmware to be downloaded.

When initialization is completed, LEDs A through R2 are briefly sequenced **ON** then OFF.

After the above sequence, the LEDs have the following meanings:

A LED: Heartbeat and On-Line Status:

- Off-line: 1 sec rate, 20% **ON**
- On-line:
  - Non-encrypted communication: 1 second rate, 80% **ON**
  - Encrypted communication: 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.1 sec OFF, 0.1 sec **ON**, 0.3 sec OFF

A LED: Error Indication:

- Waiting for application firmware to be downloaded: 0.1 sec **ON**, 0.1 sec OFF.

B LED: Serial I/O Communication Port Status:

- Indicates communication activity on the serial I/O communication port

1 LED: Input Status: IN1
2 LED: Input Status: IN2
3 LED: Input Status: IN3
4 LED: Input Status: IN4
5 LED: Input Status: IN5
6 LED: Input Status: IN6
7 LED: Input Status: IN7
8 LED: Input Status: IN8
TMP: Cabinet Tamper
PFL: Power Fault

Input in the inactive state: OFF (briefly flashes **ON** every 3 seconds).

Input in the active state: **ON** (briefly flashes OFF every 3 seconds).

Input in a trouble state (default): Rapid Flash.

R1: reader port 1:

- Clock/Data Mode: Flashes when data is received, either input.
- Data 0/Data 1 Mode: Flashes when data is received, either input.
- RS-485 Mode: Flashes when transmitting data.
- F/2F Mode: Flashes when data/acknowledgment is received.

R2: reader port 2:

- Clock/Data Mode: Flashes when data is received, either input.
- Data 0/Data 1 Mode: Flashes when data is received, either input.
- RS-485 Mode: Flashes when transmitting data.
- F/2F Mode: Flashes when data/acknowledgment is received.

LED K1 through K6: Illuminates when output relay RLY 1 (K1) through RLY 6 (K6) is energized.

Every three seconds, LEDs A through R2 are pulsed to their opposite state for 0.1 sec.

66 Installation

To install the Dual Reader Interface Module, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Mount the device in the appropriate enclosure.
2. Wire the supervised alarm inputs.
3. Wire the upstream host communication.
4. Wire the relay outputs.
5. Wire the downstream TTL interface for the keypads and/or card readers.
6. Wire the Power Fault and Cabinet Tamper Monitors.
7. Wire the power input.
8. Configure the correct settings using the jumpers and DIP switches.

66.1 Wiring

66.1.1 Supervised Alarm Inputs

The Dual Reader Interface Module contains eight (8) supervised inputs that can be used for door position monitoring, REX exit push button monitoring, and alarm control.

Input circuits can be configured as:

- Unsupervised alarm (2 states); reporting as an open or closed contact.

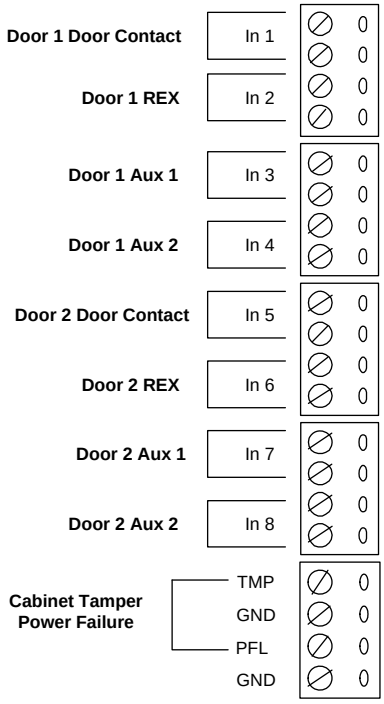
- Supervised alarm (6 states); reporting as an open or closed contact, open circuit, shorted circuit, grounded circuit *, or foreign voltage*.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

These inputs are connected using the IN1, IN2, IN3, IN4, IN5, IN6, IN7, and IN8 inputs. The standard wiring configuration is as follows:

Inputs 1-4 are for Door #1, Inputs 5-8 for Door #2

DRI Alarm Input Contact Wiring

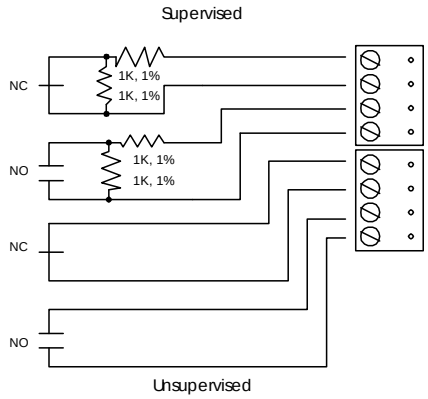


Door Contact	Selectable through software (default – normally closed)
REX	Selectable through software (default – normally open)
Aux.	Selectable through software

Wire the IN1 - IN8 inputs using twisted pair cable, 30 ohms maximum.

Terminate each of these inputs with two (2) 1000-ohm resistors (1% tolerance – 0.25 watt) for supervised inputs.

Alarm Contact Wiring



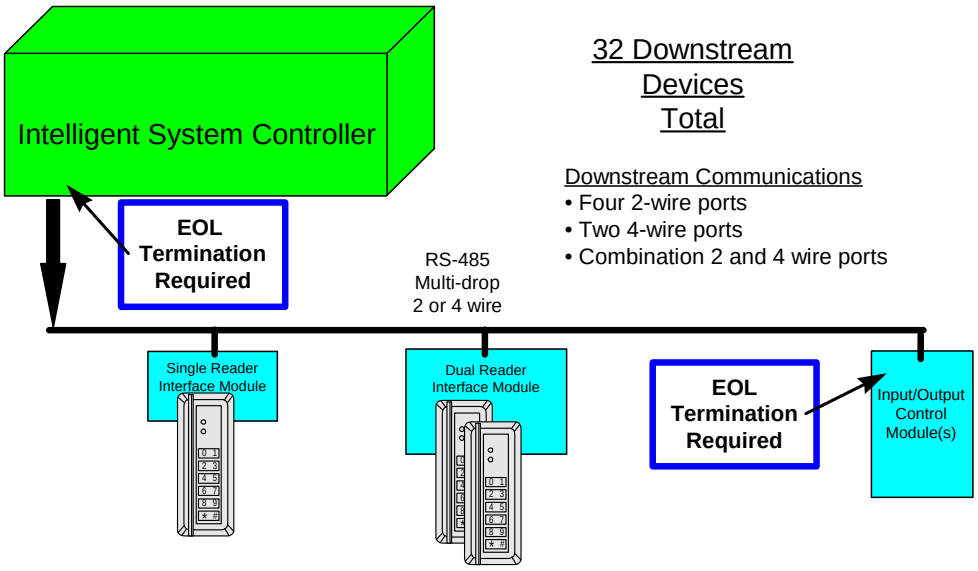
66.1.2 Upstream Communication

The Dual Reader Interface Module communicates to an Intelligent System Controller via a 2-wire RS-485 interface, that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used for series 1. Only 2-wire RS-485 cable configuration can be used for series 2 and series 3. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 for 4-wire or Belden 9841 for 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet.

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

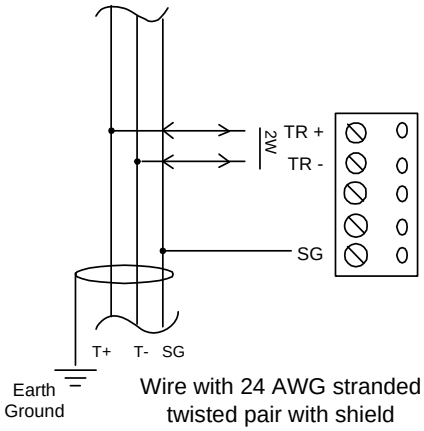
RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling.

Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.



Upstream Controller Communication Wiring (2-wire)

RS-485 2-WIRE COMMUNICATIONS



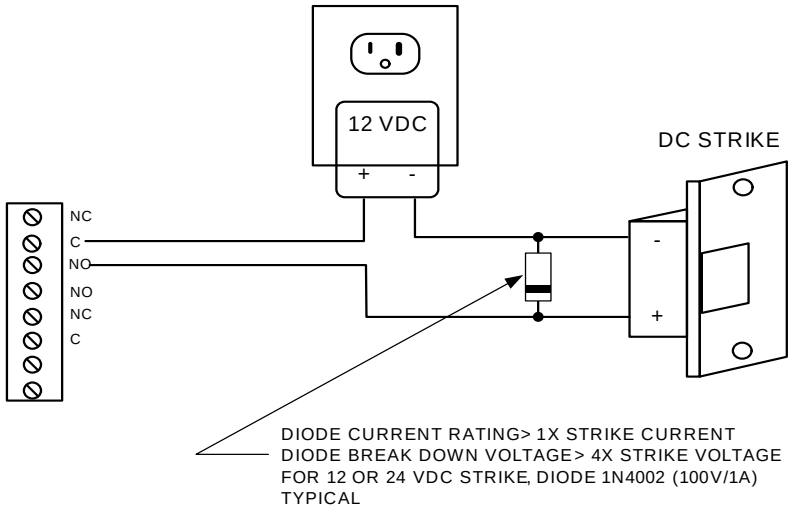
The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

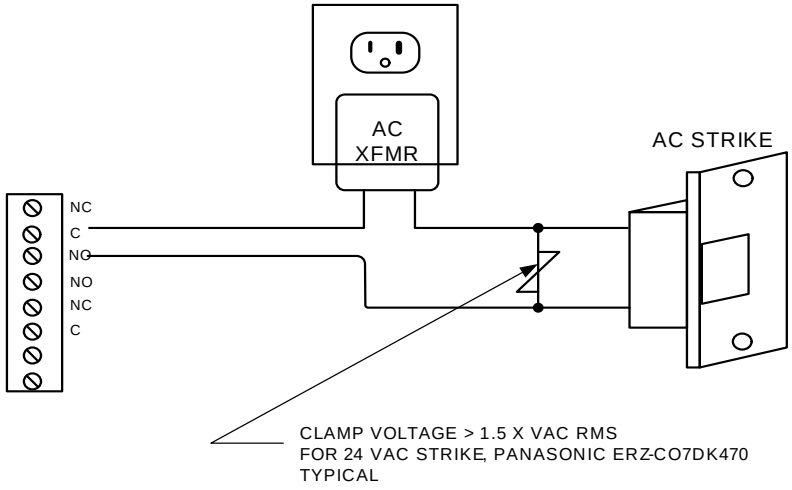
66.1.3 Output Relay Wiring

Six (6) form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used. The following two circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.

Use sufficiently large gauge of wires for the load current as to avoid voltage loss.

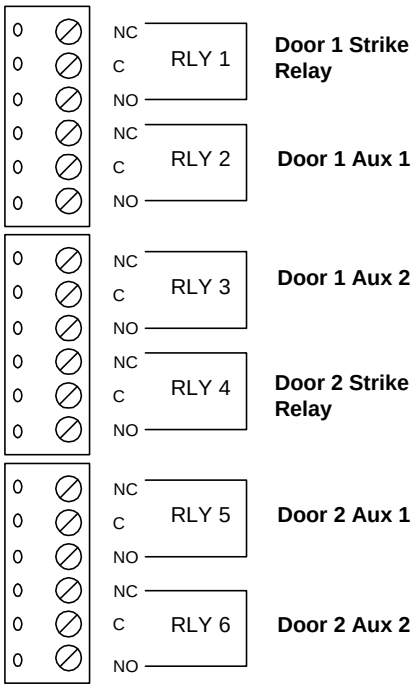
Control Output Wiring





Relay Outputs

DRI Alarm Output Contact Wiring



66.1.4 Downstream Reader Communication

The Dual Reader Interface Module can communicate downstream with two (2) keypads or card readers. Wire the J1 interface using a 24 AWG (minimum) cable.

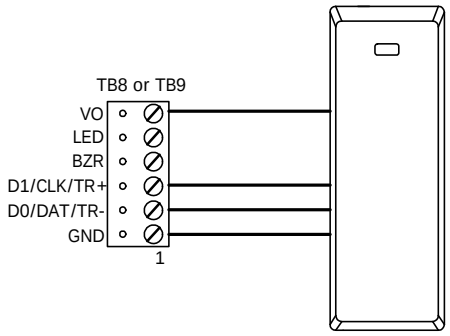
To fully utilize each reader port, a 6-conductor cable (18 AWG) is required when TTL signaling is used. F/2F signaling requires a 4-conductor cable. RS-485 signaling requires two 2-conductor cables. One cable for power (18 AWG) and one cable for communication (24 AWG).

12V PT	J1 - Reader Port Power Select
	12 VDC is available on reader ports (VIN is greater than or equal to 20 VDC).
	VIN power is “passed through” to reader ports.

Note: Install jumper J1 in the 12V position ONLY if the input voltage (VIN) is greater than 20 VDC. Failure to do so may damage the reader to the LNL-1320.

All readers that have a buzzer will beep during pre-alarm when in extended held open mode. This includes primary and alternate readers. If the reader has two-wire LED control, this feature is disabled. The reader starts beeping at pre-alarm time and continues to do so until the door is closed or the held open time is reached.

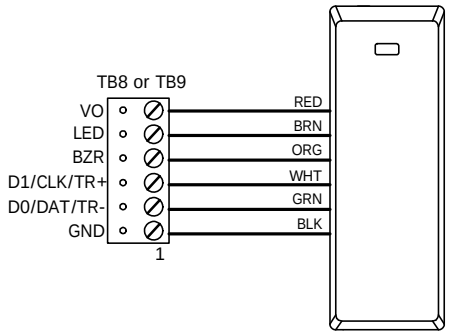
Typical 2-Wire RS-485 Device (such as OSDP Reader)



Wiegand D0-D1 Clock and Data Wiring

Each reader port supports a reader with TTL, F/2F, or RS-485 interface. Power to the reader is selectable: 12 VDC, or input voltage passed through (PT), 125mA maximum per reader port. This selection is made via jumper J2 and is made for both reader ports. For the selection of 12 VDC, the LNL-1320 must be powered by a 20 VDC minimum source. For readers requiring a different voltage or current capability, they must be powered separately. Reader port configuration is set via host software.

Typical D1/D0 - Clock/Data Reader

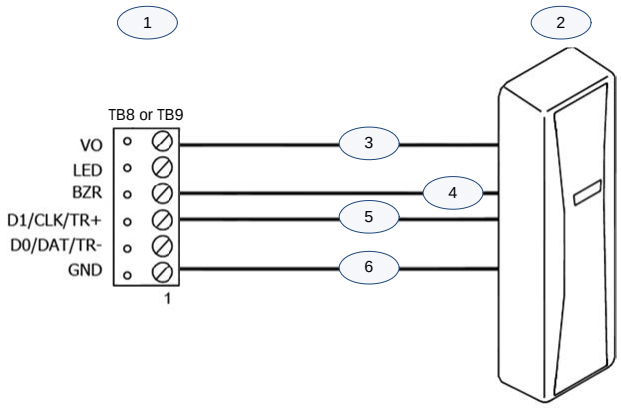


F/2F Protocol

The LNL-1320 accepts data from readers with unsupervised F/2F and supervised F/2F signaling and door hardware. Supervised F/2F is available for readers connected to LNL-1300 Series 2 with firmware version 1.52.13 or later and any LNL-1300 Series 3 module.

- **Typical Unsupervised F/2F Reader** When the "F/2F Format" **Output** type is configured in System Administration, then door monitor contact and REX are terminated on the LNL-1320 inputs. See the reader manufacturer documentation for the proper connection terminals. End-Of-Line (EOL) resistors are not required.

Unsupervised F/2F Reader Wiring



Unsupervised F/2F Reader Wiring Callouts

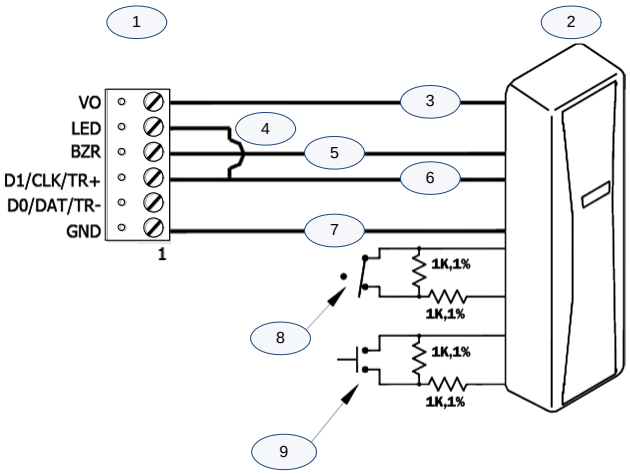
Callout	Description
1	TB8 or TB9 on LNL-1320
2	Unsupervised F/2F reader
3	TB8-1: +12 VDC connections
4	TB8-3: Reader DO (GREEN LED) connection
5	TB8-4: Reader Data 1 connection
6	TB8-6: Ground connection

- **Typical Supervised F/2F Reader Edge Inputs** Inputs for the door position monitor and REX switches are wired directly to the F/2F reader, and can be configured for either 2-State or 4-State Supervision: open, closed, short, and cut. See the reader manufacturer documentation for the proper connection terminals. EOL resistors typically require two 1K ohm resistors as shown in the 4-State example. Install the EOL resistors as close to the switch as possible.

When the "Supervised F/2F Remote Inputs" **Output** type is configured in System Administration, then door contact and REX are sent to the reader device (e.g. T 500).

Note: Supervised F/2F reader edge inputs must be configured for both LNL-1320 readers. In addition, when using this configuration, Reader 1 aux inputs are wired to input terminals 5/6 and Reader 2 aux inputs are wired to input terminals 7/8.

Supervised 4-State F/2F Reader Edge Wiring



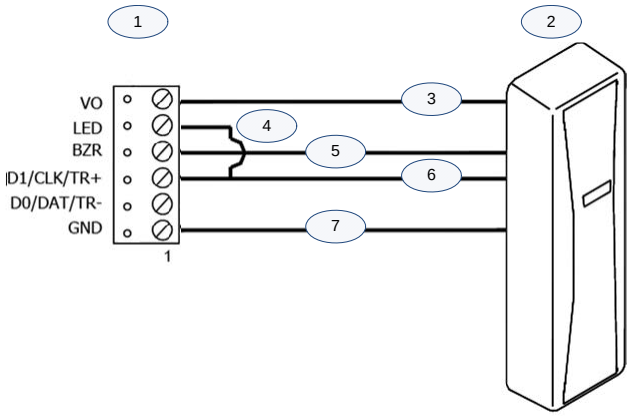
Supervised 4-State F/2F Reader Edge Wiring Callouts

Callout	Description
1	TB8 or TB9 on LNL-1320
2	Supervised F/2F reader
3	TB8-1: +12 VDC connection
4	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
5	TB8-3: Reader DO (GREEN LED) connection
6	TB8-4: Reader Data 1 connection
7	TB8-6: Ground connection
8	Normally Closed contact for door monitor switch
9	Normally Open contact for REX switch*

* Inputs on supervised F/2F readers may be unsupervised or supervised.

- **Typical Supervised F/2F Board Edge Inputs** When the "Supervised F/2F Board Edge Inputs" **Output** type is configured in System Administration, then door contact and REX are terminated on the LNL-1320 inputs.

Supervised Board Edge Wiring



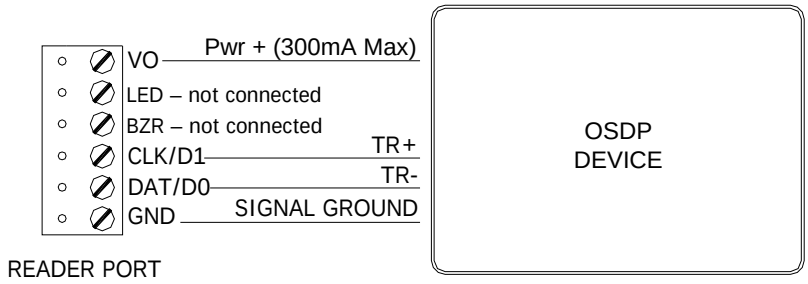
Supervised Board Edge Wiring Callouts

Callout	Description
1	TB8 or TB9 on LNL-1320
2	Supervised F/2F reader
3	TB8-1: +12 VDC connection
4	**For Supervised F/2F readers:** Install jumper between D1 and LED terminals.
5	TB8-3: Buzzer terminal to Reader DO (GREEN LED) connection
6	TB8-4: Reader Data 1 connection
7	TB8-6: Ground connection

Open Supervised Device Protocol

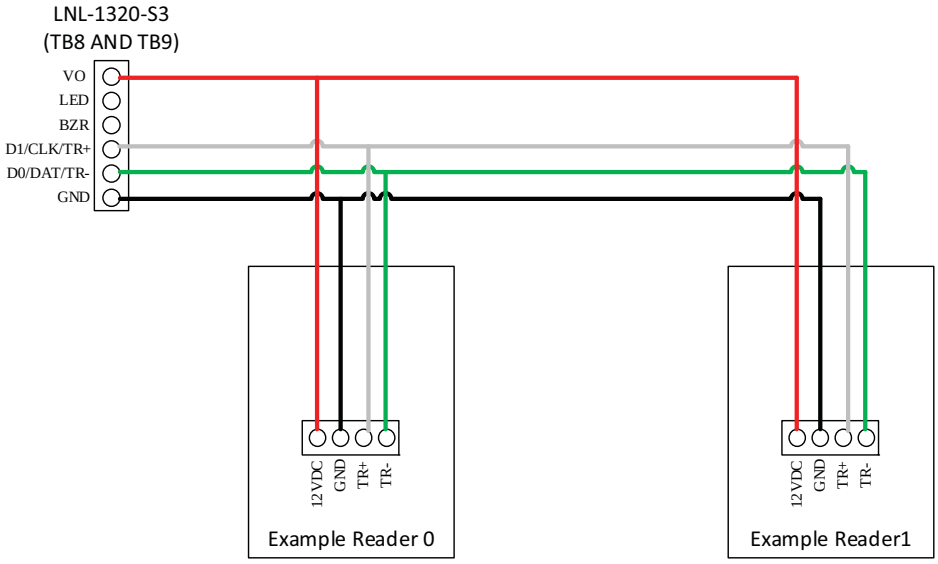
Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control.

Wiring for OSDP readers



- **Multiple OSDP Readers** The LNL-1320 Series 3 can have two OSDP readers connected to one reader port (OnGuard 7.5 and higher only). The OSDP readers on the same port must use the same baud rate.

Wiring for multiple OSDP readers on one port

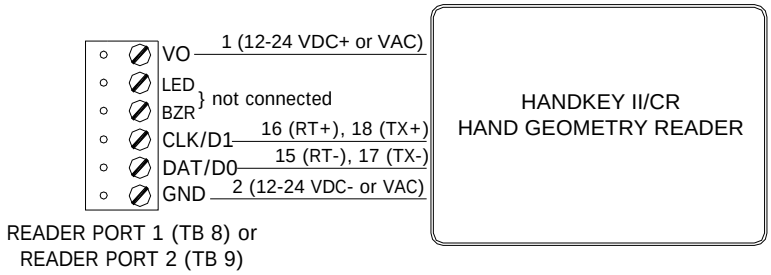


- **HandKey Reader Support** The Dual Reader Interface supports a direct RS-485 connection to hand geometry readers such as the Schlage Handkey II or CR without an LNL-500B Biometric Reader Interface connected in between the Dual Reader Interface and the hand geometry reader.

To support this connection, the Dual Reader Interface must be a Series 2 or higher board, and must have firmware version 1.57.0 or higher installed.

Wire the HandKey reader to Reader Port 1 (TB 8) or Reader Port 2 (TB 9) on the Dual Reader Interface as shown below.

Wiring for HandKey Reader (two-wire RS-485 connection)



Configure the HandKey reader as follows:

1. On the back of the HandKey reader, set the DIP switches as follows:
   - **DIP Switch SW 1:** ON
   - **DIP Switch SW 2:** ON
   - **DIP Switch SW 3:** ON for two-wire RS-485
   - **DIP Switch SW 4:** off
   - **DIP Switch SW 5:** off
2. On the front of the HandKey reader, press both the [Clear] and [Enter] buttons at the same time to enter the Command Mode.
3. When you are prompted for a password, enter [2], which is the default for the Setup Menu, and press [Enter].
   To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.
4. Press [No] until the Set Serial option is displayed.
5. Press [Yes] to select Set Serial.
6. When the HandKey reader displays `Set RS-485/422 ?`, press [Yes].
7. The last known baud rate is displayed. Continue pressing [No] until 9600 baud is displayed, then press [Yes].
8. When the HandKey reader displays `USE RS232 FOR 0-PRINTER 1-HOST`, press [0].
9. The configuration of the HandKey reader is now complete. Press [Clear] to exit the menu mode.

Notes:

The HandKey reader must be set to Address 0, which can be done from the Set Address menu option.

When the HandKey reader is powered up, the display should show `--- READY ---` followed by the time. If there are `***` instead of `---` on either side of `READY`, go back into the menu and change the HandKey reader to be a secondary and not a primary.

66.1.5 Power Fault and Cabinet Tamper Monitors

The Output Control Module features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the BA (power fault) and CT (cabinet tamper) contact terminals located on the Output Control Module.

The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum (no EOL resistors are required).



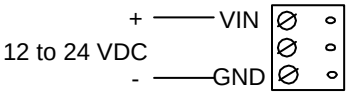
66.1.6 Power

The DRI accepts 12 to 24 VDC ± 10% for power. Locate the power source as close to the DRI as possible.

Observe POLARITY on VIN.

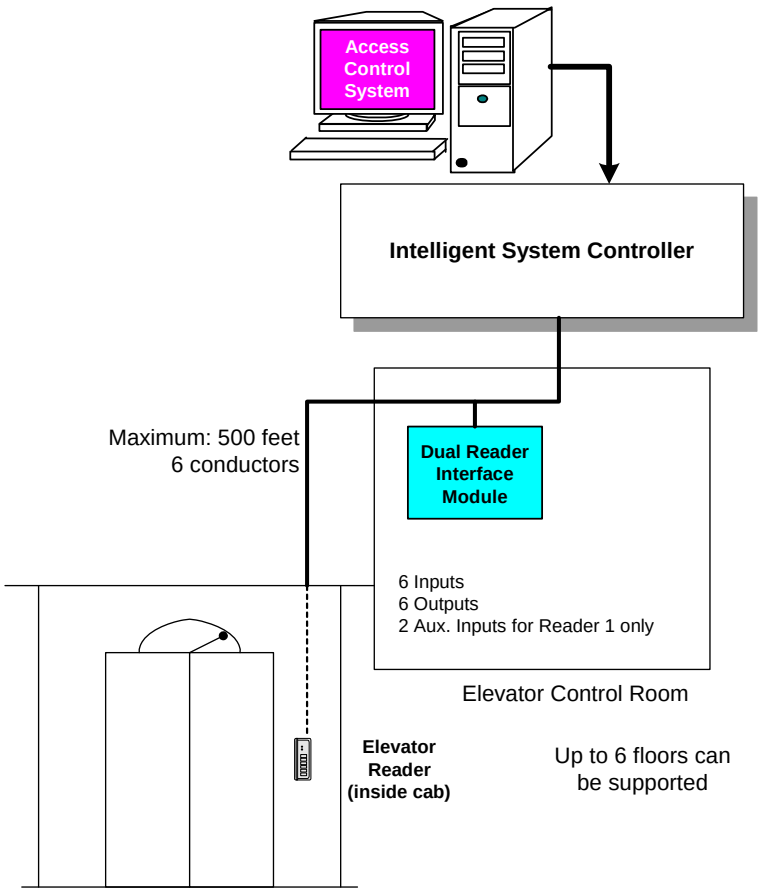
Wire the power input with 18 AWG (minimum) twisted pair cable.

Supply Power to the Interface



66.2 Elevator Control

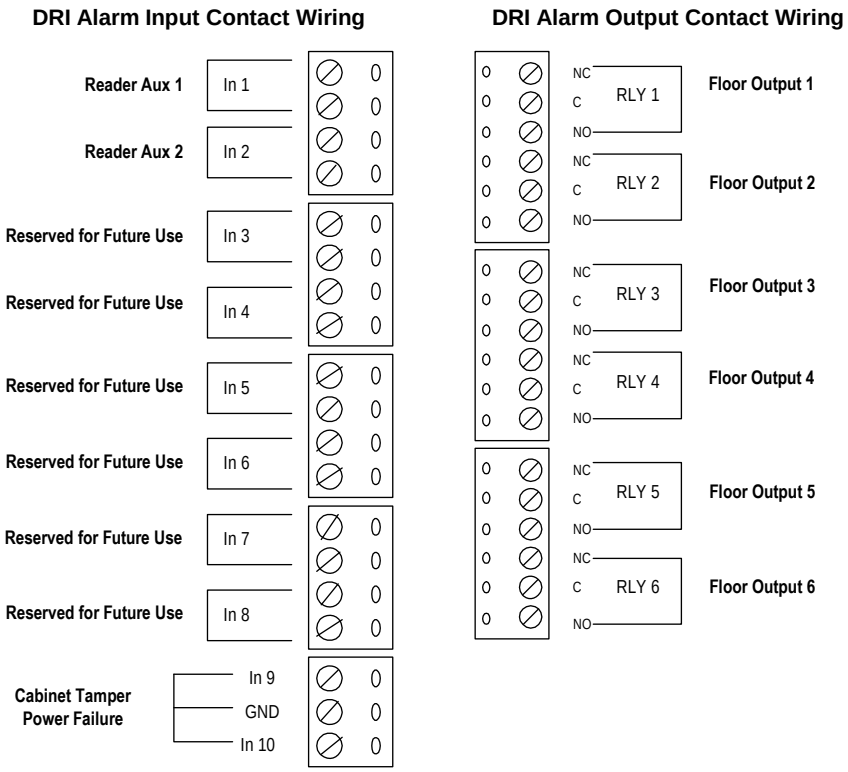
Currently, elevator control is supported for up to six floors on the Dual Reader Interface Module.



In order to use Elevator Control, your software must be configured for it. This can be done in System Administration on the Readers window.

On the Dual Reader Interface card, Reader 2 is not used. Only Reader 1 is used. The six aux outputs are used to control the six corresponding floor buttons.

Contact Wiring for Elevator Control



67 Configuration

The Dual Reader Interface Module board contains 8 DIP switches and, on Series 3 boards, 2 jumpers that must be configured for your system.

67.1 DIP Switches

DIP switch settings are described in the General Control Module Configuration chapter.

- Setting DIP Switches on Control Modules
- Device Address
- Communication Baud Rate
- Bus Encryption

67.2 Jumpers for the LNL-1320 Series 3

Jumper	Description
J1	Reader Power Select
	12V = 12 VDC at reader ports. *****
	PT = VIN "passed through" to reader ports
J4	RS-485 Termination, install in first and last units, only
All other jumpers are for factory use only	

* Install jumper J1 in the 12V position ONLY if the input voltage (VIN) is greater than 20 VDC. Failure to do so may damage the reader to the LNL-1320.

68 Specifications for the LNL-1320 Series 3

**The LNL-1320 Series 3 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice. The installation of this device must comply with all local fire and electrical codes.

- Power: 12 to 24 VDC ± 10%, 550mA maximum (plus reader current)
  - 12 VDC @ 450mA(plus reader current) nominal
  - 24 VDC @ 270mA (plus reader current) nominal
- Outputs: Six (6) Form-C relays:
  - Normally open (NO) contact: 5 A @ 30 VDC resistive
  - Normally closed (NC) contact: 3 A @ 30 VDC resistive
- Inputs:
  - Eight (8) unsupervised/supervised, standard EOL, 1k/1k ohm, 1% 1/4 watt
  - Two (2) unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- Reader interface:
  - Power (jumper selectable): 12 VDC ± 10% regulated, 300 mA maximum each reader (input voltage (VIN) must be > 20 VDC) or 12 to 24 VDC ± 10% (input voltage passed through), 300 mA maximum each reader
  - Data Inputs: TTL compatible, F/2F, or 2-wire RS-485
  - LED Output: TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink maximum
  - Buzzer Output: Open collector, 12 VDC open circuit maximum, 40 mA sink maximum
- Communication: 2-wire RS-485: 9600, 19200, 38400 or 115200 bps
- Cable requirements:
  - Power: 1 twisted pair, 18 AWG
  - RS-485 I/O devices: 1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 4000 feet (1219 m) maximum
  - Alarm inputs: 1 twisted pair per input, 30 ohms maximum
  - Outputs: As required for the load
  - Reader data (TTL): 6-conductor, 18 AWG, 500 feet (150 m) max
  - Reader data (F/2F): 4-conductor, 18 AWG, 500 feet (150 m) max
  - Reader data (RS-485): 1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 2000 feet (610 m) maximum

- Mechanical:
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)
  - Weight: 11 oz. (312 g) nominal
- Environmental:
  - Temperature: -55 to +85° C storage, 0 to +70° C operating
  - Humidity: 5 to 95% RHNC

UL 294, 6th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

69 Regulatory Information

69.1 Certifications

- UL 294 & UL 1076 Listed
- ULC Listed
- FCC Part 15
- C-Tick
- CE marking
- RoHS compliant
- WEEE

LNL-1320 Series 3B Dual Reader Interface Module

70 LNL-1320 Series 3B Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-1320 Series 3B Reference section.

1. Mount the device in the appropriate enclosure.
2. Wire the supervised alarm inputs.
3. Wire the upstream host communication.
4. Wire the relay outputs.
5. Wire the downstream TTL interface for the keypads and/or card readers.
6. Wire the Power Fault and Cabinet Tamper Monitors.
7. Wire the power input.
8. Configure the correct settings using the jumpers and DIP switches.

71 LNL-1320 Series 3B Reference

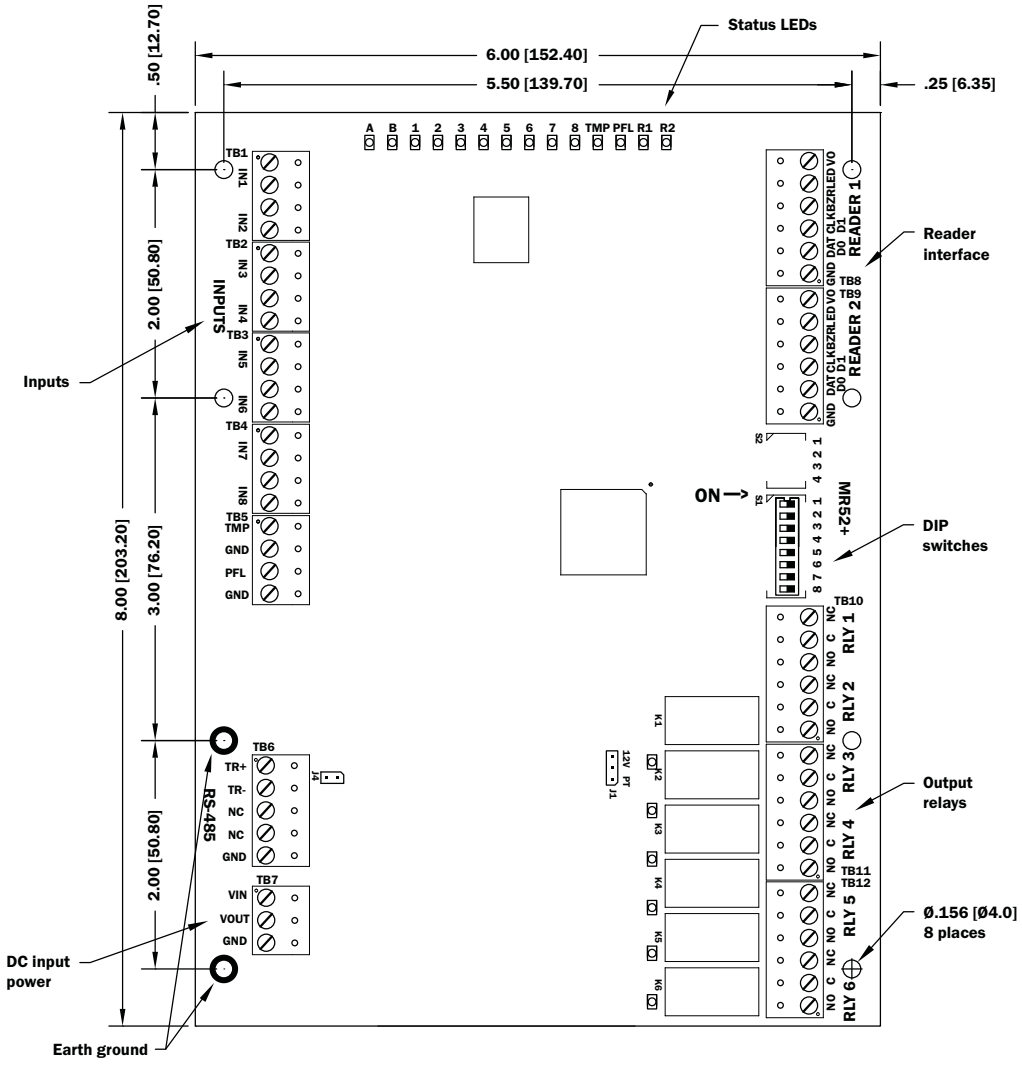
71.1 General

The LNL-1320 reader interface boards provide a solution to the host system integrator for interfacing to a TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 device and door hardware. The LNL-1320 provides a tri-state LED control and buzzer control. Six (6) Form-C relay outputs may be used for strike control or alarm signaling. Eight (8) inputs are provided that may be used for monitoring the door contact, request to exit push button and alarm contacts. Input circuits can be configured as unsupervised or supervised.

The LNL-1320 communicates to the controller via a 2-wire RS-485.

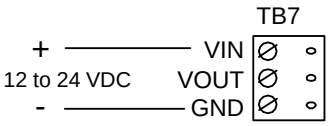
See the following diagram for component location (some components shown are not present on the LNL-1320).

71.2 LNL-1320 Series 3B Hardware



71.3 Supplying Power to the LNL-1320 Series 3B

The LNL-1320 accepts 12 to 24 VDC for power on TB7 (VIN and GND). Locate the power source as close to the LNL-1320 as possible. Make power connection with minimum of 18 AWG wires.



Important: **Incorrect connection may result in damage.**
Observe POLARITY on 12 to 24 VDC input.

The VOUT terminal on TB7 is the same as VIN.

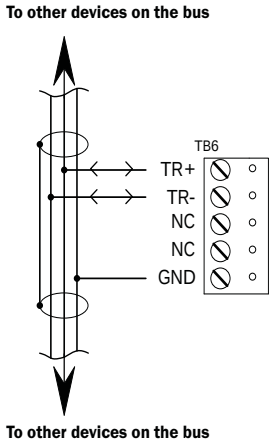
71.4 Communication Wiring (SIO Communication Port)

The LNL-1320 communicates to a LenelS2 intelligent controller (LNL-3300, for example) via a 2-wire RS-485 interface. The LNL-1320 allows for multi-drop communication on a bus of up to 4000 feet (1219 m) (not evaluated by UL). Use twisted pair (minimum 24 AWG) with drain wire and shield for communication. Refer to the Specifications section.

Install RS-485 termination jumper, J4, on the interface boards at each end of the communication line only.

2-Wire RS-485 TB10

(only 2-wire RS-485 is supported)



71.5 Reader Wiring

Each reader port supports a reader with TTL (D1/D0, Clock/Data), F/2F, or 2-wire RS-485 signaling. Power to the reader is selectable: 12 VDC (VIN must be greater than 20 VDC), or power is passed-through (PT) from the input voltage of the LNL-1320 (TB7-VIN), 300 mA maximum per reader port. Readers that require different voltage or have high current requirements must be powered separately. (Refer to the reader

manufacturer specifications for cabling requirements.) In the 2-wire LED mode, the buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

To fully utilize each reader port:

- TTL signaling requires a 6-conductor cable (18 AWG).
- F/2F signaling requires a 4-conductor cable.
- RS-485 signaling requires two 2-conductor cables. Use one (1) cable for power (18 AWG) and one (1) cable for communication (24 AWG, with drain wire and shield).

Notes: For OSDP cable lengths greater than 200 ft (61 m) or EMF interference, install 120Ω +/- 2Ω resistor across RS-485 termination ends.

Data 0 and Data 1 wires for Wiegand may be reused for OSDP. However, the standard Wiegand cable may not meet RS-485 twisted pair recommendations. The reuse of cables works best with shorter cable lengths at lower data rates.

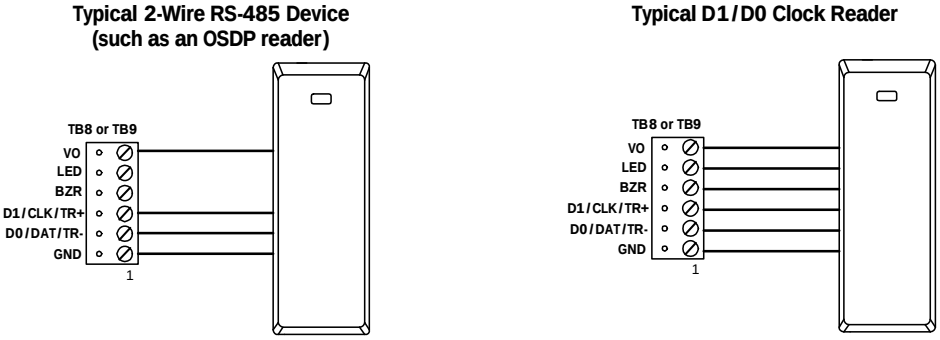
12V PT	J1 - Reader Port Power Select
	12 VDC is available on reader ports (VIN is greater than or equal to 20 VDC).
	VIN power is “passed through” to reader ports.

Note: If the input voltage to the LNL-1320 Series 3B is 12 VDC, jumper J1 **must** be in the **PT** position.

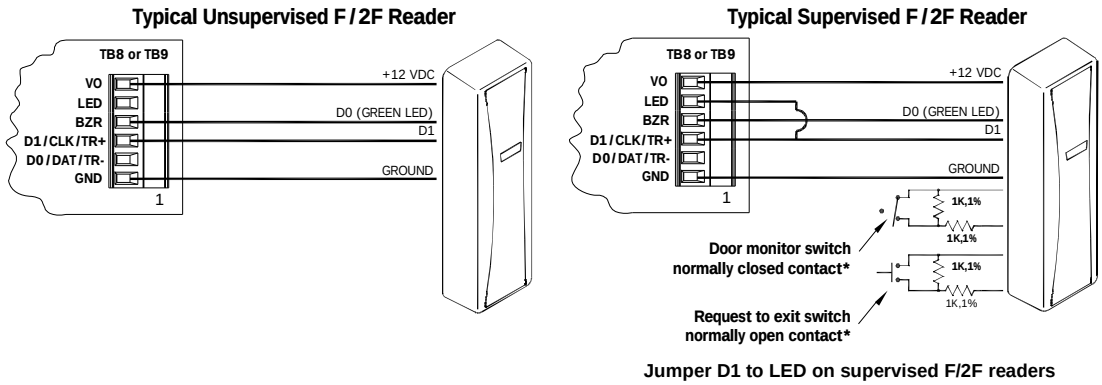
Input Power	Reader Power Select	Reader Output	Notes
24 VDC	pass-through	24 VDC	
24 VDC	12 VDC	12 VDC	
12 VDC	pass-through	12 VDC	
12 VDC	12 VDC	0 VDC	DO NOT USE

71.5.1 Reader Wiring Diagrams

Typical OSDP and Clock/Data Readers



Typical F/2F Readers



Jumper D1 to LED on supervised F/2F readers

* Inputs on supervised F/2F readers may be unsupervised or supervised (supervised shown).

71.6 Alarm Contact Wiring

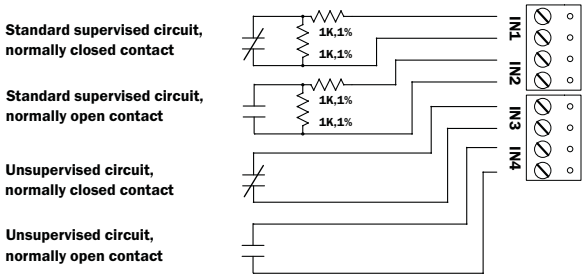
There are eight (8) inputs that are typically used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as:

- Unsupervised alarm (2 states); reporting as an open or closed contact.
- Supervised alarm (6 states); reporting as an open or closed contact, open circuit, shorted circuit, grounded circuit*, or foreign voltage*.

A supervised input circuit requires adding two (2) resistors with a value of 1k ohm, 1% to the circuit to facilitate proper reporting and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

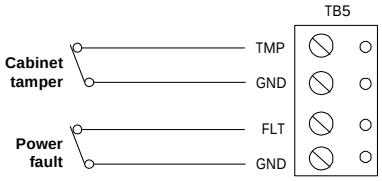
* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

The input circuit wiring configurations shown are supported but may not be typical.



71.7 Inputs for Cabinet Tamper/Power Fault

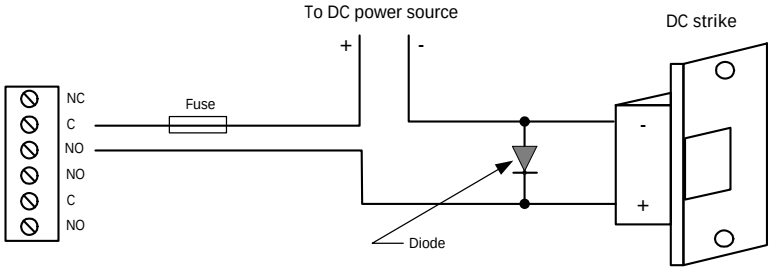
Input CT and input BA are used for monitoring cabinet tamper and power failure with normally closed contacts. These two inputs are for contact closure monitoring only and do not use EOL resistor(s). If these inputs are not used, install a short piece of wire at the input to indicate a safe condition.



71.8 Output Relay Wiring

Six (6) Form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, a contact protection circuit must be used. The following two (2) circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30 cm]), as the effectiveness of the circuit will decrease if it is located farther away.

Use sufficiently large gauge of wires for the load current to avoid voltage loss.



Diode Selection:

- Diode current rating: greater than1x strike current.
- Diode breakdown voltage: 4x strike voltage.
- For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.

71.9 Jumper and DIP Switch Usage

Jumper	Description
J1	**Reader Power Select**
	• 12V = 12 VDC at reader ports. ***** See note below *****
	• PT = VIN "passed through" to reader ports
J4	RS-485 Termination, install in first and last units, only
All other jumpers are for factory use only	

Note: Install jumper J1 in the 12V position ONLY if the input voltage (VIN) is greater than 20 VDC. Failure to do so may damage the reader or the LNL-1320.

71.9.1 DIP Switches

Switches 1 to 5 select the device address. Switch 6 and 7 select the communication baud rate. Switch 8 enables encrypted communication. All other configuration settings are set via host software.

Device Address

Address	DIP switch				
	5:	4:	3:	2:	1:
0	off	off	off	off	off
1	off	off	off	off	ON
2	off	off	off	ON	off
3	off	off	off	ON	ON
4	off	off	ON	off	off
5	off	off	ON	off	ON
6	off	off	ON	ON	off
7	off	off	ON	ON	ON
8	off	ON	off	off	off
9	off	ON	off	off	ON
10	off	ON	off	ON	off
11	off	ON	off	ON	ON
12	off	ON	ON	off	off
13	off	ON	ON	off	ON

Address	DIP switch				
	5:	4:	3:	2:	1:
14	off	ON	ON	ON	off
15	off	ON	ON	ON	ON
16	ON	off	off	off	off
17	ON	off	off	off	ON
18	ON	off	off	ON	off
19	ON	off	off	ON	ON
20	ON	off	ON	off	off
21	ON	off	ON	off	ON
22	ON	off	ON	ON	off
23	ON	off	ON	ON	ON
24	ON	ON	off	off	off
25	ON	ON	off	off	ON
26	ON	ON	off	ON	off
27	ON	ON	off	ON	ON
28	ON	ON	ON	off	off
29	ON	ON	ON	off	ON
30	ON	ON	ON	ON	off
31	ON	ON	ON	ON	ON

Communication

Baud rate	DIP switch 7:	DIP switch 6:
38,400 bps	ON	ON
19,200 bps	ON	off
9600 bps	off	ON
115,200 bps (Firmware revisions prior to 1.38.1, this setting is 2,400 BPS.)	off	off

Bus communications	DIP switch 8: (OnGuard 2009 or later)	DIP switch 8: (prior to OnGuard 2009)
Encryption is not required	off	Normal operation
Encryption is required	ON	Not allowed

71.10 Status LEDs

Power-up: All LEDs are OFF

Initialization: Once power is applied, initialization of the module begins.

When initialization is completed, LEDs A through R2 are briefly sequenced **ON** then OFF.

Run time: After the above sequence, the LEDs have the following meanings:

LED	Description
A LED heartbeat and on- line status	Off-line: 1 sec rate, 20% ON
	On-line: Non-encrypted communication: 1 sec rate, 80% ON Encrypted communication: .1 sec ON, .1 sec OFF, .1 sec ON, .1 sec OFF, .1 sec ON, .1 sec OFF, .1 sec ON, .3 sec OFF
A LED	Error Indication: Waiting for application firmware to be downloaded: .1 sec ON, .1 sec OFF.
B LED	SIO Communication Port Status: Indicates communication activity on the SIO communication port
1 LED	Input Status: IN1
2 LED	Input Status: IN2
3 LED	Input Status: IN3
4 LED	Input Status: IN4
5 LED	Input Status: IN5
6 LED	Input Status: IN6
7 LED	Input Status: IN7
8 LED	Input Status: IN8
TMP	Cabinet tamper
PFL	Power fault
	Input in the inactive state: OFF (briefly flashes ON every 3 seconds) Input in the active state: ON (briefly flashes OFF every 3 seconds) Input in a trouble state: Rapid flash
R1 LED	Reader port 1 Clock/Data: Flashes when data is received, either input D1/D0 mode: Flashes when data is received, either input RS-485 mode: Flashes when transmitting data F/2F mode: Flashes when data/acknowledgment is received

LED	Description
R2 LED	Reader port 2: Clock/Data: Flashes when data is received, either input D1/D0 mode: Flashes when data is received, either input RS-485 mode: Flashes when transmitting data F/2F mode: Flashes when data/acknowledgment is received
K1 - K6 LEDs	Illuminates when output relay RLY 1 (K1) through RLY 6 (K6) is energized. Every three seconds, LEDs A through R2 are pulsed to their opposite state for 0.1 sec.

71.11 Specifications

The LNL-1320 Series 3B is for use in low voltage, Class 2 circuits only. All output circuits are Class2/Power Limited.

The installation of this device must comply with all local fire and electrical codes.

Note: Only 12 VDC input was evaluated by UL by connection to the separately UL Listed power supplies.

Primary Power:	12 to 24 VDC ± 10%, 550 mA maximum (reader current not included)
Outputs:	Six (6) Form-C relays: Normally open (NO) contact: 5 A @ 30 VDC resistive
	Normally closed (NC) contact: 3 A @ 30 VDC resistive
Inputs:	Eight (8) unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, ¼ watt
	Two (2) unsupervised, dedicated for cabinet tamper and UPS fault monitoring
Reader Interface:	
Power: (jumper selectable)	12 VDC ± 10% regulated, 300 mA maximum each reader (input voltage (VIN) must be greater than 20 VDC)
	or
	12 to 24 VDC ± 10% (input voltage (VIN) passed through), 300 mA maximum each reader
Data Inputs:	TTL compatible, F/2F or 2-wire RS-485
LED Output:	TTL levels, high >3 V, low <0.5 V, 5 mA source/sink maximum
Buzzer Output:	Open collector, 12 VDC open circuit maximum, 40 mA sink maximum

Communication:	2-wire RS-485:9600, 19200, 38400 or 115200 bps
Cable Requirements:	
Power:	1 twisted pair, 18 AWG
RS-485 I/O Devices:	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 4000 feet (1219 m) maximum
Alarm Input:	1 twisted pair per input, 30 ohm maximum
Outputs:	As required for the load
Reader data (TTL):	6-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (F/2F):	4-conductor, 18 AWG, 500 feet (150 m) maximum
Reader data (RS-485):	1 twisted pair with drain wire and shield, 24 AWG, 120 ohm impedance, 2000 feet (610 m) maximum
Mechanical:	
Dimension:	6 in. (152.4 mm) W x 8 in. (203.2 mm) L x 1 in. (25 mm) H
Weight:	11 oz. (312 g) nominal
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC

UL evaluated to:

- ULC 60839-11-1: Grade 2, indoor dry
- UL 294 7th edition Performance Levels:

Feature	Level
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

Note: Outputs are Power limited/class 2 when powered by external power limited/class 2 power supply model LNL-AL400ULX (includes AL1012ULXBL & PD2) or LNL-AL600ULX-4CB6 (includes AL1012ULXBL PD4).

For the ULC 60839-11-1 and UL2610 evaluations of Model LNL-1320-S3B: the panel configuration consisted of the following: Enclosure Models LNLAL600ULX-4CB6 or LNL-AL600ULX-4CB6, Altronix Access Control Power Supply Board, Model AL1012ULXB, Power Distribution module PD4A , HID models LNL-1100-S3, LNL-1320-S3, LNL-1200-S3, LNL1300-S3, and LNL-X3300.

Only the input of 12 VDC was evaluated of the LNL-1320-S3B.

ULC 60839-11: Optional items have not been evaluated by UL.

These specifications are subject to change without notice.

71.11.1 UL Listed Installations

- Reader Ports are Special Applications rated: 11.295 – 12 VDC (Reader 1) and 11.412 – 12.1 VDC (Reader 2)
- The following readers are to be connected:
  - BlueDiamond models: LNL-R11330-05TB, LNL-R11320-05TB, LNL-R11325-05TB
  - HID Signo models: 20, 20K, 40, 40K

71.12 Regulatory Information

71.12.1 Certifications

- UL 294, UL 2610 Listed
- ULC Listed
- ULC 60839-11-1: Grade 2, indoor dry
- FCC Part 15 and Industry Canada EMC
- C-Tick
- CE marking
- RoHS compliant
- WEEE

LNL-1324e OSDP Reader Interface Module

72 LNL-1324e Installation

To install the controller, perform the installation procedures using the diagrams provided in the LNL-1324e Reference section.

Important: To help prevent damage from electrostatic charges or other transient electrical surges, connect earth ground to the panel at the screw next to the Ethernet Connector before making other connections. Recommended earth ground references are a grounding rod or a cold water pipe. The mounting hole next to the Ethernet jack is connected to the case of the Ethernet jack and other Ethernet transient suppression devices. The grounding connection must be made at this point. The system should be connected to earth ground at only one point.

1. Mount the device in the appropriate enclosure.
2. Wire the device for communication.
3. Wire readers.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Supply power to the controller.
7. Remove the plastic safety strip from the memory backup battery.
8. Configure the correct settings using the jumpers and DIP switches.
9. Set the board for the desired initial IP addressing mode.
10. Configure the network and port settings using the embedded web server (refer to Web Page Configuration of the LNL-1324e OSDP Reader Interface Module on page 395).

73 LNL-1324e Reference

73.1 General

The LNL-1324e OSDP reader interface provides a network connected interface to control two physical barriers using OSDP readers and provides a solution for the OEM integrator for interfacing to OSDP readers and door hardware. The on-board Ethernet with PoE/PoE+ support enables easy installation.

The LNL-1324e supports up to four OSDP readers configured as paired or alternate readers.

Note: For UL, the Power Sourcing Equipment (PSE) such as a PoE/PoE+ enabled network switch and/or PoE/PoE+ power injectors must be UL Listed under UL294.

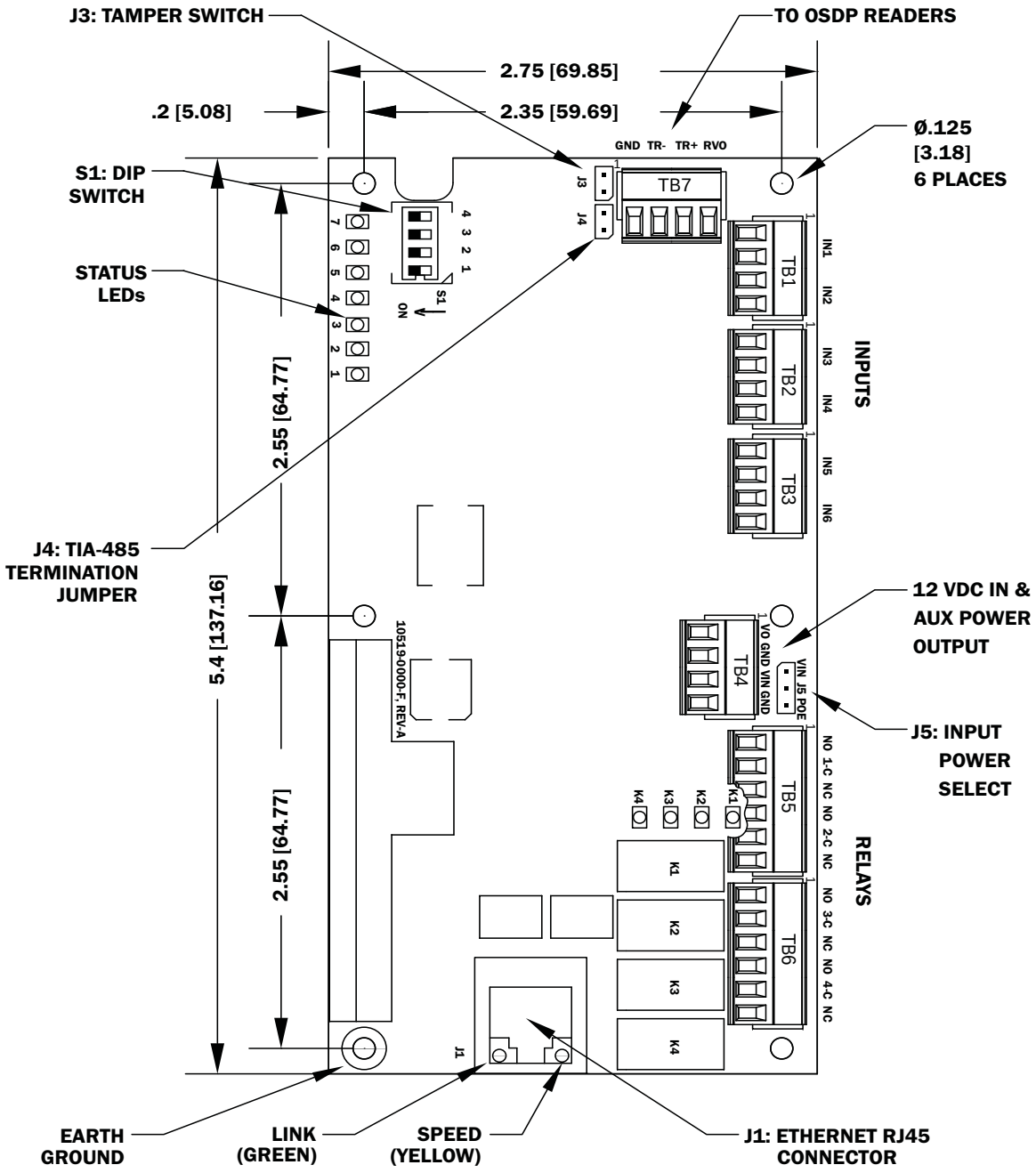
One serial 2-wire RS-485 communication port is available that can accommodate up to four OSDP readers.

Four Form-C relay outputs may be used for door strike control or alarm signaling. The relay contacts are rated at 2 A @ 30 VDC, resistive and are in a dry contact configuration.

Six inputs are provided that may be used for monitoring the door contacts, exit push buttons, and alarm contacts. Input circuits can be configured as unsupervised or supervised. The LNL-1324e requires PoE, PoE+ or local 12 VDC for power.

The LNL-1324e may be mounted in a 3-gang switch box; a mounting plate is supplied with the unit or be mounted in an enclosure; the supplied mounting plate has mounting holes that match the LNL-1300, LNL-1300e, or LNL-X2210 mounting footprint.

73.2 LNL-1324e Hardware



73.3 LNL-1324e Alarm Panel Wiring

Terminal Blocks 1-7 Connections		
TB1-1	IN1	Input 1
TB1-2	IN1	
TB1-3	IN2	Input 2
TB1-4	IN2	
TB2-1	IN3	Input 3
TB2-2	IN3	
TB2-3	IN4	Input 4
TB2-4	IN4	
TB3-1	IN5	Input 5
TB3-2	IN5	
TB3-3	IN6	Input 6
TB3-4	IN6	
TB4-1	VO	Auxiliary Power Output - 12 VDC
TB4-2	GND	Auxiliary Power Output Ground
TB4-3	VIN	Input Power - 12 VDC (from local power supply)
TB4-4	GND	Input Power Ground
TB5-1	NO	Relay K1 - Normally Open Contact
TB5-2	1-C	Relay K1 - Common Contact
TB5-3	NC	Relay K1 - Normally Closed Contact
TB5-4	NO	Relay K2 - Normally Open Contact
TB5-5	2-C	Relay K2 - Common Contact
TB5-6	NC	Relay K2 - Normally Closed Contact
TB6-1	NO	Relay K3 - Normally Open Contact
TB6-2	3-C	Relay K3 - Common Contact
TB6-3	NC	Relay K3 - Normally Closed Contact
TB6-4	NO	Relay K4 - Normally Open Contact
TB6-5	4-C	Relay K4 - Common Contact
TB6-6	NC	Relay K4 - Normally Closed Contact
TB7-1	GND	Reader Power Ground

Terminal Blocks 1-7 Connections		
TB7-2	TR-	2-Wire RS-485 TR- (B) *
TB7-3	TR+	2-Wire RS-485 TR+ (A) *
TB7-4	RVO	12 VDC Reader Power Output

* Terms A & B are from the RS-485 standard.

73.3.1 Jumpers

Jumpers	Set at	Description
J1	N/A	Ethernet Connection with PoE/POE+ support
J2	N/A	Factory Use Only
J3	N/A	Tamper Switch (normally open contact)
J4	N/A	RS-485 Termination, install only if the LNL-1324e is at the end of the communication bus
J5	PoE	LNL-1324e powered from the Ethernet connection
	VIN	LNL-1324e powered from an external 12 VDC power source connected to TB4-3 (VIN), TB4-4 (GND)
J6-J13	N/A	Factory Use Only

73.3.2 DIP Switches

The four switches on S1 DIP switch configure the operating mode of the LNL-1324e. DIP switches are read on power-up except where noted.

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 390.
OFF	ON	OFF	OFF	Use factory default communication parameters.
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 386.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 386.

X = ON or OFF. All other switch settings are unassigned and reserved for future use.

Factory Default Communication Parameters

- Network: static IP address: 192.168.0.251
- Subnet Mask: 255.255.0.0
- Default Gateway: 192.168.0.1

73.4 Bulk Erase Configuration Memory

The bulk erase function can be used for the following purposes:

- Erase all configuration and cardholder database (sanitize board, less third party applications)
- Restore to LenelS2 default parameters

If clearing the memory does not correct the initialization problem, contact LenelS2 OnGuard Technical Support.

73.4.1 Bulk Erase Steps

Important: Do not remove power during steps 3-6.

1. Set S1 DIP switches to: 1 & 2 "ON," 3 & 4 "OFF."
2. Apply power to the LNL-1324e board.
3. After the LNL-1324e boots up, watch for LEDs 1 & 2 and 3 & 4 to alternately flash at a 0.5 second rate.
4. Within 10 seconds after the above pattern starts, change switches 1 or 2 to "OFF." If these switches are not changed, the LNL-1324e board will power up using the OEM default communication parameters.
5. LEDs 1 and 2 alternately flash at a .05 second rate indicating that the configuration memory is being erased. Full memory erase takes up to 60 seconds, usually a lot less.
6. When complete, LED 1 will be on for about 3 seconds and then the LNL-1324e board will reboot.

73.5 Input Power

The LNL-1324e is powered by one of two ways (jumper selected, J5):

- Power is supplied via the Ethernet connection using PoE or PoE+.
- Local 12 VDC power supply, TB4-3 (VIN), TB4-4 (GND).

73.6 Communication Wiring

Communication between the LNL-X series controller and the LNL-1324e is Ethernet (10Base T/100Base-TX). It is not recommended to connect the LNL-1324e to a public intranet.

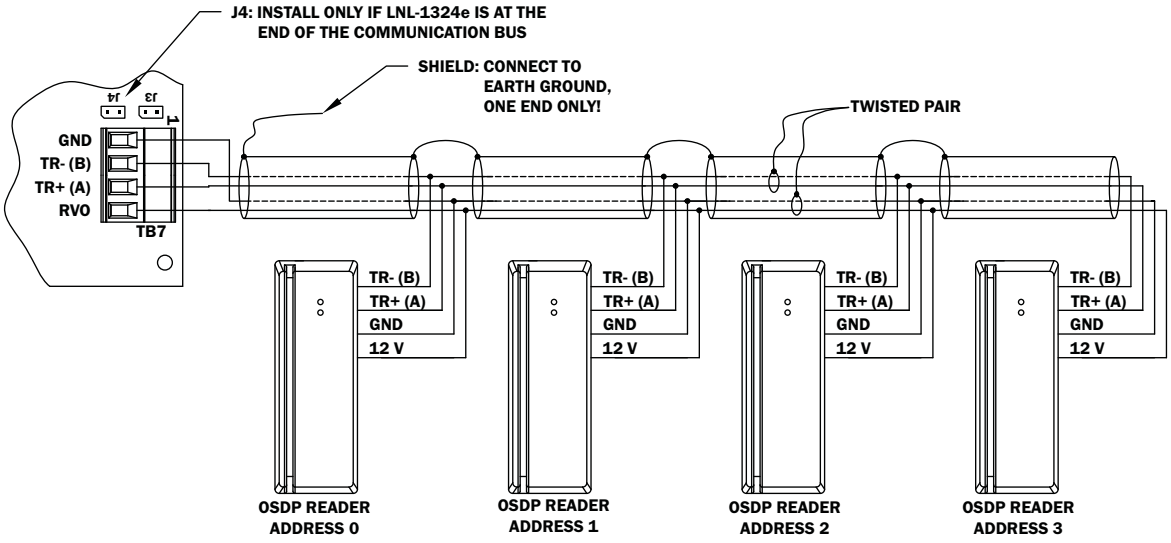
73.7 OSDP Reader Wiring

TB7 has connections for the 2-wire RS-485 OSDP communication bus and 12 VDC to power the OSDP readers. Up to four OSDP readers are supported on the LNL-1324e. This 12 VDC output is limited to .5 A. maximum. The OSDP reader wiring diagram that follows shows the use of a 2-pair cable for data and power. If this cable cannot support the voltage/current requirements, a 1-pair cable of sufficient gauge must be used for power. For more information, refer to Specifications on page 391.

The RS-485 termination jumper, J4, is only installed if the LNL-1324e is at one end of the communication bus. Only devices at each end of the communication bus are terminated, never install termination to more than two devices on the communication bus.

Important: When powering any remote device(s) by the LNL-1324e, care must be taken not to exceed the maximum current available. Cable gauge must also be evaluated. For more information, refer to Specifications on page 391.

Typical OSDP Reader Wiring



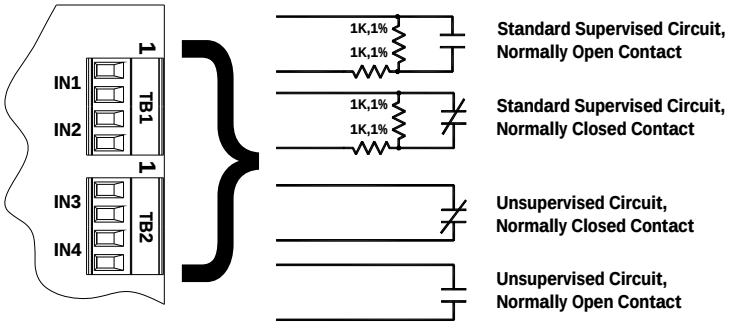
73.8 Input Circuit Wiring

The 6 (six) inputs are typically used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states.

When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded,* and foreign voltage.* A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1k ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and, therefore, not verified by UL.

The input circuit wiring configurations shown are supported, but may not be typical.



73.9 Reader Interface Wiring

Terminal Blocks 1-7 Connections		
TB1-1	IN1	Input 1
TB1-2	IN1	Door Contact for Reader 1
TB1-3	IN2	Input 2
TB1-4	IN2	Request to Exit for Reader 1
TB2-1	IN3	Input 3
TB2-2	IN3	Auxiliary Input for Reader 1
TB2-3	IN4	Input 4
TB2-4	IN4	Door Contact for Reader 3
TB3-1	IN5	Input 5
TB3-2	IN5	Request to Exit for Reader 3
TB3-3	IN6	Input 6
TB3-4	IN6	Auxiliary Input for Reader 3
TB4-1	VO	Auxiliary Power Output - 12 VDC
TB4-2	GND	Auxiliary Power Output Ground
TB4-3	VIN	Input Power - 12 VDC (from local power supply)
TB4-4	GND	Input Power Ground
TB5-1	NO	Relay K1 - Strike Relay for Reader 1 (Door 1)
TB5-2	1-C	
TB5-3	NC	
TB5-4	NO	Relay K2 - Auxiliary Relay for Reader 1 (Door 1)
TB5-5	2-C	
TB5-6	NC	
TB6-1	NO	Relay K1 - Strike Relay for Reader 3 (Door 2)
TB6-2	3-C	
TB6-3	NC	
TB6-4	NO	Relay K2 - Auxiliary Relay for Reader 3 (Door 2)
TB6-5	4-C	
TB6-6	NC	

Terminal Blocks 1-7 Connections		
TB7-1	GND	Reader Power Ground
TB7-2	TR-	2-Wire RS-485 TR- (B) *
TB7-3	TR+	2-Wire RS-485 TR+ (A) *
TB7-4	RVO	12 VDC Reader Power Output

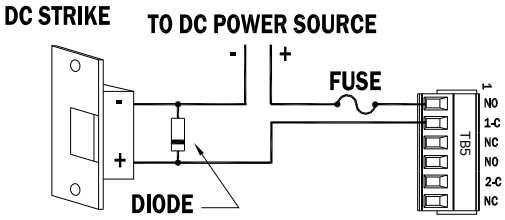
* Terms A & B are from the RS-485 standard.

73.10 Relay Circuit Wiring

Four relays with Form-C contacts (dry) are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 2 A @ 30 VDC, resistive and are in a dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When controlling the delivery of power to the door strike, the Normally Open and Common poles are typically used. When momentarily removing power to unlock the door, as with a magnetic lock, the Normally Closed and Common poles are typically used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, it is recommended that a diode be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.

Important: It is possible for the LNL-1324e to provide power for a 12 VDC door strike providing the maximum current is not exceeded, see specification section.



73.10.1 Diode Selection

Diode current rating: 1x strike current. Diode breakdown voltage: 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.

73.11 IT Security

When installing the LNL-1324e, it is important to ensure that it is done in a secure manner.

Upon installation, the user accounts to the web configuration page should be created with secure passwords, and that all DIP switches are in the off position for the normal operating mode. The LNL-1324e is shipped

from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before the LNL-1324e is commissioned. It is also highly recommended not to configure the LNL-1324e with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. Additionally, data encryption can be enabled over the host communication port.

73.12 Status LEDs

Power-up: All LEDs OFF.

Initialization: After power is applied, LED 1 turns ON, then LEDs 2 through 7 are turned ON then Off in sequence.

If the sequence stops or repeats, perform "Bulk Erase Steps" on page 386.

Running: After initialization is complete, the LEDs have the following meanings:

LED	Description
1	On-line = four pulses per second; 0.1 second ON, 0.1 second OFF, OFF for 0.3 seconds
	Off-line: 0.2 second ON, 0.8 second OFF
	Waiting for application firmware to be downloaded: .1 sec ON, .1 sec OFF
2	Input IN1 Status: OFF = Inactive, ON = Active, Flashing = Fault *
3	Input IN2 Status: OFF = Inactive, ON = Active, Flashing = Fault *
4	Input IN3 Status: OFF = Inactive, ON = Active, Flashing = Fault *
5	Input IN4 Status: OFF = Inactive, ON = Active, Flashing = Fault *
6	Input IN5 Status: OFF = Inactive, ON = Active, Flashing = Fault *
7	Input IN6 Status: OFF = Inactive, ON = Active, Flashing = Fault *
J1 - YELLOW	Ethernet speed: OFF = 10 Mb/S, ON = 100 Mb/S
J1 - GREEN	OFF = No Link, ON = Good Link, Flashing = Ethernet Activity

* If this input is defined, every three seconds the LED is pulsed to its opposite state for 0.1 seconds, otherwise, the LED is off.

73.13 Specifications

The interface is for use in low voltage, Class 2 circuits only.

The installation of this device must comply with all local fire and electrical codes.

Power Input:	PoE (12.95 W), compliant to IEEE 802.3af or PoE+ (25 W), compliant to IEEE 802.3at or 12 VDC ± 10 %, 1.7 A maximum For UL, the Power Sourcing Equipment (PSE) such as a PoE/PoE+ enabled network switch and/or PoE/PoE+ power injectors must be UL Listed under UL294. Wiring for the 12V input shall not extend more than 30m from the product.
Power Output:	PoE: VO (TB4-1) and RVO (TB7-4), combined: 12 VDC @ .66 A maximum PoE+ or 12 VDC: VO (TB4-1) 12 VDC @ 1 A maximum, RVO, (TB7-4) 12 VDC @ .5 A maximum
Inputs:	Six unsupervised/supervised, End of Line resistors: 1k/1k ohm, 1%, ¼ watt standard
Outputs:	Four relays, Form-C with dry contacts rated at 2 A @ 30 VDC
Reader Interface:	
Power:	12 VDC @ .5 A maximum (RVO, TB7-4)
Communication:	2-Wire RS-485, OSDP protocol, four devices maximum
Cable Requirements:	
Communication: :	Ethernet, Category 5, minimum
External Input Power:	1 twisted pair, 18 AWG (if required)
Alarm Inputs:	1 twisted pair per input, 30 ohm maximum
Relay Outputs:	As required for the load
Reader Data and Power*	RS-485/power: 2 twisted pair with shield, 24 AWG, 120 ohm impedance, 4000 foot (1220 m) maximum. or RS-485: 1 twisted pair with shield, 24 AWG, 120 ohm impedance, 4000 foot (1220 m) maximum and power: 1 pair 18 AWG* * Type of cable(s) and gauge determined by length and voltage/current requirements. Local power source may be required
Environmental:	
Temperature:	Storage: -55 to +85 °C (-67° to 185° F) Operating: 0 to +70 °C (32° to 158° F)
Humidity:	5 to 95% RHNC

Mechanical:	
Dimension:	5.5 in. (140 mm) W x 2.75 in. (70 mm) L x 0.96 in. (24 mm) H without bracket 5.5 in. (140 mm) W x 3.63 in. (92 mm) L x 1.33 in. (34 mm) H with bracket
Weight:	4 oz. (112 g) without bracket 5 oz. (142 g) with bracket

UL 294, 7th edition Performance Levels:

Feature	**Level**
Standby Power	I
Endurance	IV
Line Security	I
Destructive Attack	I

These specifications are subject to change without notice.

73.13.1 UL Listed Installations

- PoE is only for use with Access control-only installations and not for use with burglar installations.
- For access control-only installations using DC power, power shall be provided by a UL 294 or UL 603, class 2 power supply with appropriate ratings.
- For burglar alarm installations, backup power is not provided. A UL 603 listed, class 2 power supply with appropriate ratings shall be used that provides a minimum four hours of standby power after notification of loss of AC power.
- Locations and wiring methods shall be in accordance with the National Electrical Code, ANSI/ NFPA 70.

For UL installations, the following must be observed:

- PoE power is to be supplied by an Access Control System Unit (ALVY), power limited, PoE injector (PSE) providing 44-57VDC and 15W for maximum output, and PoE+ injector (PSE) providing 42.5 – 57 VDC, 25.5W for maximum output).
- This product is not intended for outside wiring as covered by Article 800 in the National Electrical Code, NFPA 70.
- Category 5e cabling is the minimum performance category recommended.
- The minimum conductor gauge permitted to connect between the PSE or power injector and the PD shall be 26 AWG (0.13 mm^2) for patch cords; 24 AWG (0.21 mm^2) for horizontal or riser cable.
- Connected through standard eight-pin RJ-45 connectors.
- Compliance with IEEE 802.3 (at or af) specifications was not verified as part of UL 294.

73.13.2 Firmware Revision

In Alarm Monitoring, the firmware revision can be displayed in the System Status Tree by selecting **Display Device Firmware Version** from the **Options** menu.

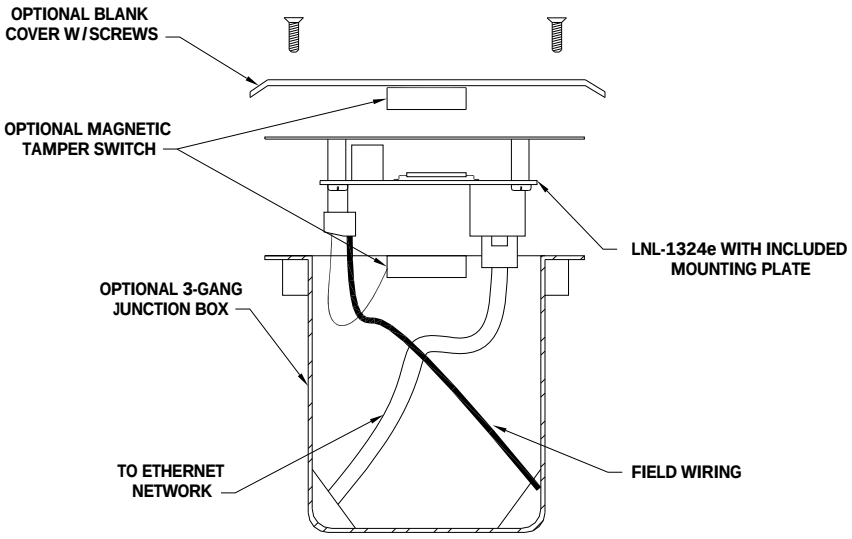
In the Controller Web Page, select **Device Info**. For more information, refer to the *Web Page Configuration of the LNL-1324e OSDP Reader Interface Module* chapter in the Hardware Installation Guide (DOC-600).

73.14 Additional Mounting Information

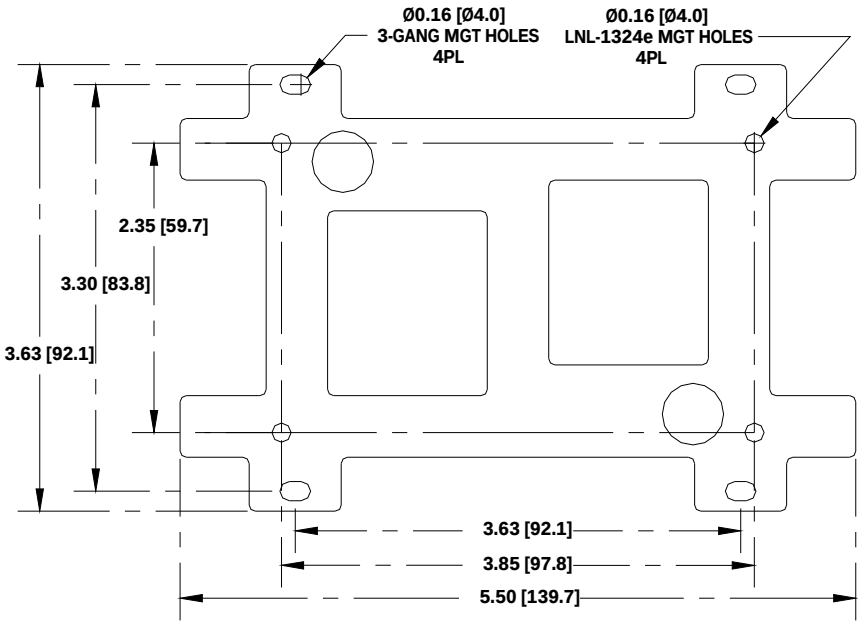
Sources for the optional items:

- 3-gang stainless steel blank cover. Available from:
  Leviton: part number 84033-40
  Graybar: part number 88158404
- Magnetic switch set: G.R.I. part number: 505

Side View



Mounting Plate Dimensions



74 Web Page Configuration of the LNL-1324e OSDP Reader Interface Module

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-1324e OSDP Reader Interface Module can be configured through the secure web interface connection. The web page provides the ability to:

- Configure the IP address (Host Communication address or DHCP name)
- Create and manage user logins
- View device information

74.1 Secure Access to Controller Web Page Configuration

Upon installation, the user accounts to the web configuration page should be created with secure passwords and the DIP switches set in the off position for the normal operating mode. The intelligent controllers are shipped from the factory with a default login account, which is enabled when DIP 1 is moved from OFF to ON. The default login user name and password will be available for five minutes once enabled. Therefore, it is important that at least one user account is defined, and the DIP switches are set to OFF before an intelligent controller is commissioned. It is also highly recommended not to configure the controller with an IP address that is accessible from the public Internet.

To further enhance network security, options are available to disable SNMP, Zeroconf discovery, as well as the web configuration module itself. For more information, refer to Configure Other Settings on page 400.

74.1.1 Default User

There is one pre-defined user always available by turning DIP switch SW1 ON after power up. When logging in for the first time, since no other users are defined yet, the default user name and password are required for configuring this board.

If the user name and password for the controller are unknown, configure the DIP switches as follows:

1	2	3	4	Definition
OFF	OFF	OFF	OFF	Normal operating mode.
ON	X	OFF	OFF	After initialization, enable default User Name (admin) and Password (password). The switch is read on the fly, no need to re-boot. For more information refer to IT Security on page 390.
OFF	ON	OFF	OFF	Use factory default communication parameters.
ON	ON	OFF	OFF	Use LenelS2 default communication parameters. Contact system manufacturer for details. See Bulk Erase Configuration Memory on page 386.
ON	ON	OFF	OFF	Bulk Erase prompt mode at power up. See Bulk Erase Configuration Memory on page 386.

The DIP switches configure the operating mode of the processor. DIP switches are read on power-up except where noted.

Notes: The default username (admin) & password (password) will work for 5 minutes after switch 1 is set to ON. Before disabling the default username & password, ensure at least one user has been created and then set Switch 1 to off.

After configuring ports and users, be sure to turn SW1 off to enable the updated settings.

74.2 Open the Configuration Web Page and Log In

The Configuration Web Page can be launched from within System Administration (if an IP address or host name is specified) or by using a browser to access the programmed IP address. Depending on your proxy settings, you may have to allow this web page. (For more information, consult your browser's online help or system administrator for assistance.)

1. In System Administration in the Access Panels folder, click the **Configuration Web Page** button or open a browser and navigate to the device using the IP address.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website's security certificate. Although it is not recommended, proceed to the website.

2. Click the link to go to the login page.

Note: The factory default does not have a security certificate. Depending on the browser and security settings, a certificate error may be displayed. Continue anyway.

3. Log in using your user name and password.

Notes: Only 3 users may be logged in at the same time and only 1 level 1 user may be logged in at any time.

If a third user closes the browser without logging out, another user attempting to log in will see a Server Busy error and need to wait until someone logs out or the inactivity timer is reached for the one who closed the browser without logging out.

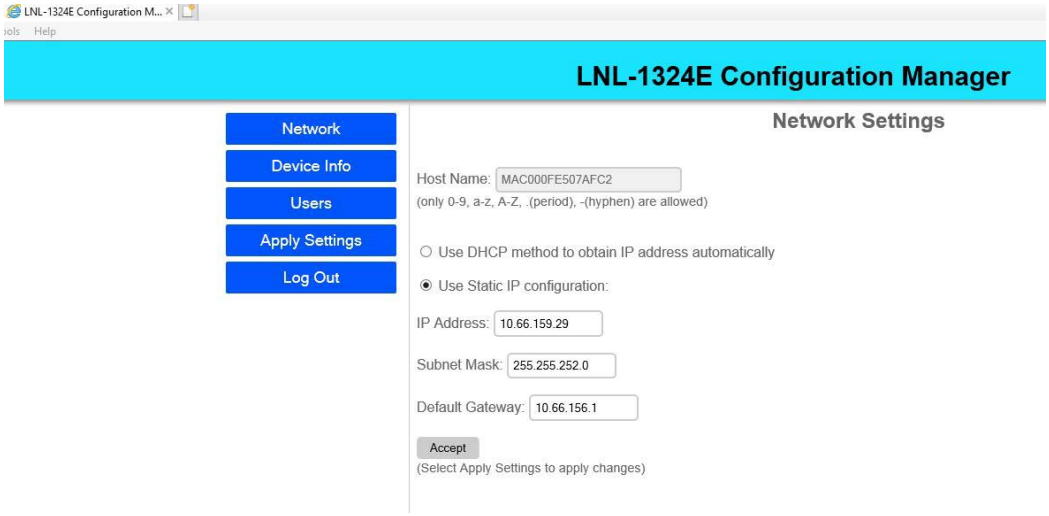
The Home page is displayed. It indicates the type of device, provides links to other setup pages, and has a Notes field for identifying information within the controller or indicating contact information.

4. (Optional) Type up to 250 characters in the Notes field and click **Save Notes**.

74.3 Configure Network Settings

The Network Settings page specifies the addressing mode and address for the intelligent controllers.

1. Select **Network** from the left-hand menu. The Network Settings page is displayed.



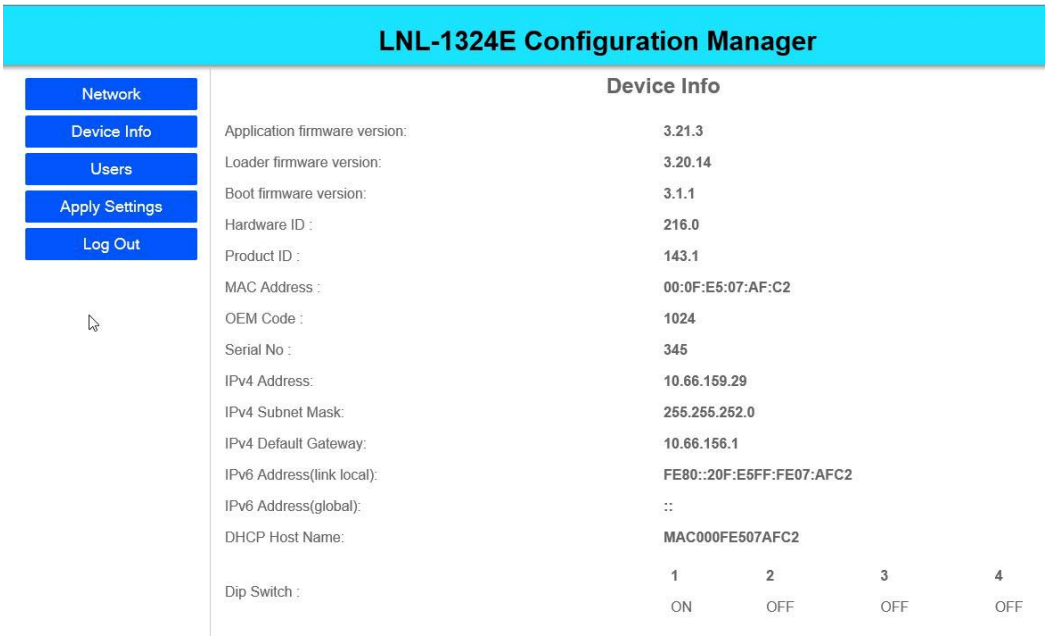
2. If using DHCP, specify the host name. The default DHCP name uses the MAC address of the controller.
3. Select the appropriate option to connect to the controller on the network:
   - **Use DHCP**
     With DHCP, IP settings will be configured automatically.
   - **Use Static IP**
     Specify the IP address, subnet mask, default gateway, and an optional DNS suffix for the controller.

4. Click **Accept**.
5. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

74.4 Display Information

The **Device Info** page displays hardware and configuration settings on the controller, including the firmware revision. This page is refreshed every minute.

Select **Device Info** from the left-hand menu. The **Device Info** page is displayed.

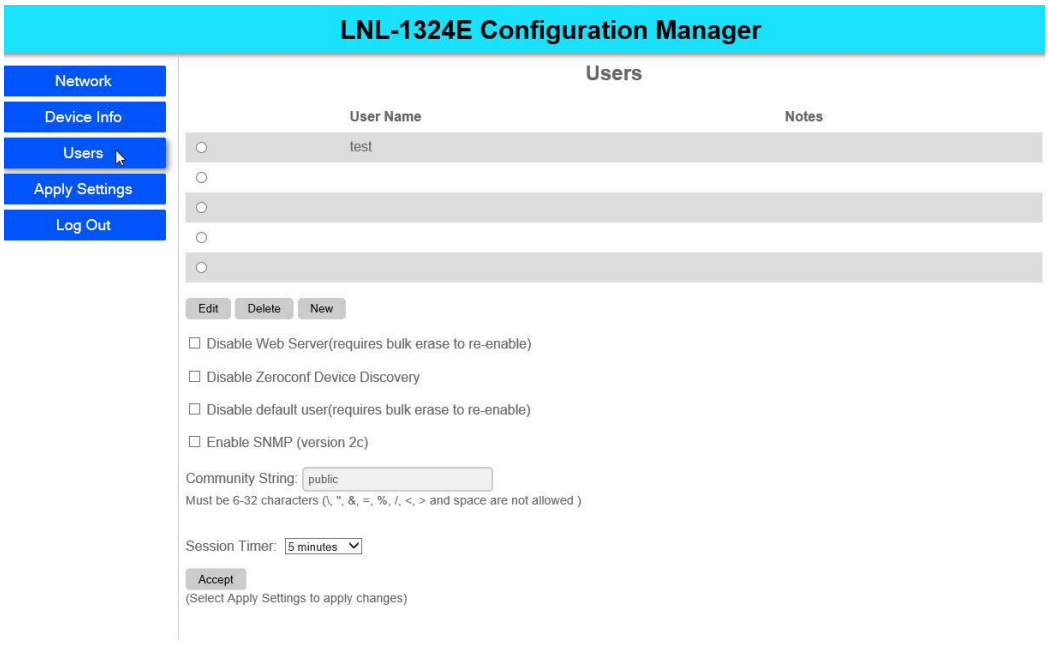


74.5 Configure User Accounts and Other Settings

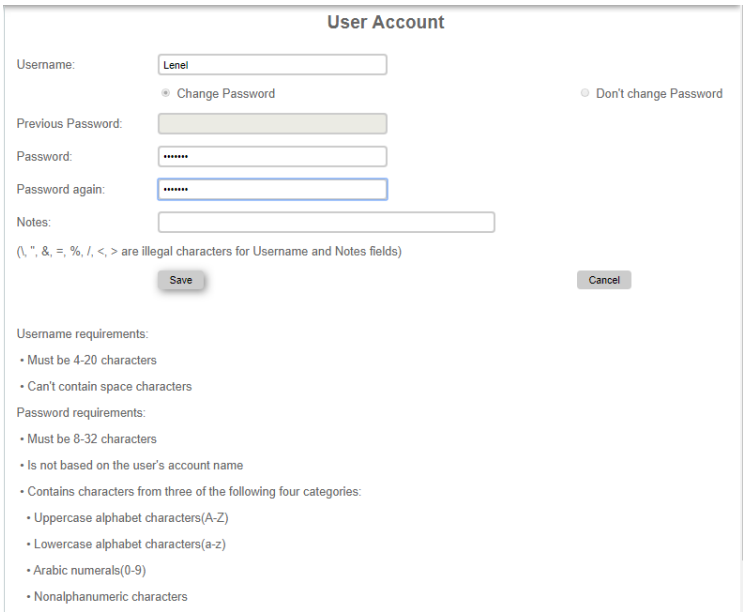
User accounts for the Web Configuration Manager may be created, edited or deleted. Up to five (5) users may be defined.

74.5.1 Create or Edit a User Account

1. Select **User** from the left-hand menu. The users page is displayed.



2. To edit a user account, select a user from the list and then select **Edit**.
   To create a new user account, select **New User**.
   The User Account page is displayed.



3. Enter a **Username** of 4-20 characters.
4. Select Change password, if desired for an existing user.
5. Enter a **Password** of 8-32 characters using the guidelines for a strong password listed below Save.

6. Enter the **Password again** to verify the entry.
7. Enter a note of up to 32 characters, if desired. Example: Level 2 user.
8. Select **Save**. The Users page is displayed with the new user added to the list.
9. Select a value for the **Session Timer** from the drop-down menu to specify the period of inactivity allowed before the user is automatically logged out.
10. Select **Save**.

74.5.2 Delete a User Account

1. Select **User** from the left-hand menu. The users page is displayed.
2. Select a user from the listing and then **Delete**.
3. Select **Save.**

74.5.3 Configure Other Settings

1. Select **User** from the left-hand menu. The users page is displayed.
2. Select the check boxes at the bottom of the page to enable or disable the following options (options vary by controller type):

Note: Some options are only available for selection when DIP switch 1 is set to ON.

- **Disable Web Server**
  Select this option to disable web access to the controller. (To re-enable the web interface, turn Switch 1 to ON and login.)
- **Disable Zeroconf Device Discovery**
- **Disable Default User**
- **Enable SNMP (version2c)**

3. Enter a **Community String** of 6-32 characters to access SNMP device statistics. The default is “public.”
4. Select a **Session Timer** value to limit the session time for the user.
5. Select **Accept**.
6. When all changes are complete, select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

74.6 Apply Settings

The **Apply Settings** page is used to save the changes made to the network settings. These settings are not applied and saved to the controller until **Apply Settings, Reboot** is selected.

1. Select **Apply Settings** from the left-hand menu. The Apply Settings page is displayed.
2. Select **Apply Settings, Reboot**.

74.7 Log Out

Note: Remember to select **Apply Settings** from the left-hand menu and click **Apply Settings, Reboot** to permanently save all changes.

Select **Log Out** from the left-hand menu.

LNL-8000 STAR MULTIPLEXER

LNL-8000 Star Multiplexer

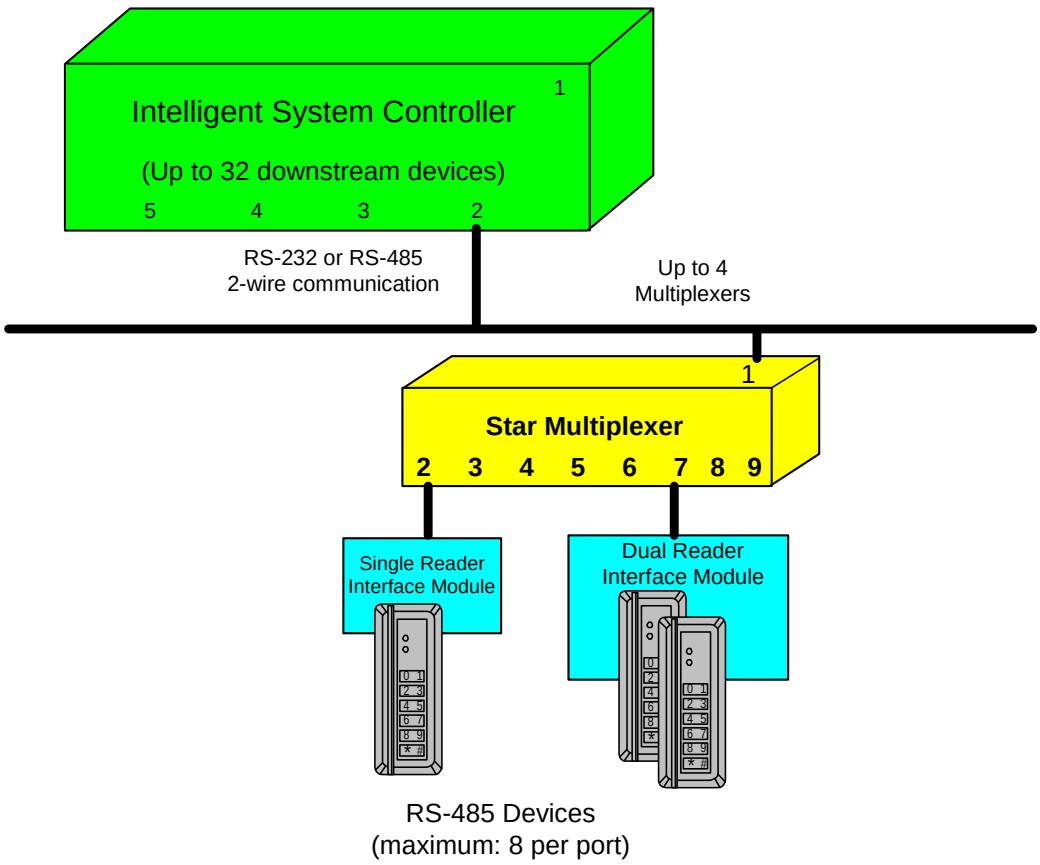
75 Overview of the LNL-8000 Star Multiplexer

The Star Multiplexer was designed to implement star topology on a single downstream port (ports 2 through 5) of the Intelligent System Controller, to eight RS-485 (2-wire) ports or four RS-485 (4-wire) channels. The Star Multiplexer requires 12 VDC for power. It allows conversion of communication protocol, and provides connection with alternate communication devices to extend effective distance.

75.1 Interfaces

The primary or host interface can be either RS-232 or RS-485 (2-wire) communication. The Star Multiplexer interfaces upstream with the Intelligent System Controller, and downstream with one or many RS-485 products (Input Control Module, Output Control Module, Single Reader Interface Module, Dual Reader Interface Module) on each downstream port (ports 2-9). A maximum of eight (8) devices are allowed per port.

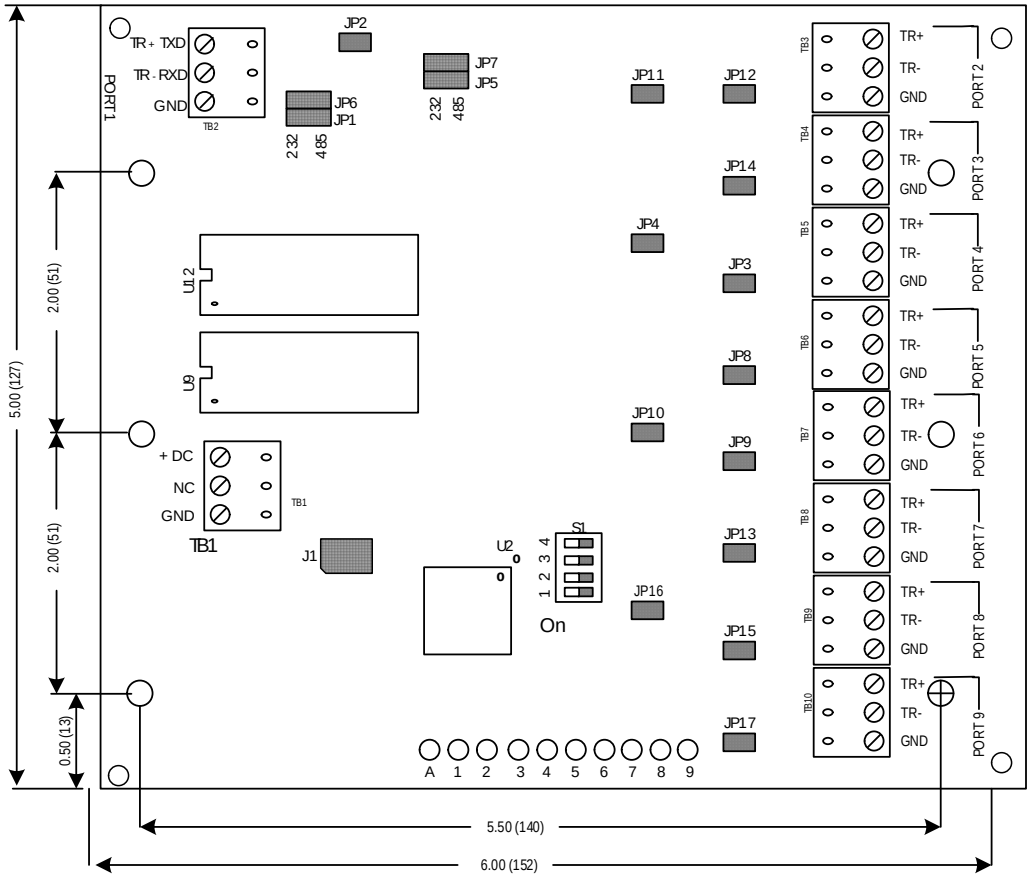
Communications Overview



75.2 Star Multiplexer Board Components

The Star Multiplexer board contains the following components: one (1) power input, one (1) host communication RS-232/RS-485 input, eight (8) RS-485 (2-wire) Star Legs or four (4) RS-485 (4-wire), one (1) communication speed DIP Switch four-position selector and seventeen (17) jumpers.

Star Multiplexer Board



75.2.1 Status LEDs

There are ten (10) status LEDs on the Star Multiplexer.

LED	PURPOSE
A	This LED is the heartbeat of the circuit board. In its powered-up normal condition, the LED will blink rapidly. If there is no power, the LED will be off.
1	This LED indicates data coming from the upstream or host port. When data is being sent to the Star Multiplexer, this light will blink rapidly.
2-9	These LEDs indicate data coming from downstream devices. When data is being sent from a downstream device to a Star Multiplexer port, the corresponding LED will blink rapidly.

76 Installation

To install the Star Multiplexer, perform the installation procedures described in the following sections, in the order in which they are presented. Then be sure to configure the board in the access control system.

76.1 Wiring

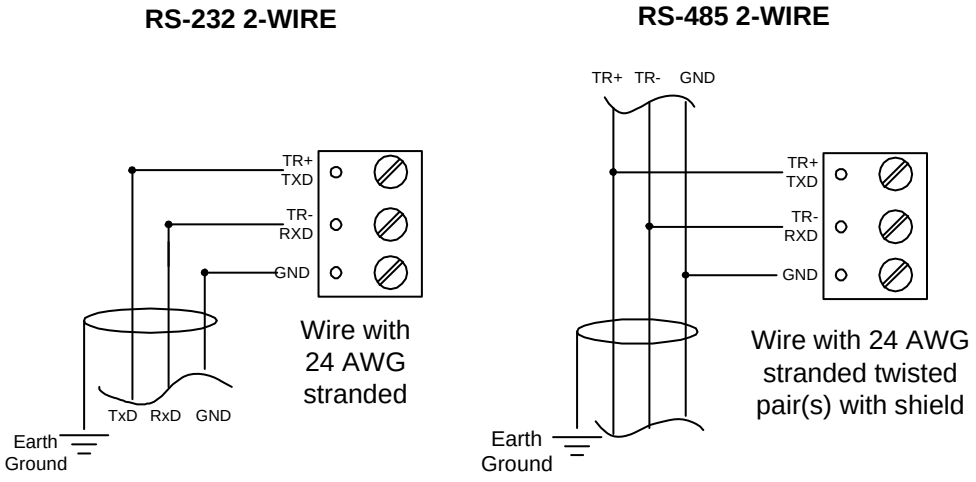
1. Wire the upstream host communication.
2. Wire the downstream device communication.
3. Wire the power input.

76.1.1 Upstream Controller Communication

The Star Multiplexer can communicate to the Intelligent System Controller by one of four downstream ports, either by RS-485 (2-wire) communications or RS-232 to RS-485 converters. The recommended configuration is with RS-485 (2-wire) communications.

Each port of the Intelligent System Controller (ports 2-5) can support up to four (4) Star Multiplexers within 1000 feet of the Intelligent System Controller. The Intelligent System Controller ports are not limited to only the Star Multiplexer. The controller is capable of other addressable devices (such as the Input Control Module, Output Control Module, Single Reader Interface Module, or Dual Reader Interface Module) on the same port as the Star Multiplexer. However, the same distance limitation applies.

Upstream Host Communication Wiring



The RS-232 communications interface is for short distance wiring or point to point communications. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15.24 m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables (the optimal cable is a Belden 9610 or equivalent wire) or line signal converters.

The main run RS-485 cable should be no longer than 4000 feet (1219 m), 120 ohms maximum (Belden 9842 for 4-wire or Belden 9841 for 2-wire, or plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

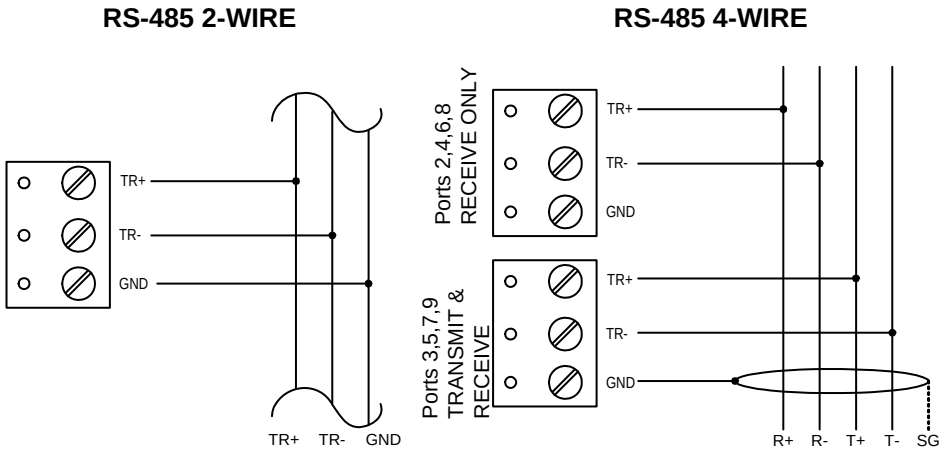
Note: If the Star Multiplexer is configured at the end of the RS-485 line, an RS-485 terminator is required.

76.1.2 Downstream Device Communication

The Star Multiplexer topology is capable of eight different downstream directions in RS-485 (2-wire) communications (using Belden 9841, West Penn, or equivalent) or four different downstream directions with RS-485 (4-wire) communications (using Belden 9842, West Penn, or equivalent).

Each Leg of the star, in either configuration, has a maximum wire distance of 4000 feet. Each leg supports up to eight (8) hardware RS-485 devices (Input Control Module, Output Control Module, Single Reader Interface Module, or Dual Reader Interface Module) in many configurations.

Downstream Device Communication Wiring



76.1.3 Power

The Star Multiplexer accepts a 12 VDC ± 15% power source for its power input. The power source should be located as close to the Star Multiplexer as possible.

Wire the power input with an 18 AWG (minimum) twisted pair cable.

Power Source	Requirements	Current
DC power sources	Isolated, non-switching, regulated DC power	250 mA

Note: When using a 12 VDC power source, be sure to observe polarity.

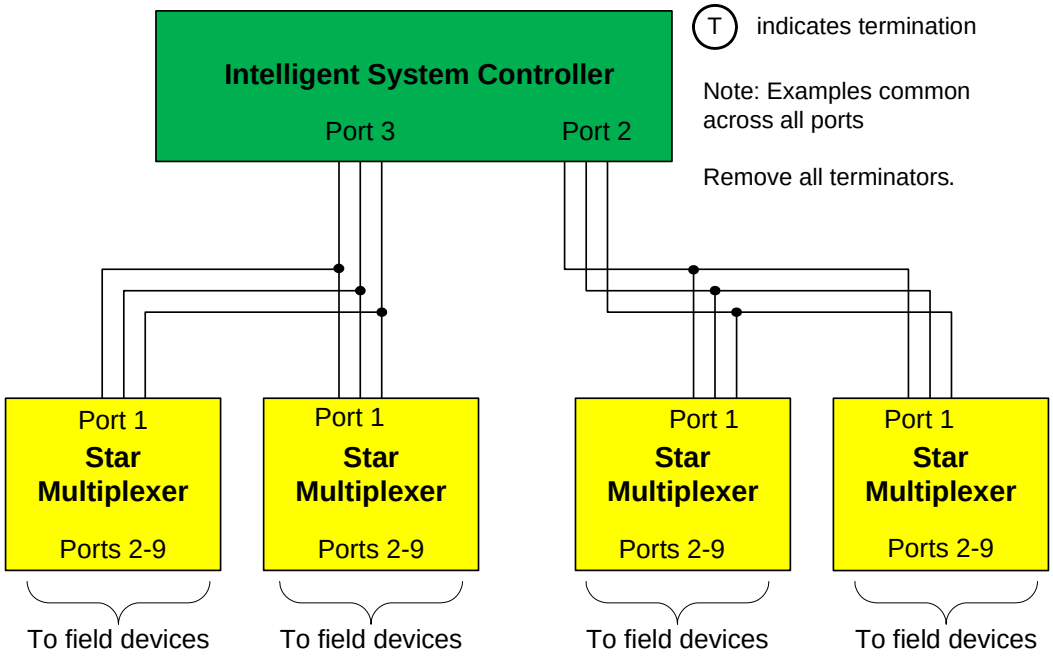
76.2 Wiring and Termination

When wiring the Star Multiplexer(s) downstream from a controller, follow these guidelines for termination:

- Termination is not required on the intelligent system controller.
- Termination is not required on the Star Multiplexer input (port 1).
- Termination is not required on any of the Star Multiplexer ports.
- Only use termination at the last reader or input/output device.

Note: For long cable runs of over 1000 feet, termination on the Star Multiplexer may be required for downstream ports (2-9) under some configurations.

Wiring and Termination (from the ISC to downstream devices)

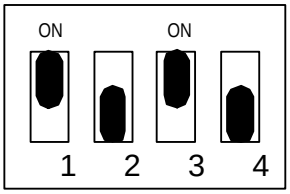


77 Configuration

77.1 Setting DIP Switches

DIP switches on the Star Multiplexer are used to control the communication speed setting.

DIP Switches (shown in positions for 38400 bps)



The communication speed is determined by the speed at which the Intelligent System Controller is communicating to the downstream devices. Use the following table to configure your selection:

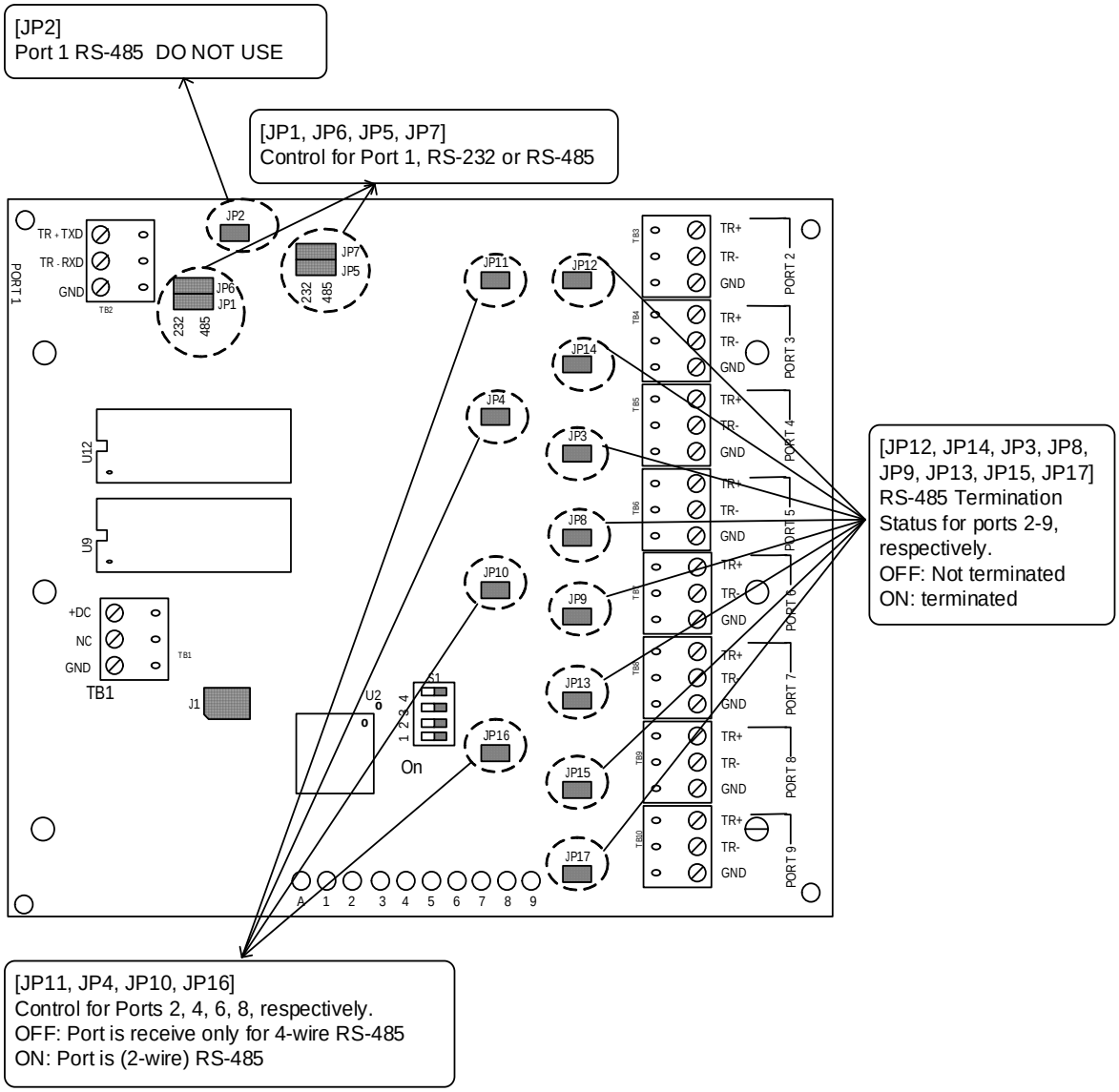
S1	S2	S3	S4	Speed
OFF	OFF	OFF	OFF	300 bps (35 ms)
ON	OFF	OFF	OFF	1200 bps (9.58 ms)
OFF	ON	OFF	OFF	2400 bps (4.79 ms)
ON	ON	OFF	OFF	4800 bps (2.50 ms)
OFF	OFF	ON	OFF	9600 bps (1.25 ms)
ON	OFF	ON	OFF	19200/38400 bps normal (625 µs) — recommended setting
OFF	ON	ON	OFF	38400 bps fast turn (365 µs)
ON	ON	ON	OFF	38400 bps fast turn (365 µs)

Currently, OnGuard only supports 38400 bps. Set the communication speed DIP switches in the 38400 bps positions.

When connecting the Star Multiplexer directly to a host computer for multi-drop configuration, set DIP switches 2 and 3 to ON, and DIP switches 1 and 4 to OFF. This setting is 38400 BPS Fast.

77.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The default shipping position is shown below.



78 Specifications

** The Star Multiplexer is for use in low voltage, class 2 circuits only.

- Primary Power:
  - DC input: 12-24 VDC ± 10%, 200 mA maximum
- Interfaces:
  - Port 1: RS-232/RS-485, selectable
  - Ports 3, 5, 7, 9: RS-485, Transmit/Receive

  - Ports 2, 4, 6, 8: RS-485, Transmit/Receive or Receive Only

- Wire Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG stranded twisted pair(s) with shield, 4000 feet (1200 m) maximum
  - RS-232: 24 AWG stranded, 50 feet (15.24 m) maximum
- Environmental:
  - Temperature: 0 to 70° C operating, -55 to +85° C storage
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 5 x 6 x 1 in. (127 x 152 x 25 mm)
  - Weight: 4 oz. (114 g) nominal
- Certifications:
  - UL 294 & UL 1076 Listed
  - ULC Listed
  - FCC Part 15
  - CE marking
  - RoHS compliant
  - WEEE

Note: These specifications are subject to change without notice.

READERS AND KEYPADS

BlueDiamond Mobile Readers

79 BlueDiamond Mobile Readers

LenelS2 BlueDiamond™ Mobile allows smartphones to be used, similar to badges, to gain access to a place secured by an access control reader. The application communicates with a reader via Bluetooth to verify identities.

The Bluetooth reader is installed on a door that is configured and controlled by the OnGuard system. The system administrator issues a virtual credential to a cardholder in the system through the LenelS2 Credential Service. When the credential is issued, the cardholder installs the application and activates it. With the app, the credential can be used on the Bluetooth reader to verify identity and access level.

For complete installation and configuration information, refer to the BlueDiamond™ Mobile Configuration Guide (DOC-1122).

79.0.1 Wiring the Reader

The readers communicate upstream via RS-485 with a LenelS2 reader interface module or a controller with an onboard reader interface.

Notes:

When using OSDP with Secure Channel encryption, the reader must be connected to a controller or reader interface module that supports it: the LNL-2220 (onboard readers 1 and 2), LNL-2210 (onboard reader 1), LNL-1300e (reader 1), LNL-1324e (all readers), or LNL-4420 (onboard readers 1 and 2).

To use OSDP with Secure Channel encryption, the reader must be in Link Mode.

For complete wiring information, refer to the BlueDiamond™ Mobile Configuration Guide (DOC-1122).

LenelProx Readers

80 LenelProx Readers Overview

Not evaluated by UL.

LenelProx readers are radio-frequency proximity readers (with or without integrated keypads). OnGuard currently supports the following models:

- LenelProx LPMM-6800
- LenelProx LPSP-6820
- LenelProx LPKP-6840
- LenelProx LPSR-2400
- LenelProx LPRKP-4600
- LenelProx LPMR-1824 and LPMR-1824 MC
- LenelProx LPLR-911

The *RFID* (Radio Frequency Identification) readers, or proximity readers, use radio frequency to identify, locate, and track people and objects that carry the appropriate transponders. Proximity readers can work in non-line-of-sight situations.

A typical proximity system consists of three components – an interrogator (reader), a transponder (card, keytag, etc.), and a data processing panel and/or computer combination. Most RFID readers have an internal micro-controller, a transmitter, a receiver and a shared transmit/receive antenna.

The credential is usually passive and consists of an antenna and an RFID *ASIC* (Application Specific Integrated Circuits). During operation, the reader sends out an electromagnetic wave to establish a zone of surveillance. When a card enters this zone, the electromagnetic energy from the reader interacts with the IC in the tag. Once the IC is energized, it goes through an initialization process and begins to broadcast its identity. This process utilizes a low-energy back-scattering technology that selectively reflects or back-scatters the electromagnetic energy back to the reader. The circuits in the reader receive and decode this back-scattered signal and determine the identity of the tag.

80.1 Read Range

To measure the read distance between the reader and card, grasp the card by the corner or near the slot and move the card slowly toward the reader, with the card surface parallel to the reader until a beep occurs. The beep indicates that the reader detects and reads the card. In order the read again, the card must be fully withdrawn from the reader's field of surveillance and then presented again. During normal operation, the card can be presented at any angle relative to the reader; however, this will result in slight variation of read range.

Note: Waving the card in front of the reader will result in a diminished read range.

80.2 Installation Guidelines

Conduct a site survey before starting installation to avoid possible sources of interference. If the reader is not installed properly, the performance will be degraded. Reader damage is also possible.

- Do not install the reader in an area where sources of broadband noise may exist. (Examples of broadband noise sources: motors, pumps, generators, AC switching relays, light dimmers, CRTs, induction heater, etc.)
- Do not bundle the reader wires together in one conduit with the AC power cables, lock power, and other signal wiring.
- Keep all the reader wiring at least 12 inches (30 cm) away from all other wiring, which includes, but it not limited to, AC power, computer data wiring, telephone wiring, and wiring to electrical locking devices.
- Do not install the reader within 24 inches (60 cm) of a computer CRT terminal.
- Make sure that the supply voltage of the reader is within specification. As a rule of thumb, higher supply voltage results in longer read range but at the expense of higher power consumption.
- Use cables with overall shield (screen).
- For best results, run the cable in an individual conduit with at least 12 inches distance from the AC power, computer data cables, and cables for electrical locking devices.
- Use recommended cable. Do not use any unshielded “twisted pair” type cable.
- Use the largest wire gauge possible.
- Use dedicated and linearly regulated power supply, where applicable.
- Use Single Point Grounding (Earthing). Do not use ground loops.

80.2.1 General Wiring Requirements

All the reader wiring must be continuously shielded. Use 22 AWG up to 18 AWG, six or seven-conductor shielded cables. Longer distances and higher current consumption on the power supply line will require larger gauge wires.

80.2.2 Power

The operating frequency of a typical power supply ranges from 15 to 50 kHz. It will usually generate wideband-switching noises. Some of its harmonics may fall on or near the operating frequency of the reader, 125 kHz. Therefore, avoid using a switching power supply at all times. Void using a single power supply for reader and the magnetic lock. Doing so will affect reader operation and may cause damage to the reader.

Note: When using an external power supply, always use a linear power supply. Do NOT use a switching power supply.

If a LenelProx reader is disconnected from the power supply and then reconnected, the readers will not read the initial card presented. Subsequent cards will be read as usual.

80.2.3 Grounding

Grounding is critical for proper operation of the reader. When installing the reader, it is crucial to assure that the earth ground is the best ground available. If you elect to use the AC main power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or a structural steel member that is in direct contact with the ground. This resistance should be less than 50 ohms. If you find that the AC main power does not provide adequate earth ground, try using a solid connection to a cold water pipe or for best results drive your own copper-clad ground rod into the earth for the ground point.

For multiple reader installations, it is critical that all readers are connected to a single ground point. Using multiple ground points will create secondary current paths or ground loops that can affect the performance and cause damage to the reader.

80.2.4 Wiring

Some of these readers are designed for Wiegand and RS-232 standard communication formats. If an external power supply is being used, leave the panel's Ground and Power terminals open and connect the readers Ground (Black) and 5-12 VDC (Red) terminals to the external power supply.

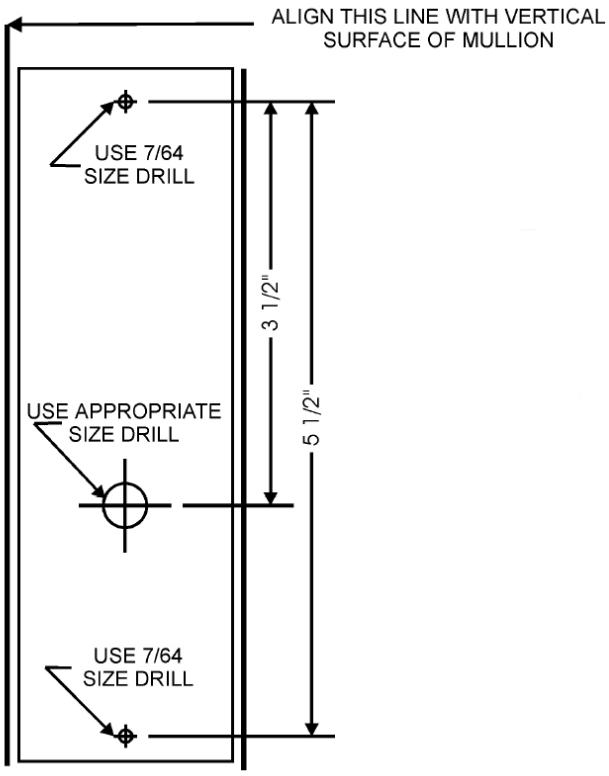
80.3 LenelProx LPMM-6800

The LenelProx LPMM-6800 mullion mount reader is a radio-frequency proximity reader. The reader consists of a transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted on a metal door frame or flat surface (wall, housing, etc.).

80.3.1 Installation

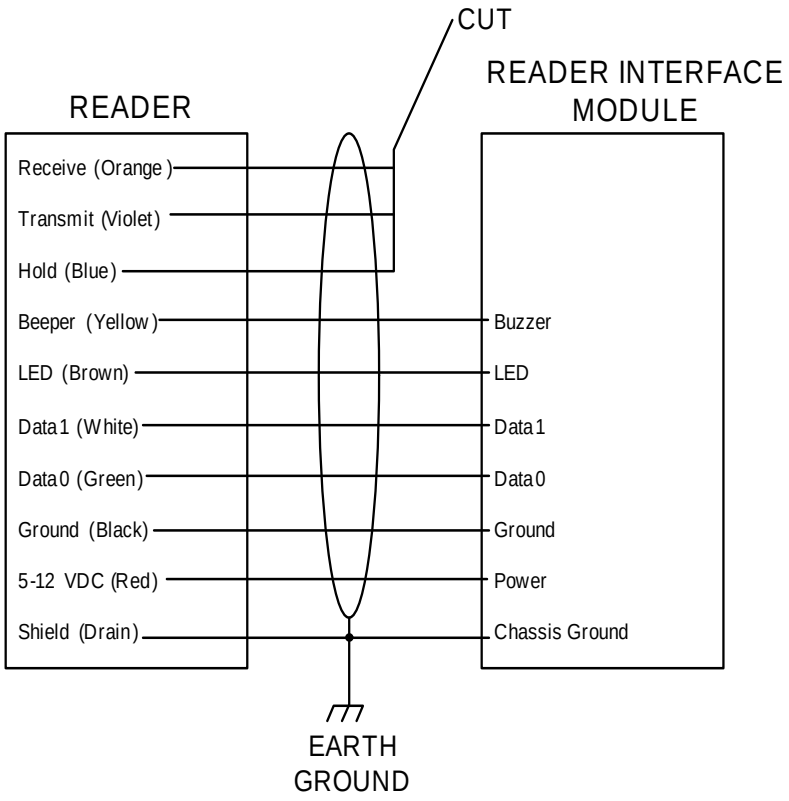
1. Position the reader at the desired mounting height on the metal door frame. Observe ADA height requirements. Drill two 7/64 (0.109)-inch holes for the reader, and one clearance hole for the cable.

Holes location



2. Clip off the white connector from the end of the reader's cable. Keep the wires as long as possible.
3. Connect the reader to the access control panel according to the following figure. Tape or cap the unused wires singly.

Wiring diagram (Wiegand)



4. Use a regulated linear power supply, between 5 volts (50 mA peak) and 12 volts DC (80 mA peak).
5. Align the reader with the screw holes in the frame. Attach the reader to the frame with screws.
6. Power up the reader. The LED is steady amber (the beeper does not sound).
7. Present any LenelProx credential (card, keytag, or wafer) briefly to the reader. This initializes the reader and prepares it for reading cards authorized for the door or gate. The reader sounds a single short beep. The LED is steady red to indicate standby mode.
8. The LED color in standby may be changed from red to green, or from green to red, using a Color Changer card.
   Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the Color Changer card to toggle the LED color at standby.
9. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card (part # LB-E).
   Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

10. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads.
    Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

80.3.2 Specifications

- Cable to Controller
  - 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 6 inches (15 cm)
  - 12 VDC: typically 8 inches (20 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes: The beeper sounds as described even if the yellow wire is not connected to the controller.

The Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

LPMM-6800 readers have both Wiegand and RS-232 interfaces.

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

80.4 LenelProx LPSP-6820

The LPSP-6820 reader is a radio-frequency proximity switchplate reader. The reader consists of a transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted like a cover plate on a single-gang electrical utility box, or on a flat surface (wall, housing, and so on).

80.4.1 Installation

1. Install a single-gang utility box, or drill two no. 27 (0.144)-inch clearance holes for the reader and one hole for the cable, at the desired mounting height. Observe ADA height requirements.
2. Snap open the reader's top cover by inserting a screwdriver blade into the slot at the bottom edge of the cover, then twisting the blade gently.
3. Connect the reader to the access control panel according to the following figure(s). Tape or cap the unused wires singly.
   - Wiring with reader interface modules:

Use the following tables to wire the LenelProx LPSL-6820 with either the single or dual reader interface module. Since the current requirements for these readers range from 40 to 120 mA, this means that the readers can be powered from the reader interface modules.

Wiring the LPSP-6820 and the LNL-1300

From LNL-1300		To LPSP-6820 Reader		Typical Software Settings
Reader Terminal	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
TB4	GND	Black	Ground	
	BZR	Yellow	Beeper	
	LED	Brown	LED	
	CLK D1	White	Data 1	
	DAT D0	Green	Data 0	
	V0	Red	5 - 12 VDC	

Wiring the LPSP-6820 and the LNL-1300-U

From LNL-1300-U		To LPSP-6820 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Data 0	
	CLK D1	White	Data 1	
J13	LED1	Brown	Green LED	
	LED2	Not connected	Not connected	
	BZR	Yellow	Buzzer	
	V0	Red	5-12 VDC	

For the Dual Reader Interface Module, make sure that jumper J2 is set to unregulated power mode. This will allow the maximum amount of current for the readers.

Wiring the LPSP-6820 and the LNL-1320

From LNL-1320	To LPSP-6820 Reader		Typical Software Settings
Reader 1 or Reader 2 Pin	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
GND	Black	Ground	
DAT D0	Green	Data 0	
CLK D1	White	Data 1	
BZR	Yellow	Beeper	
LED	Brown	LED	
V0	Red	5-12 VDC	

Wiring the LPSP-6820 and the LNL-1320-U

From LNL-1320-U		To LPSP-6820 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Data 0	
	CLK D1	White	Data 1	
J13	LED1	Brown	Green LED	
	LED2	Not connected	Not connected	
	BZR	Yellow	Buzzer	
	V0	Red	5-12 VDC	

4. Use a linear and regulated power supply, between 5 volts (50 mA peak) and 12 volts DC (80 mA peak).
5. Align the reader with the electrical utility box. Attach the reader to the electrical box with screws.
6. Put the reader's top cover in place and snap the housing closed.
7. Power up the reader. The LED is steady amber. (The beeper does not sound.)
8. Present any LenelProx credential (card, key tag, or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is steady red to indicate standby mode. This initializes the reader and prepares it for reading cards authorized for this door or gate.

Note: You must use LenelProx credentials.

9. If the LED color in standby is green (instead of red), it may be changed to red using a Color Changer card.

Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.

10. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card (part # LB-E).
    Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

80.4.2 Specifications

- Cable to Controller
  - 5 to 7 conductors (not twisted pairs), stranded, 22 AWG, color-coded insulation, overall 100% shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 6 inches (15 cm)
  - 12 VDC: typically 8 inches (20 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes: The beeper sounds as described even if the yellow wire is not connected to the controller.

The Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a height level (3.6 to 5.0 VDC) when not used.

LPSP-6820 readers have both Wiegand and RS-232 interfaces.

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

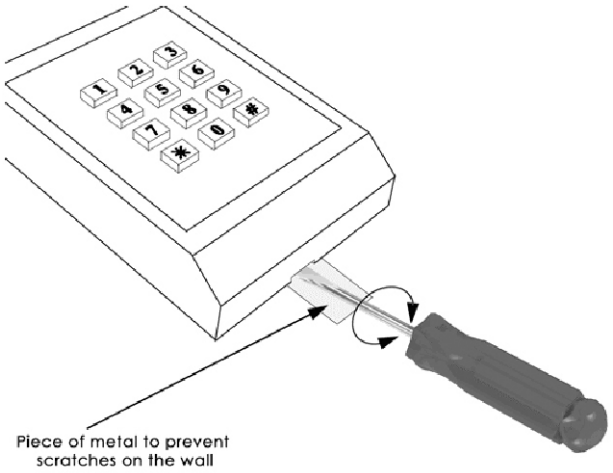
80.5 LenelProx LPKP-6840

The LenelProx LPKP-6840 reader is a radio-frequency switchplate proximity reader with integrated keypad. The reader consists of a 12-key keypad, transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted like a cover plate on a single-gang electrical utility box, or on a flat surface (wall, housing, etc.).

80.5.1 Installation

1. Install a single-gang utility box, or drill two no. 27 (0.144 inch) clearance holes for the reader and one hole for the cable, at the desired mounting height. Observe ADA height requirements.
2. Snap open the reader's top cover by inserting a small screwdriver blade into the slot at the bottom edge of the cover, then twisting the blade gently. Do not remove the keypad from the reader.

Snapping open the cover



3. Clip off the white in-line connector from the end of the reader's cable. Keep the wires as long as possible.
4. Connect the reader to the access control panel according to the following tables.

Wiring the LPKP-6840 and the LNL-1300

From LNL-1300		To LPKP-6840 Reader		Typical Software Settings
Reader Terminal	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = 8-Bit Output • LED Mode = 1-Wire LED Control
TB4	GND	Black	Ground	
	BZR	Yellow	Beeper	
	LED	Brown	LED	
	CLK D1	White	Data 1	
	DAT D0	Green	Data 0	
	V0	Red	5 - 12 VDC	

Note: Connect reader's cable drain shield to earth ground.

Wiring the LPKP-6840 and the LNL-1320

From LNL-1320	To LPKP-6840 Reader		Typical Software Settings
Reader 1 or Reader 2 Pin	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = 8-Bit Output • LED Mode = 1-Wire LED Control
GND	Black	Ground	
DAT D0	Green	Data 0	
CLK D1	White	Data 1	
BZR	Yellow	Beeper	
LED	Brown	LED	
V0	Red	5-12 VDC	

Note: Connect reader's cable drain shield to earth ground.

Wiring the LPKP-6840 and the LNL-1300-U

From LNL-1300-U		To LPKP-6840 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = 8-Bit Output • LED Mode = 1-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Data 0	
	CLK D1	White	Data 1	
J13	LED1	Not connected	Not connected	
	LED2	Brown	Green LED	
	BZR	Yellow	Buzzer	
	V0	Red	5-12 VDC	

Note: Connect reader's cable drain shield to earth ground.

Wiring the LPKP-6840 and the LNL-1320-U

From LNL-1320-U		To LPKP-6840 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = 8-Bit Output • LED Mode = 1-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Data 0	
	CLK D1	White	Data 1	
J13	LED1	Not connected	Not connected	
	LED2	Brown	Green LED	
	BZR	Yellow	Buzzer	
	V0	Red	5-12 VDC	

Notes: Do not connect the LPKP-6840 Reader to the J15 and J18 terminals on the LNL-1320-U.

Connect reader's cable drain shield to earth ground.

5. Use a linear regulated power supply, between 5 volts (at least 60 mA) and 12 volts (at least 120 mA).
6. Align the reader with the electrical utility box. Attach the reader to the electrical box with the screws provided.
7. Place the reader's top cover in place and snap the housing closed.
8. Power up the reader. The LED should be steady amber (the beeper does not sound).
9. Present any LenelProx credential briefly to the reader. The reader sounds a *Short-Long-Short-Short* sequence. The LED is steady red to indicate standby mode. The reader is now ready for normal operation.
10. The LED color in standby mode may be changed from red to green or from green to red using a color changer card. Remove power from the reader for a few seconds, then restore power. When the LED is amber, present the color changer card to toggle the LED's standby color.
11. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED mode changer card (part # LB-E). Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED mode changer card to toggle the LED standby mode.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

80.5.2 Operating Modes

The LPKP-6840 supports the following operating modes:

- **Prox-plus-PIN.** Present proximity card first, then enter PIN on keypad (default).

- **PIN-plus-Prox.** Enter PIN on keypad first, then present proximity card.

- **Prox-Only.** Present proximity card only. The read cycle is terminated when the controller send out an acknowledgment signal by pulling the LED control line low momentarily. The reader resets and is ready for the next read.

- **PIN-Only.** Enter PIN on keypad only. The read cycle is terminated when the controller sends out an acknowledgment signal by pulling the LED control line low momentarily. The reader resets and is ready for the next PIN entry.

The number of PIN keystrokes required is determined by the host system.

If the host system is programmed for the # command, complete the keypad PIN entry by pressing [#].

80.5.3 Specifications

- Cable to Controller
  - 5 to 7 conductors (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 6 inches (15 cm)
  - 12 VDC: typically 8 inches (20 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)
  - Keypad: 8-bit code from each key
- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

80.5.4 Notes

1. Power down before any wiring changes. Connect the black wire (ground) first, and the red wire (power) last.
2. When the brown and yellow wires are not used, the LED and beeper remain active, under the readers' internal control.
3. The LED, Beeper, and Hold are logic levels. Never apply power to them They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and float at a high level (3.6 to 5.0 VDC) when not used.
4. The reader has both Wiegand protocol and RS-232 serial interfaces. RS-232 applies to the card reader output only (not to the keypad).
5. FCC Compliance: This equipment has been tested and found to be in compliance with the limits for FCC Part 15, class A digital device. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference with radio communications. Operation of this

equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
The user are prohibited from making any change or modification to this product. Any modification to this product shall void the user's authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

6. Industry Canada Compliance: Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of the device.

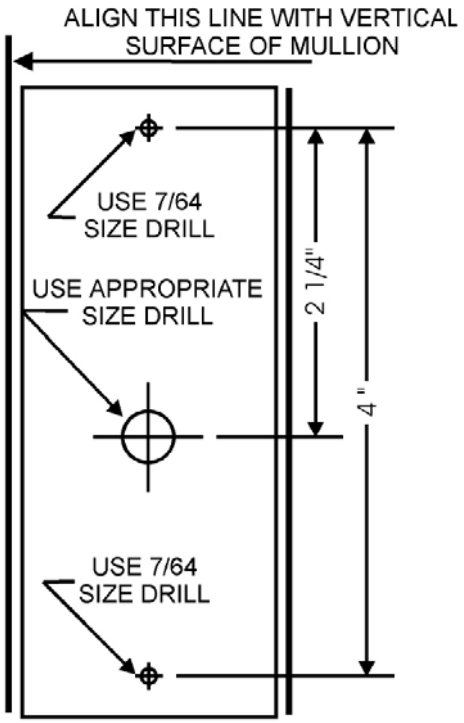
80.6 LenelProx LPSR-2400

The LenelProx LPSR-2400 reader is a radio-frequency proximity reader. The reader consists of a transmit/ receive antenna, reader electronics, in a polycarbonate housing. The housing is potted with epoxy resin to protect the components. The reader may be mounted on a metal door frame or flat surface (wall, housing, etc.).

80.6.1 Installation

1. Position the reader at the desired mounting height. Observe ADA height requirements. Drill two 7/64 (0.109)-inch holes for the reader, and one clearance hole for the cable.

Holes location for the LPSR-2400



2. Clip off the white connector from the end of the reader's cable. Keep the wires as long as possible.
3. Connect the reader to the access control panel according to the following tables.
   Connect the yellow wire only if used for Beeper control by the panel.
   Do not connect the orange, blue and violet wires to anything; do not let them touch ground.
   Tape or cap all unused wires singly.

Wiring the LPSR-2400 and the LNL-1300

From LNL-1300		To LPSR-2400 Reader		Typical Software Settings
Reader Terminal	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
TB4	GND	Black	Ground	
	BZR	Yellow	Beeper	
	LED	Brown	LED	
	CLK D1	White	Data 1	
	DAT D0	Green	Data 0	
	V0	Red	5 - 12 VDC	

Wiring the LPSR-2400 and the LNL-1300-U

From LNL-1300-U		To LPSR-2400 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Data 0	
	CLK D1	White	Data 1	
J13	LED1	not connected	not connected	
	LED2	Brown	Green LED	
	BZR	Yellow	Buzzer	
	V0	Red	5-12 VDC	

For the Dual Reader Interface Module, make sure that jumper J2 is set to unregulated power mode. This will allow the maximum amount of current for the readers.

Wiring the LPSR-2400 and the LNL-1320

From LNL-1320	To LPSR-2400 Reader		Typical Software Settings
Reader 1 or Reader 2 Pin	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
GND	Black	Ground	
DAT D0	Green	Data 0	
CLK D1	White	Data 1	
BZR	Yellow	Beeper	
LED	Brown	LED	
V0	Red	5-12 VDC	

Wiring the LPSR-2400 and the LNL-1320-U

From LNL-1320-U		To LPSR-2400 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire Color**	**Description**	• Reader Type = Wiegand/Prox • Keypad = No Keypad • LED Mode = 1-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Data 0	
	CLK D1	White	Data 1	
J13	LED1	not connected	not connected	
	LED2	Brown	Green LED	
	BZR	Yellow	Buzzer	
	V0	Red	5-12 VDC	

4. Use a linear and regulated power source, between 5 volts (40 mA peak) and 12 volts DC (70 mA peak).
5. Install the reader on the door frame or other surface. Attach the reader to the door frame with supplied screws or with adhesive or sealant.
6. Power up the reader. The LED is steady amber. (The beeper does not sound.)
7. Present any LenelProx credential (card, keytag, or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is then steady red to indicate standby mode. The reader is now initialized and prepared to read cards.

Note: All credentials must be LenelProx credentials.

8. The LED color in standby may be changed from red to green, or from green to red, using a Color Changer card. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.

9. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

10. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads. Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

80.6.2 Specifications

- Cable to Controller
  - 5 or 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall 100% shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 4 inches (10 cm)
  - 12 VDC: typically 5.5 inches (14 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes: When the yellow wire is not used, the beeper remains active and under the reader's internal control.

The Beeper and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

LPSR-2400 readers have Wiegand-protocol electrical interface only. (There is no RS-232 interface.)

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

80.7 LenelProx LPRKP-4600

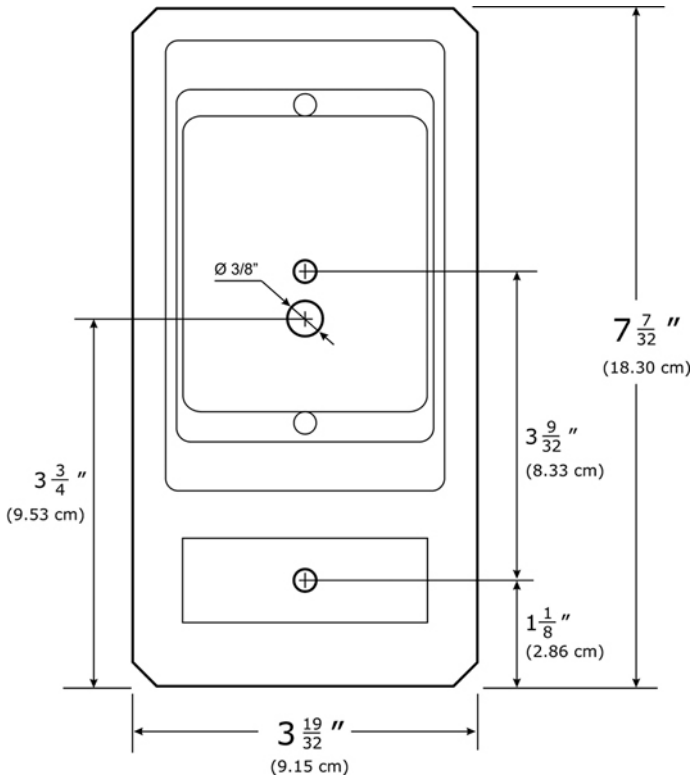
The LenelProx LPRKP-4600 reader is a radio-frequency proximity reader with a virtually indestructible integrated keypad for access control systems. The reader consists of a 12-key piezoelectric keypad, transmit/receive antenna, and reader electronics, in a slim plastic housing. The reader electronics are potted with

epoxy resin to protect against the environment. The reader may be mounted on a single-gang electrical utility box, or on any surface (wall, cabinet, etc.).

80.7.1 Installation

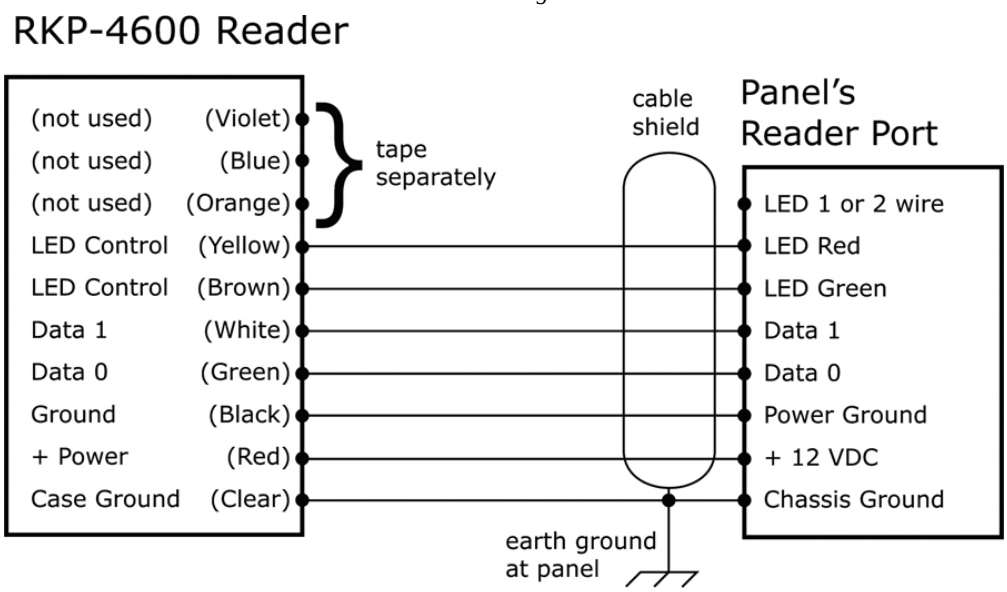
1. Install a single-gang electric utility box, or drill two no. 27 (0.144 inch) clearance holes for the reader's screws and one hole for the cable, at the desired mounting location. Observe ADA height requirements.

Mounting dimensions



2. Place the plastic foam pad behind the reader’s plastic housing. Line up the opening in the plastic foam pad with the opening in the reader's housing where the cables pass through the housing.
3. Pull the reader’s short cable (with the 12-pin connector) through the opening in the housing and out the front of the housing. Pull the long cable (with pigtails) out the back of the housing toward the wall.
4. Wire the reader’s 15-inch-long cable (with gray plastic sheath and 10 pigtails) to the cable from the reader location to the controller panel. The reader's orange wire must be floating - no connection to anything.

Reader wiring



5. Place the reader's plastic housing on the mounting location. Align the two large screw holes in the housing with the holes in the utility box or in the wall. Use appropriate fasteners (supplied). Tighten the screws firmly.
6. Plug the reader's 12-pin female connector, on the short cable, into the 12-pin male connector on the back of the keypad. The connectors' shells are mechanically keyed.
7. Place the keypad on the top of the plastic housing. Use the two no. 6-32 X 5/8" flat-head screws to fasten the keypad to the threaded brass inserts in the plastic housing. Tighten the screws firmly.
8. Use a linear regulated power supply, 12 volts DC +/- 3.0 volts (90 mA peak load). Power may be supplied by the controller panel; connect to the +12 VDC and ground terminals on the reader input port.
9. Power up the reader. There are two sets of LEDs - separate red and green LEDs on the keypad, and a combined red/green/amber LED for the card reader at the bottom of the reader's housing.
10. To start, the keypad's red LED is on, blinking red-off, and the reader's LED is steady amber. (The beeper does not sound.)
11. Present a valid LenelProx credential (card, keytag or wafer) briefly to the reader. This initializes the reader. To read a credential, hold it over the indent in the lower-end of the plastic housing. To enter a keystroke, press the marked key firmly. Either action makes an LED change color and a beeper sound.
12. The reader sounds a Short-Long-Short-Short <pause> Long-Short-Short-Short sequence. The reader's LED is blinking-red to indicate Standby mode. The reader is now prepared to read cards.
13. Test the card reader and the keypad on the host system. Then attach the strip label with two small openings over the keypad's LEDs. Attach the other strip label over the keypad's lower screw hole. Attach the larger label over the plastic housing's bottom screw hole; insert this label into the housing's indentation.
14. The reader's LED color in Standby may be changed from red to green, or from green to red, using a Color Changer card. Remove power from the LPRKP-4600 for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED's Standby color.
15. The reader's LED Standby mode may be changed from blinking-red to steady-red, or from steady-red to blinking-red, using an LED Mode Changer card (part # LB-E). Remove power for the LPRKP-4600

for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED's Standby mode.

Operation Modes

LPRKP-4600 Revision LB supports the following operation modes of the host system:

- Prox-plus-PIN. Present proximity card first, then enter PIN on keypad.
- Prox-Only. Present proximity card only.
- Pin-plus-Prox. Enter PIN on keypad first, then present proximity card.
- PIN-Only. Enter PIN on keypad only.

The keypad's red LED blinks once each time that the user presses any key.

The number of PIN keystrokes allowed is determined by the host system (not by the reader).

If the host system is programmed for this command, terminate keypad PIN entry by pressing the # key.

80.7.2 Specifications

- Cable to Controller:
  - 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
  - Length: up to 500 feet
- Read Range (at 12 VDC): typically 4-6 inches (10-15 cm)
- Characteristics:
  - Temperature: -35° to 65°C (-31° to 150°F) operating
  - Humidity: 0 to 95% non-condensing
  - CE Marking
  - UL 294 Listed
  - FCC Part 15 certified
- Operating Parameters:
  - Excitation frequency: 125 kHz
  - Wiegand output:
    - Card reader: 26 to 50 bits (determined by code in credentials)
    - Keypad: 8-bit code for each keystroke

Notes:

Two readers at the same door may need to be separated physically or shielded from each other for best operation.

The beeper has no external control. The beeper operates under the reader's internal control.

The LED lines are at TTL logic levels. Never apply power to them. They may be pulled to low level (0 to 1.2 VDC) to enable their function, and float at high level (3.6 to 5.0 VDC) when not used.

FCC Compliance: This equipment has been tested and found to be in compliance with the limits for FCC Part 15, Class A digital device. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause

harmful interference in which case the user will be required to correct the interference at his own expense.

The users are prohibited from making any change or modification to this product. Any modification to this product shall void the user's authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance: Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

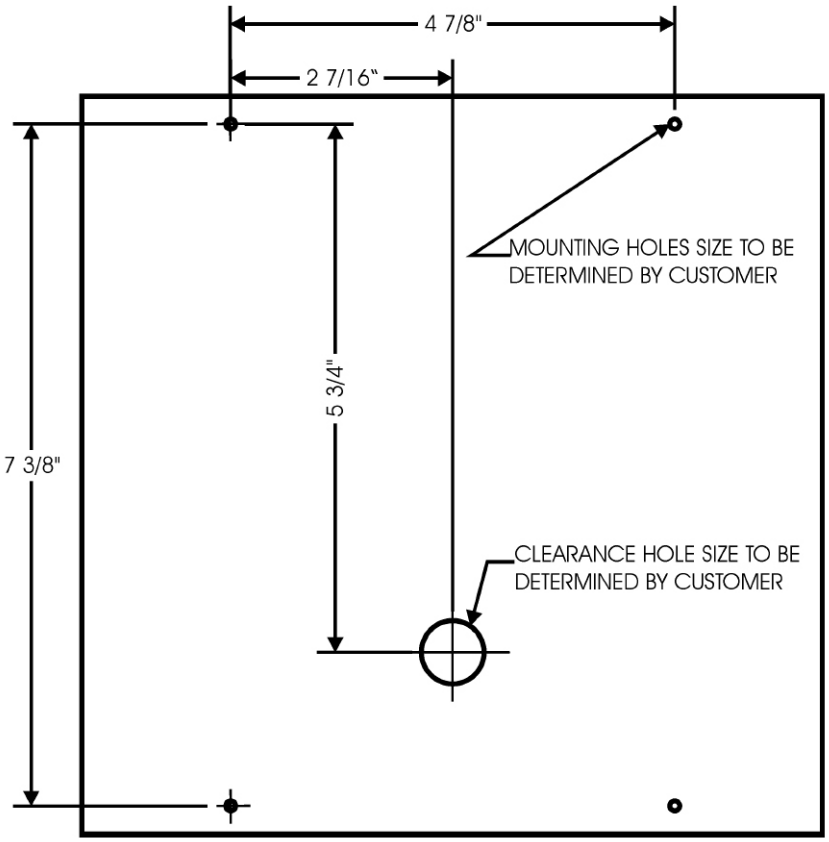
80.8 LenelProx LPMR-1824 and LPMR-1824 MC

The LenelProx LPMR-1824 reader is a medium-range radio-frequency proximity reader for gate control and access control systems. The reader consists of a transmit/receive antenna, associated electronics, and a poly carbonate housing that encloses the antenna and electronics. The housing is potted with epoxy to protect the components. The reader may be mounted on a flat surface (wall, plate or housing). “MC” designates the metal-compensated version of this reader that must be mounted on a metal surface larger than the reader.

80.8.1 Installation

1. Position the reader at the desired mounting position. Observe ADA height requirements, if applicable. Drill four holes for the screws or anchors, and one clearance hole for the cable. The installer determines the size of mounting holes and cable clearance hole.

Holes location



Notes:

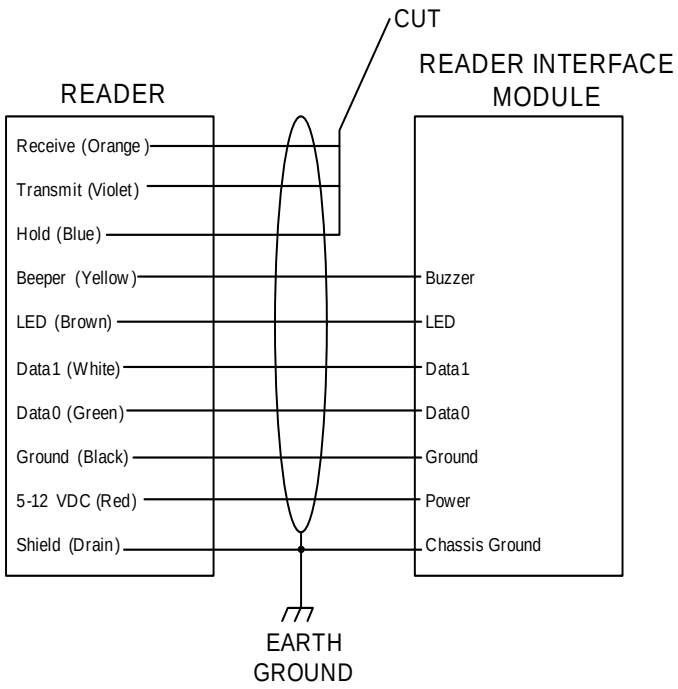
Use the LPMR-1824 MC, the metal-compensated form of the LPMR-1824 reader only when nearby metal will reduce the performance of the standard LPMR-1824 reader.

When using the LPMR-1824 MC reader, it should be mounted on a metal surface that is larger than the 8 x 8 inch reader housing. A metal surface of 12 square inches or larger is recommended.

2. If you are installing the LPMR-1824, SKIP THIS STEP and proceed to step 3!
   To mount the LPMR-1824 MC reader on the metal surface:
   a. Remove the four screws through the front of the reader's plastic housing. This releases the four ferrite tiles from the back of the reader.
   b. Use the ferrite tiles as templates for mounting holes on the wall or other surface. These holes are at the center of each 4 x 4-inch tile. The center of the hole is two inches from each edge.
   c. If necessary, enlarge the hole in the ferrite tiles slightly by drilling or reaming.
   d. Screw the reader's plastic base and the ferrite tiles to the wall by inserting the 4 screws first through the inside of the plastic base, then through the holes in the ferrite tiles, then into the mounting holes in the wall.
   e. Reattach the reader's plastic cover using the screws that were removed in step a.
3. Clip off the white in-line connector from the end of the reader's cable. Keep the wires as long as possible.

4. Connect the reader to the controller panel according to the following figure.

Wiring diagram (Wiegand)



Connect the yellow wire only if used for Beeper control by the panel.
Connect the blue wire only if used for Hold control by the panel.
Do not connect the orange and violet wires to anything. Tape or cap the unused wires singly.

5. Use a regulated power supply with linear output, between 5 volts (250 mA) and 12 volts DC maximum (600 mA peak). Do not power the LPMR-1824 from the panel's reader input port. Tie the ground side of all DC power supplies together – including the reader, the panel's input port, and the door/gate release.
6. To install the reader's cable through the surface directly behind the reader, insert both cable slot plugs in the sides of the reader's top cover. To run the cable exiting from the side of the reader, press-fit the cable into the curved channel and guide the cable out of the desired side of the reader. Then insert the cable slot plug in the other side of the top cover.
7. Install the reader on the mounting surface, using screws and anchors as necessary.
8. Power up the reader. The LED is steady amber. (The beeper does not sound.)
9. Present any valid LenelProx credential (card, key tag or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is steady red to indicate standby mode. The reader is initialized and prepared to read cards.

Note: All credentials must be LenelProx credentials.

10. The LED color in standby mode may be changed from red to green, or from green to red, using a Color Changer card. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.

11. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card (part # LB-E). Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED Mode Changer card to toggle the LED mode at standby.

> **Note:** In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

12. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads.
    Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

80.8.2 Maximum Read Range

Following the listed recommendations will assure that LenelProx LPMR-1824 readers perform at the published read range rating (18-24 inches).

Wiring

- The reader cable may be 6 conductor, 22 gauge, up to 500 feet long. It MUST be high quality, overall-shielded. It does not have to be twisted pair.
- If the cable is twisted pair, assign the connections to avoid data crosstalk - pair one of the data lines (say, D0) with the power hot wire in one twisted pair. The reader’s paired wire colors will then be green with red, and white with black.

Power Supply - Voltage

- Use a REGULATED DC power supply with LINEAR output current. Do not use a switching power supply.
- Use a power supply that delivers not more than 12.0 volts DC at the reader's power connections. (The applied voltage at the reader may be as low as 5 VDC, but this may reduce the read range by about 25%.)
- Connect power common (ground) to the black wire in the reader's cable, and connect positive power to the red wire.

Power Supply - Current

- Do not draw reader power from the host controller's internal power source, such as the reader input port, unless it meets all of the requirements above, and its current rating is sufficient for the peak power requirement of the LPMR-1824 (600 mA at 12 VDC, or 250 mA at 5 VDC).
- Use a DC millimeter in series with the reader power supply to measure the current capacity.
- If using an external power supply, you should use the PS12-1A DC Power Supply, which has excess power for 1 MR-1824 reader.

Distance from Metal

- Mount the MR-1824 reader on a non-metallic surface. Metal sheets, screens, plates, studs, posts, structural members, etc. should be about one foot away from the reader, in all directions.

- If there is metal behind the MR-1824 reader, such as the mounting plate on a gooseneck post or pedestal, use a non-metallic housing for easy installation and wiring. Or use plaster or plastic or wood spacers for at least 4 inches between reader and metal.
- Do not mount the reader inside a metal housing, enclosure or room. Do not recess the reader in an opening in a metal surface.

Metal Compensation

- If the reader must be mounted on metal, use the LPMR-1824 MC metal-compensated version.
- The LPMR-1824 MC reader must be installed on a metal sheet or plate that is larger than the 8 x 8 inch reader case. A plate that is 12 inches square to 24 inches square is effective.
- If the metal-compensated LPMR-1824 MC reader is used, the plastic housing or spacers are not necessary.
- The effective read range of the metal-compensated MR-1824 MC, with the LenelProx cards, is approximately 16 inches due to the compensation factors.

Distance between Readers

- Multiple LPMR-1824 readers should be at least 8 feet apart.
- If LPMR-1824 readers must be closer together than 8 feet, place metal sheet, foil or screen between them, to isolate their fields.
- If the installation combines an MR-1824 with other proximity readers having shorter read range than LPMR-1824, the distance between these readers can be less than 8 feet.
- Connect just one reader to the terminals of each reader-input port on the host controller or panel.

Credentials

- Use only LenelS2 125 kHz proximity cards, key tags and wafers. (Cards or tags from another manufacturer will not be read by LenelProx readers.)
- For best read range, use LenelProx-Linc CS clamshell cards. For rated read range, use GR or GRMAG cards. KT key tags have read range that is about 75% of the GR cards' range. PW proximity wafers have read range that is about 40% of the GR cards' range.

Environment

- LPMR-1824 readers may be mounted where they are exposed to weather (but observe the specifications for operating temperature and humidity, in the MR-1824 data sheet).
- Keep computer monitors several feet away from the LPMR-1824 reader.
- Mount the LPMR-1824 reader in an electrically quiet environment. Avoid heavy electrical machinery.
- Stay away from RF fields, like radio transmission antennas and microwave.

Field Test

1. Carry the MR-1824 reader to a remote outdoor area not subject to electrical noise and RF fields.
2. Power the reader with a fully charged battery, 12 volts, 7 ampere-hours or larger.
3. Connect only the 2 power wires - black to ground, and red to +12V.

4. Present a LenelProx card to the reader. The LED will change from red to amber for about 1 second, then back to steady red when the card is removed.
5. Experiment with the maximum distance from the reader at which the card reads. Record the test results.
6. If the reader fails to meet the required specifications, contact LenelS2 OnGuard Technical Support.

Site Test

Interchange two MR-1824 readers - Does the problem stay at the location or move with the reader?

80.8.3 Specifications

- Mounting Surface
  - LPMR-1824: Non-metallic material only (Keep reader at least 3 inches from all metal)
  - LPMR-1824 MC: Metallic material only (Metal plate, sheet or housing with surface at least 12 square inches; reader centered in area)
- Cable to Controller
  - 5 to 7 conductors (not twisted pairs), stranded, 22 AWG, color-coded insulation, overall 100% shielded (Number of conductors depends upon use of optional features - Beeper, Hold and LED.)
  - Length: up to 500 feet
- Read Range
  - LPMR-1824:
    - 5 VDC: typically 12 inches (30 cm)
    - 12 VDC: typically 18 to 24 inches (45 to 60 cm)
  - LPMR-1824-MC:
    - 5 VDC: typically 8 inches (20 cm)
    - 12 VDC: typically up to 16 (40 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)
- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

Notes:

The Beeper sounds as described without connecting the yellow wire to the controller.

Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

Use the LPMR-1824-MC (the metal-compensated form of the LPMR-1824) only when nearby metal will reduce the performance of the standard LPMR-1824 reader.

When using the LPMR-1824-MC reader, it should be mounted on a metal surface that is larger than the 8 x 8 inch reader housing. A metal surface 12 square inches or larger is recommended.

LPMR-1824 and LPMR-1824 MC readers have both Wiegand and RS-232 interfaces.

80.9 LenelProx LPLR-911

The LPLR-911 reader is a long-range (9 to 11 feet) reader that works with paper-thin passive windshield-mounting tags or surface-mounting tags. This reader comes with a unique combination of long read range, small size, and low power consumption. The LPLR-911 has an internal power converter, allowing it to work with a wide range of supply inputs without affecting its performance. With a 12 VDC supply, its current consumption is less than 450 mA, making it possible to be powered directly from the supply in the access control panel, thereby eliminating the need for an external supply. LPLR-911 has simultaneous Wiegand and RS-232 outputs. Its primary applications are automated parking garage entrance control, hands-free access control, asset tracking, and asset management applications.

80.9.1 Preparing for Installation

Always conduct a site survey before starting installation. Avoid any possible sources of interference. If the reader is not installed properly, the performance will be degraded or more seriously the reader may be damaged. The following is a list of installation procedures that should be followed during installation:

- Do not install the reader in an area where sources of broadband noise may exist. Avoid mounting the reader facing a cellular phone tower or in close proximity to the base station of a 900 MHz wireless telephone.
- Keep all of the reader wiring at least 12 inches (30 cm) away from all other wiring, including, but not limited to, AC power, computer data wiring, telephone wiring, and wiring to electrical locking devices.
- Do not operate the reader in close proximity to any 900 MHz wireless equipment.
- Avoid mounting the reader under direct sun light. Sun light in some locations may cause the reader to operate at a temperature above the 65 degrees Celsius upper limit.
- Make sure that the supply voltage of the reader is within specification.
- Use cables with over-all shield (screen).
- For best results, run the cable in an individual conduit with at least 12 inches distance from the AC power, computer data cables and cables for electrical locking devices.
- Use recommended cable. Do not use any unshielded “Twisted Pair” type cable.
- Use the largest wire gauge possible.
- Use dedicated power supply, where necessary.
- Use Single Point Grounding (Earthing). No ground loops.

The LPLR-911 has a uni-directional antenna with an antenna beam width of about 60-70 degrees. The radiation pattern is an oval-shaped beam, which should be aimed toward where the transponders will pass. For best results, the antenna should be mounted on a post, about 6 to 7 feet above pavement, with the antenna angled slightly downward toward a vehicle passing through the drive lane. The 11 foot tip of the antenna radiation pattern should reach the windshield directly in front of the passenger or driver. Install readers for neighboring vehicle lanes so that the effective areas for detecting tags do not intersect. Only one reader should be able to read a tag at any location of the tag. Be sure to elevate the antenna slightly to accommodate sport utility vehicles, minivans and trucks.

Note: An additional installation kit (part number LPLRIN) is required for the LPLR-911.

Wiring Requirements

All the reader wiring must be continuously shielded. Use 22 AWG up to 18 AWG, six or seven-conductor shielded cables. Longer distances and higher current consumption on the power supply line will require larger gauge wires. Due to system data termination differences, contact your panel manufacturer for the proper wire sizes to meet the specific requirements.

Power Supply

For consistent performance, choose a high-efficiency switching power supply with remote sense and use the voltage sense wire to ensure consistent performance. Alternatively, use a linear, regulated power supply with sufficient current capacity.

Grounding

Grounding is critical for proper operation of a system with LPLR-911 readers. When installing the controllers, it is crucial to assure that the earth ground is the best ground available. If you elect to use the 120 VAC power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or structural steel that is in direct contact with the ground. The resistance should be less than 50 ohms. If you find that the AC power line does not provide adequate earth ground, try using a solid connection to a cold water pipe.

For multiple controller installations, it is critical that all panels are connected to the same grounding system. Using different grounding systems will create secondary current paths or ground loops that can affect the performance and cause damage to the readers.

The Shield (Drain) wire of the reader cable should be connected to the shield of the extender cable between the reader and the panel. If there is no extender cable, the reader's Shield (Drain) wire should be connected to nothing. Do not connect the extender cable's shield to ground at either end – not at the reader and not at the panel.

Measuring Reader Distance

The WS transponder for this reader is designed for windshield mounting. To measure the read range between the reader and the transponder, the transponder must be placed behind a piece of glass about 0.25 inches thick and the transponder must be flat against the glass. Grasp the transponder by the edges and hold the transponder so that the copper circuit faces the reader. Move the transponder toward the reader, with the card surface parallel to the reader, until a BEEP occurs (using the SP-6820-LR test unit). The BEEP indicates that the reader detects and reads the transponder. Optional firmware allows the user to select read repetition rates of about 3 per second, 1 per second, or 1 per 3 seconds.

Important: FAILURE TO FOLLOW THE INSTALLATION GUIDE MAY RESULT IN POOR PERFORMANCE OR EVEN CAUSE PERMANENT DAMAGE TO THE READER, THUS VOIDS THE PRODUCT WARRANTY.

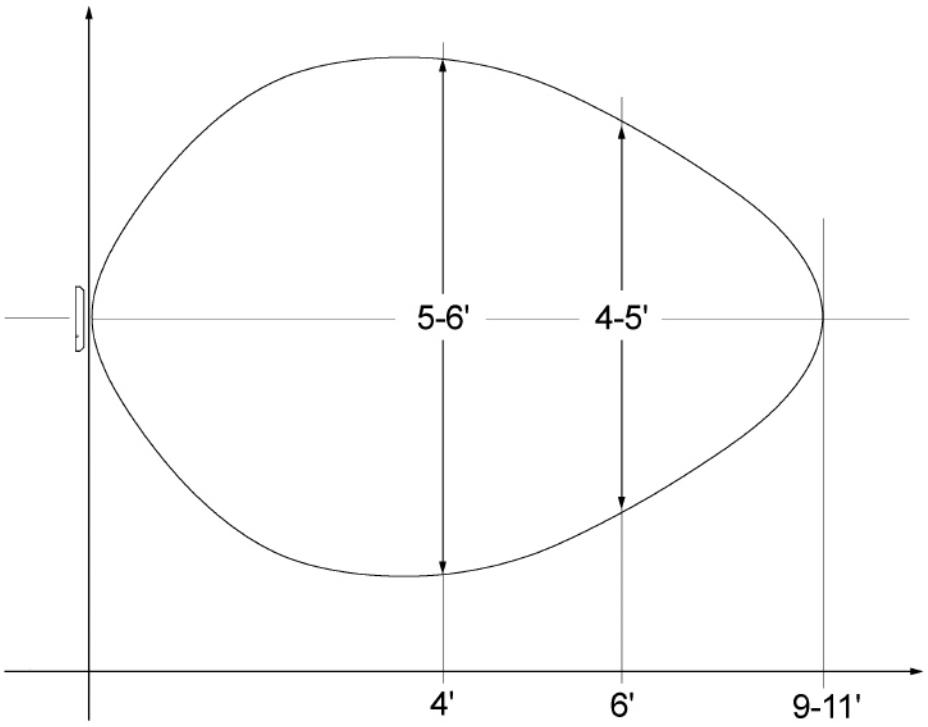
80.9.2 Installation

1. Locate the reader at the desired mounting position on a mounting post or a mounting surface. For mounting on a flat surface, drill four small holes through the aluminum plate behind the reader housing for mounting screws, and one clearance hole for the reader cable. For flexible mounting, use a video

camera adjustable mount or clamps. The installer determines the size of the mounting holes and the clearance hole. Consider the following:

- Metal plate: The reader is equipped with an aluminum plate attached on the back surface, which provides a flange that may be used as desired to install the reader. The flange may be drilled for screw holes, or may be clamped to an adjustable bracket. Do not remove this plate.
- Reader orientation: The reader may be mounted in any orientation – at any angle.
- Mounting material: The surface or the device that supports the reader may be any material, including metal.
- Environment: There must be no material between the reader and the tag (except for the windshield glass when using the WS tag). Avoid strong RF fields, such as nearby radio transmitters. Avoid HVAC motors with improper shielding.
- Multiple readers: Maintain at least 12-foot spacing between adjacent readers. Aim the readers so that the fields from adjacent readers are parallel (not overlapping within the read range). This will prevent a given tag from being detected by two readers simultaneously.
- Mapping a reader's field: The field in which a long-range tag can be detected is a circular oval emitted from the front of the reader. The oval's apex is at the center of the reader. Maximum read range occurs close to the axis of the cone.

Width and height of surveillance zone with WS tag



2. Install the tags on the selected surface, for example, inside vehicle windshields or on the side of bins, pallets, truck trailers, etc. The tags must be firmly attached on the inside of vehicle windshield glass, to assure rated read range. Do not use plastic pouches, attach to window glass, hold by hand, or place on dashboard. There are two types of tags that can be used: WS tags and MT tags.
   - For WS tags:

a. Selecting the location for WS tags: Choose a location on the vehicles' windshields where there is minimal or no tinting, and no embedded wires for defrosting or radio antenna. The location should be closest to the LPLR-911 reader and "facing" the reader, that is, with the surface of the tag parallel to the front surface of the reader.

b. Preparing a tag: Clean the inside of the windshield where the tag will be applied. Carefully peel off the front of the tag (the unprinted side), exposing the adhesive and the copper circuit.

c. Applying the tag: Press the adhesive side of the tag on the inside of the windshield. Rub the tag so that it is tightly attached to the glass, as flat as possible, without wrinkles. This is a onetime application – the tag can not be removed from the glass and re-applied.

Note: Any metal content in or on the windshield can severely limit the reader's capability.

- For MT tags,

a. Selecting the location for MT tags: Choose a flat surface large enough for the entire tag to be supported. The material of this surface may be metal or other material. The tag should not be subject to mechanical damage. The location should be closest to the LPLR-911 reader and "facing" the reader, that is, with the surface of the tag parallel to the front surface of the reader.

b. Preparing a tag: Clean the surface where the tag will be applied. Carefully peel off the pink paper from the back of the tag, exposing the adhesive.

c. Applying the tag: Press the adhesive side of the tag to the mounting surface. Rub the tag lightly so that it is tightly attached to the surface, as flat as possible. This is a one-time application – the tag can not be removed from the surface and re-applied.

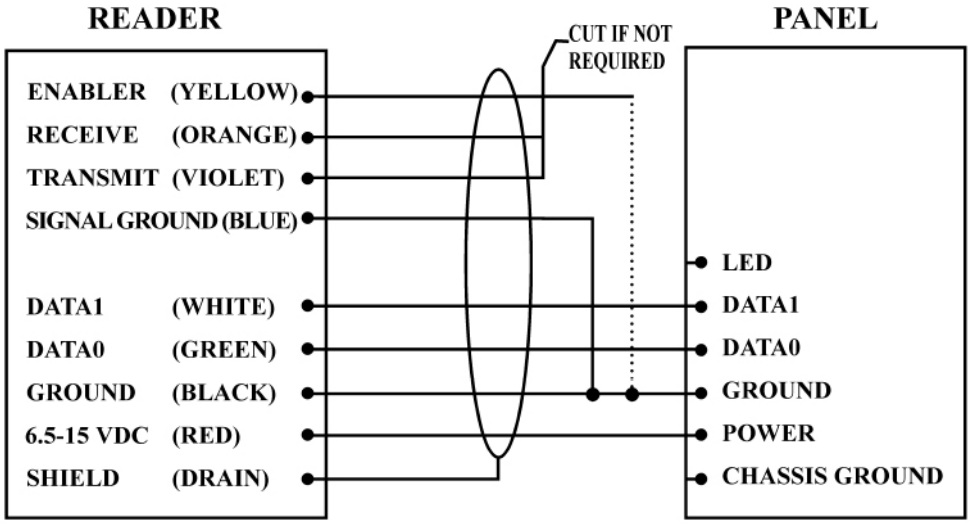
d. Securing the tag: When MT tags are installed outdoors, add a bead of silicone adhesive around the entire perimeter of the tag. This adds to the adhesion and excludes moisture.

3. Use the Installation Kit to provide audible and visible feedback as the tags are attached and the reader is aimed at the tags.

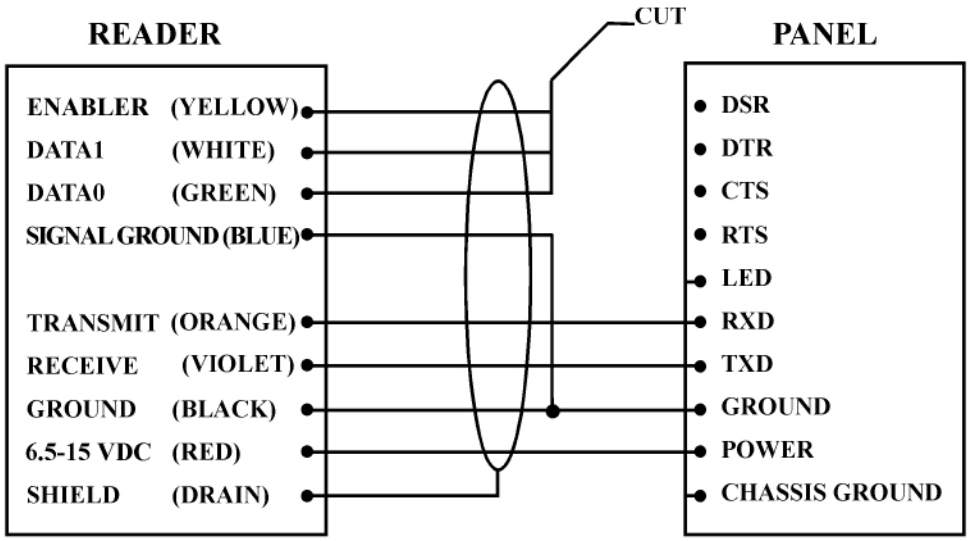
4. For Wiegand or RS-232 outputs, see the following wiring diagrams.

- Reader cable: Use high-quality cable, 6 conductors, 22 gauge, stranded, color-coded insulation, overall-shielded. Maximum cable length from the reader to the host controller is – For Wiegand interface, 500 feet. For RS-232 serial interface, 50 feet.
- Electric power: Voltage may be between +6.5 VDC and +15 VDC, regulated, either linear or switched. Power rating must be sufficient to supply 1.0 ampere at 6.5 volts, 0.5 ampere at 12 volts, or 0.4 ampere at 15 volts.
- Data connection: The LPLR-911 reader has wires for both Wiegand and RS-232 interfaces, with simultaneous output. For Wiegand Interface, the data format is the same as the bit format used in programming the tags (between 26 bits and 56 bits). For RS-232 interface, connect the reader's Receive line (violet) to the TXD terminal, and the reader's Transmit line (orange) to the RXD terminal.

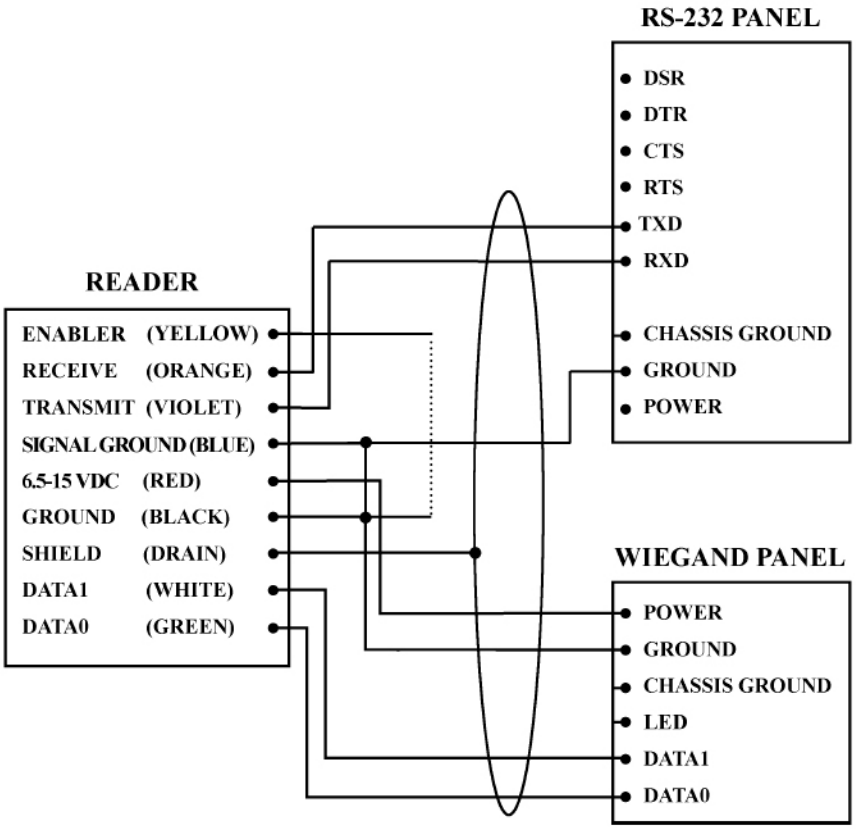
Wiring diagram for Wiegand output format



Wiring diagram for RS-232 output format



Wiring diagram for RS-232 & Wiegand output format



5. Complete the following steps for verification.
   a. Connect the LPSP-6820-LR test unit, which is part of the Installation Kit, to the reader cable. Use the wiring list in the Installation Instructions. Apply power to the reader and the test unit, using the plug-in DC power module in the Installation Kit.
   b. Use either a WS tag that is attached firmly by its adhesive to a rectangle of windshield glass, or a MT tag for verification. Hold the tag so that the hand does not interfere with direct line-of-sight between the tag and the reader.
   c. Move the tag into the field. Observing the LPSP-6820-LR test unit, there is a brief LED color change and a beep to indicate each read of the tag by the reader. Reads will repeat at a rate that is determined by the reader's firmware.
   d. Move the tag from side to side, and at varying distances from the front of the reader housing, to determine the space in which the tag and reader are active.
6. Mount the reader.
   a. Check to ensure that all connections are secure. Feed all wires through the cable access hole to the rear or the side of the mounting position.
   b. Mount the reader using fasteners on the aluminum plate to which the LPLR-911 reader is attached. Drill holes through the plate as required by the application, or attach flexible mounting devices or clamps.
   c. Adjust the position or the angle of the reader so that the tags (which have been fastened by adhesive to the windshield or other surface) are detected and read at the desired distance from the reader.

80.9.3 LPLRIN Installation Kit

The installation kit consists of the following components:

- one LPSP-6820-LR test unit with LED and beeper, and cable with three spring-clips
- one LPWS tag, mounted on a windshield glass square
- one LPMT tag
- one LPPS12-1A power supply for LPLR-911 with cable and two spring-clips
- one RS-232 adapter cable with 9-pin “D” serial connector, and cable with three spring-clips

The LPSP-6820-LR test unit is connected to the LPLR-911 reader only during test and alignment of the reader. It has a red-green LED and a buzzer, providing visible and audible feedback to the installer every time that the tag is read.

Use the tag that is attached to the windshield glass sample to test the installation. The glass must be in between the reader and the tag. Be sure that the fingers and the hand do not come between the reader and the tag.

Hold the glass with the LPWS tag in the approximate position where tags will be mounted inside the vehicles' windshields. Adjust the reader on its adjustable mounting until the LED and beeper indicate repeated reading (at a rate of about three per second).

80.9.4 Specifications

- Cable to Controller: 9 conductor stranded, 22 AWG, with continuous shield for typical installation
- Read Range: 9-11 feet (2.75-3.35 meters)
- Weight: 37.5 oz.
- Operating Parameters:
  - Operating temperature: -35° to 65°C (-31° to 150°F)
  - Operating humidity: 0 to 95% non-condensing
  - Transmitting frequency: 902 to 928 MHz
  - Voltage: 6.5 VDC to 15 VDC
  - Current requirement: 1.0 A to 0.4 A
  - Output format: Wiegand and RS-232
- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

Lenel OpenCard Readers

81 Wiring the Lenel OpenCard Readers

Not evaluated by UL.

Use the following diagrams to wire (single wire LED control) Single/Dual Reader Interface Modules and OpenCard readers.

81.1 OpenCard ISO-X Readers

The ISO-X reader model LNL-XF1100D (mullion mount) operates at 6-16 VDC with an average current draw of 95mA.

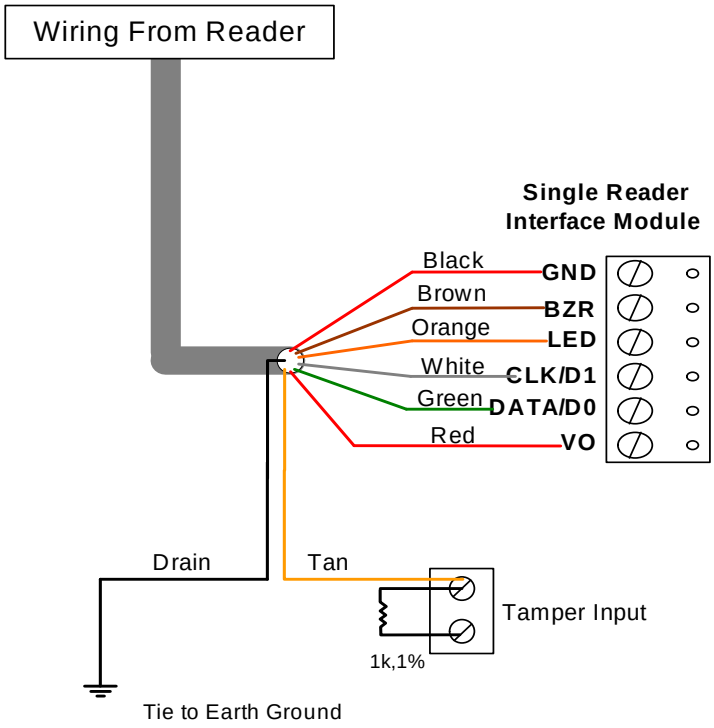
Model LNL-XF2100D (wall mount) operates at 8-16 VDC with an average current draw of 95mA.

Model LNL-XF2110D (wall mount) has a keypad and operates at 8-16 VDC with an average current draw of 120 mA.

Model LNL-XF1050K (mini-mullion) operates at 5-16 VDC.

Standards and Technologies Supported	Compatibility
125 kHz Proximity	
GE CASI ProxLite®	Supported
HID® Proximity	Supported
XceedID™	Supported
ISO 15693 13.56 MHz Vicinity	
XceedID ISO-X™ Secure Sector	Supported
Infineon my-d® Secure Sector	Supported
HID iCLASS® Serial Number	Supported
Infineon my-d® Serial Number	Supported
Inside Contactless PicoTag® Serial Number	Supported
ST Microelectronics® Serial Number	Supported
Texas Instruments Tag-It® Serial Number	Supported
Philips I-Code® Serial Number	Supported
ISO 14443 13.56 MHz Proximity	
XceedID ISO-X™ Secure Sector	Supported
Infineon my-d® Secure Sector	Supported
DESFire® Serial Number	Supported
DESFire® Sector	Q4 2005
MIFARE® Serial Number	Supported
MIFARE® Sectors	Q4 2005

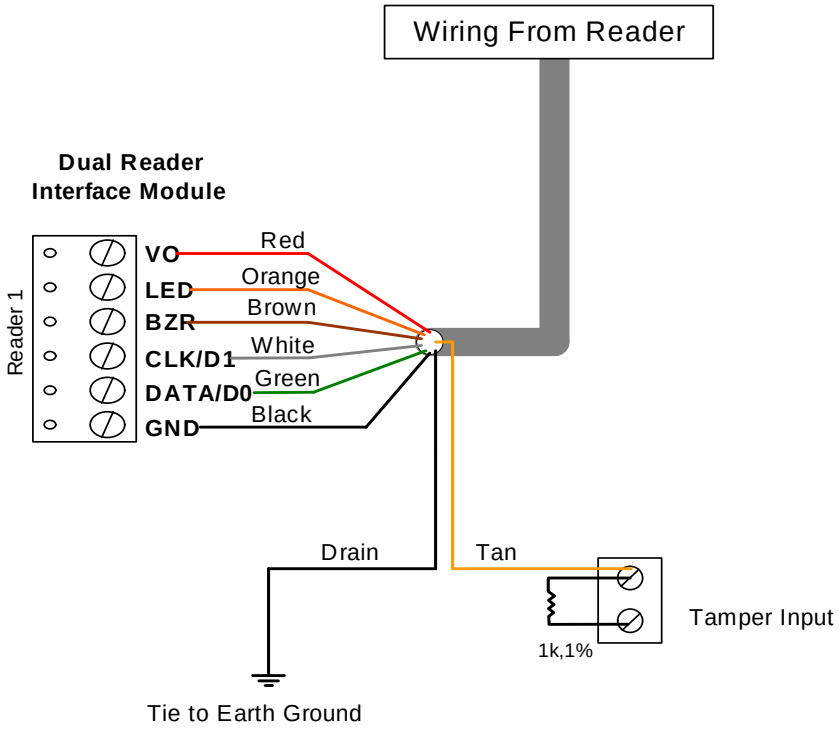
81.1.1 Wiring the LNL-1300



TYPICAL SOFTWARE SETTINGS

1. Reader Type = WIEGAND/PROX
2. Keypad = No Keypad/8-bit Output Keypad on XF 2110 Only
3. LED Mode = 2-WIRE LED CONTROL

81.1.2 Wiring the LNL-1320



TYPICAL SOFTWARE SETTINGS

1. Reader Type = WIEGAND/PROX
2. Keypad = No Keypad/8-bit Output Keypad on XF2110 Only
3. LED Mode = 2-WIRE LED CONTROL

81.2 OpenCard XF1050-K

OpenCard XF1050-K Reader Power Specifications

Model	Voltage	Current
OpenCard XF1050-K	5 to 16 VDC	110 mA average, 160 mA peak

81.2.1 Wiring the LNL-1300

From LNL-1300		To OpenCard XF1050-K Reader		Typical Software Settings
Reader Terminal	**Pin**	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
TB4	GND	Black	Ground	
	BZR	Brown	Red LED	
	LED	Orange	Green LED	
	CLK D1	White	Data/D1	
	DAT D0	Green	Clock/D0	
	V0	Red	Power (5-12 VDC)	

Note: Connect reader's cable drain shield to earth ground.

81.2.2 Wiring the LNL-1320

From LNL-1320	To OpenCard XF1050-K Reader		Typical Software Settings
Reader 1 or Reader 2 Pin	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
GND	Black	Ground	
DAT D0	Green	Clock/D0	
CLK D1	White	Data/D1	
BZR	Brown	Red LED	
LED	Orange	Green LED	
V0	Red	Power (5-12 VDC)	

Note: Connect reader's cable drain shield to earth ground.

81.2.3 Wiring the LNL-1300-U

From LNL-1300-U		To OpenCard XF1050-K Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Clock/D0	
	CLK D1	White	Data/D1	
J13	LED1	Orange	Green LED	
	LED2	Brown	Red LED	
	BZR	Blue	Buzzer Input	
	V0	Red	Power (5-12 VDC)	

Note: Connect reader's cable drain shield to earth ground.

81.2.4 Wiring the LNL-1320-U

From LNL-1320-U		To OpenCard XF1050-K Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Data/D1	
	CLK D1	White	Clock/D0	
J13	LED1	Orange	Green LED	
	LED2	Brown	Red LED	
	BZR	Blue	Buzzer Input	
	V0	Red	Power (5-12 VDC)	

Note: Connect reader's cable drain shield to earth ground.

81.3 OpenCard XF1500

OpenCard XF1500 Reader Power Specifications

Model	Voltage	Current
OpenCard XF1550	5 to 16 VDC	110 mA average, 160 mA peak

81.3.1 Wiring the LNL-1300

From LNL-1300		To OpenCard XF1500 Reader		Typical Software Settings
Reader Terminal	**Pin**	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
TB4	GND	Black	Ground	
	BZR	Brown	Red LED	
	LED	Orange	Green LED	
	CLK D1	White	Data/D1	
	DAT D0	Green	Clock/D0	
	V0	Red	Power (5-12 VDC)	

Note: Connect reader's cable drain shield to earth ground.

81.3.2 Wiring the LNL-1320

From LNL-1320	To OpenCard XF1500 Reader		Typical Software Settings
Reader 1 or Reader 2 Pin	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
GND	Black	Ground	
DAT D0	Green	Clock/D0	
CLK D1	White	Data/D1	
BZR	Brown	Red LED	
LED	Orange	Green LED	
V0	Red	Power (5-12 VDC)	

Note: Connect reader's cable drain shield to earth ground.

81.3.3 Wiring the LNL-1300-U

From LNL-1300-U		To OpenCard XF1500 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Clock/D0	
	CLK D1	White	Data/D1	
J13	LED1	Orange	Green LED	
	LED2	Brown	Red LED	
	BZR	Blue	Buzzer Input	
	V0	Red	Power (5-12 VDC)	

Note: Connect reader’s cable drain shield to earth ground.

81.3.4 Wiring the LNL-1320-U

From LNL-1300-U		To OpenCard XF1500 Reader		Typical Software Settings
Reader Terminals	**Pin**	**Wire**	**Description**	• Reader Type = Wiegand/Prox • LED Mode = 2-Wire LED Control
J10	GND	Black	Ground	
	DAT D0	Green	Clock/D0	
	CLK D1	White	Data/D1	
J13	LED1	Orange	Green LED	
	LED2	Brown	Red LED	
	BZR	Blue	Buzzer Input	
	V0	Red	Power (5-12 VDC)	

Note: Connect reader’s cable drain shield to earth ground.

LNL-CK Command Keypad

82 LNL-CK Command Keypad Overview

The LNL-CK command keypad integrates a 32-character back-lit LCD display with a 16-position keypad and a reader port. It serves as a command reader, with programming being accomplished using the OnGuard software. This device features time display (in either 12-hour or 24-hour clock format, based on the Windows setting of the Communications Server) and text feedback during reader operations. For example, when using the extended held open command, the command keypad displays the time countdown before the held open time is reached. It also displays status, such as access granted, access denied, enter PIN, etc. Features supported include:

- Card/PIN access
- Function execution
- Extended held open time
- Global arm and disarm
- Instant commands
- Advanced arm and disarm

82.1 Communication

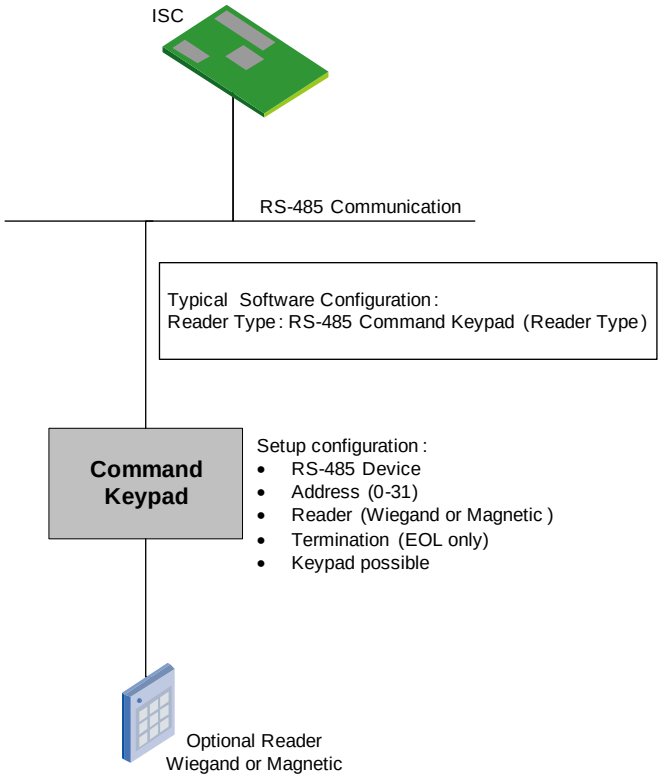
The command keypad communicates with the controller via a 2-wire RS-485 interface or as a reader device through a reader interface module. There are three possible scenarios:

- Command keypad as a stand-alone device (see Command Keypad as a Stand-alone Device, on page 460 for details.)
- Command keypad as an alternate reader device (see Command Keypad as an Alternate Reader Device, on page 461 for details.)
- Command keypad as a primary reader device (see Command Keypad as a Primary Reader Device, on page 463 for details.)

82.1.1 Command Keypad as a Stand-alone Device

The command keypad can be installed as a stand-alone device. It can be connected via RS-485 and may be used to execute command programming (*4-15#) or the extended held open command. With the optional reader connected, all reader modes are supported. The keypad supports PIN entry; however, there is no door hardware connection capability.

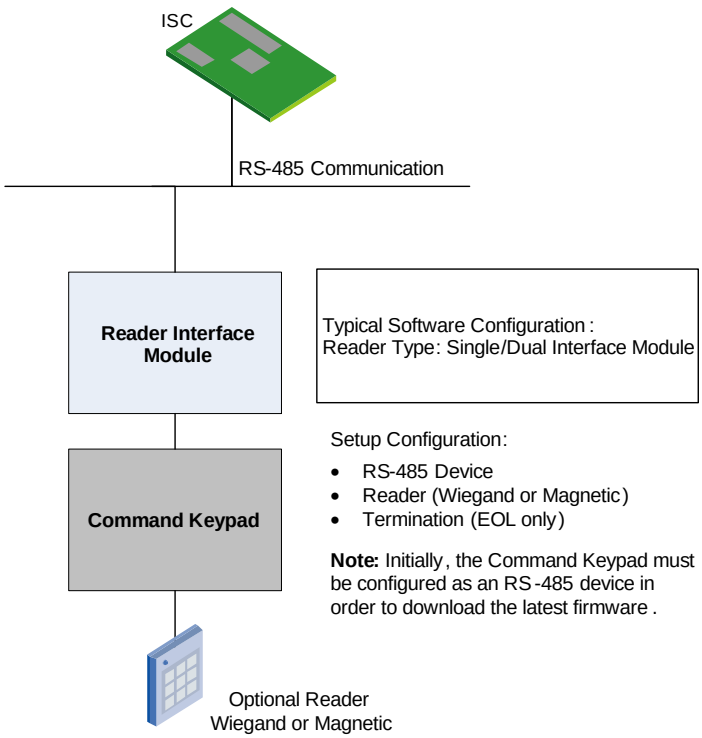
Command Keypad installed as stand-alone device



82.1.2 Command Keypad as an Alternate Reader Device

The command keypad can be connected via RS-485 and used as an alternate reader device along with a primary reader (associated with a single/dual reader interface module) for door inputs and outputs from the primary reader interface device. In this scenario, it will support all reader modes. It may be used to execute command programming (Card Reader Cipher Mode, Extended Held Open Time, User Command Programming ability) as well as PIN entry.

Command Keypad installed as alternate reader device



Wiring

Connect the command keypad to the single/dual reader interface module (LNL-1300 or LNL-1320) as follows:

Command Keypad		Single/Dual Reader Interface Module Port Reader
Pin	**Color**	
2	Black	GND
3	Blue	CLK D1
4	Gray	DAT D0
1	Red	Connect to a separate +12 VDC power supply

Configuration in OnGuard

Configuring the command keypad as an alternate reader device in OnGuard requires adding two LNL-1300 or LNL-1320 reader interface modules, one as the primary reader and the other as the alternate reader. The alternate reader will use the command keypad.

To add the reader interface module in OnGuard as the primary reader:

1. In System Administration, go to ***Access Control > Readers and Doors***.
2. On the **General** tab, make the following settings:
   - From the ***Type*** menu, select **LNL-1300 (Single Interface)** or **LNL-1320 (Dual Interface)**.

   Note: Make sure any access control readers are properly connected (for example, HID Wiegand/ Prox) to the reader interface module.

   - From the ***Reader Modes*** menus, select an option for Online and Offline operation.
   - From the ***Keypad*** menu, select an applicable keypad for the reader.
   - From the ***Card Format*** menu, select the appropriate card format for the primary reader type.
3. On the **Settings** tab, select **1-Wire LED Control (Std)** from the ***LED Mode*** menu.

To add the reader interface module in OnGuard as the alternate reader:

1. In System Administration, go to ***Access Control > Readers and Doors***.
2. On the **General** tab, make the following settings:
   - From the ***Type*** menu, select **LNL-1300 (Single Interface)** or **LNL-1320 (Dual Interface)**.
   - Check the **Alternate Reader** box.
   - From the ***Primary Reader*** menu, select the primary reader that you created earlier.

   Note: The alternate reader must be associated to a primary reader.

3. On the Settings tab, select **LCD Command Keypad** from the ***LED Mode*** menu.

Configuration at the Command Keypad

Use the Setup mode in the command keypad to make the following configuration settings. For more information, refer to Command Keypad Configuration on page 469.

1. Disconnect and then reconnect the +12 VDC power.
2. When the screen displays “Press two keys for Setup,” simultaneously press the keys indicated to enter the setup screen. Follow the instructions on the LCD and press the [Configure] key.
3. Make the following settings and press the [Accept] key after each setting is made:
   - **Communication:** Set to **RS-485**.
   - **Baud Rate:** Set to **9600 bps.**

Note: If the command keypad is connected to the downstream reader interface module, set the baud rate to 9600 bps. If the command keypad is connected directly to the controller, set the baud rate to 38400 bps.

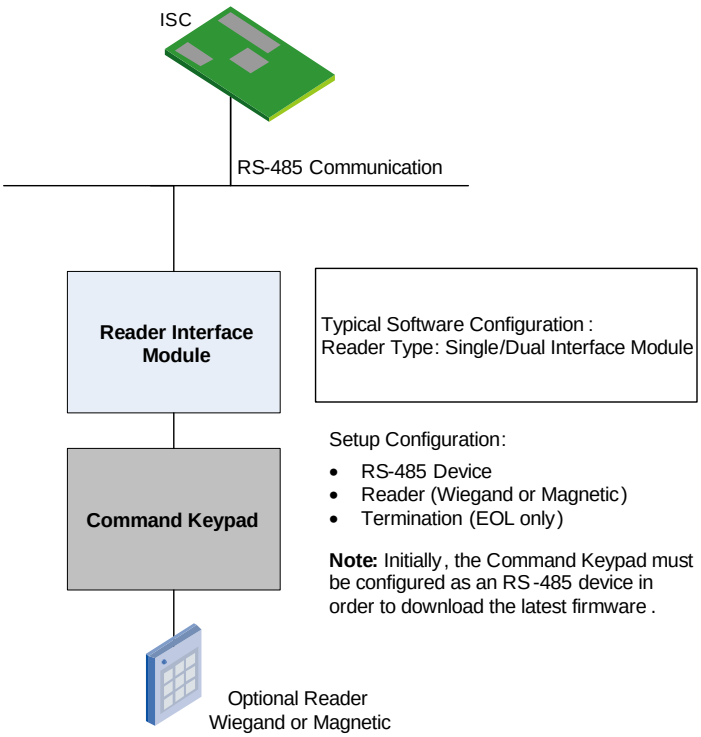
- **Protocol:** Set to **MSP1**.
- **Communication Address: 00**.
- **Backlight:** Set to **03**.
- **LED:** Set to **1-Wire**.

4. At the "Save Configuration" prompt, select **Yes**.
   The display shows "Ready."

82.1.3 Command Keypad as a Primary Reader Device

The command keypad can be connected as a primary reader device on the reader interface module along with any type of alternate reader (for example, a biometric device). The command keypad will support all reader modes. It may be used for PIN entry or execution of command programming. The reader interface allows door hardware connection capability.

Command Keypad installed as primary reader device



The command keypad communicates to a controller via a half duplex multi-drop 2-wire RS-485 interface. The total cable length is limited to 4000 feet (1219 meters). It can also communicate via Wiegand interface, with a maximum cable length of 500 feet. Shielded cable of 24 AWG with characteristic impedance of 120 ohm is specified for the RS-485 interface. If the command keypad is the last device on each end of the cable, it should have the termination enabled (set DIP1=ON).

Wiring

Connect the command keypad to the single/dual reader interface module (LNL-1300 or LNL-1320) as follows:

Command Keypad		Single/Dual Reader Interface Module Port Reader
Pin	**Color**	
2	Black	GND
3	Blue	CLK D1
4	Gray	DAT D0
1	Red	Connect to a separate +12 VDC power supply

Configuration in OnGuard

Configuring the command keypad as an primary reader device for another alternate reader in OnGuard requires adding two LNL-1300 or LNL-1320 reader interface modules, one as the primary reader and the other as a SIM/DIM alternate reader.

To add the reader interface module in OnGuard as the primary reader:

1. In System Administration, go to ***Access Control > Readers and Doors***.
2. On the **General** tab, make the following settings:
   - From the ***Type*** menu, select **LNL-1300 (Single Interface)** or **LNL-1320 (Dual Interface)**.
   - From the ***Reader Modes*** menus, select an option for Online and Offline operation.
   - From the ***Keypad*** menu, select an applicable keypad for the reader.
   - From the ***Card Format*** menu, select the appropriate card format for the alternate reader device that is connected to the command keypad (for example, magnetic reader type).
3. On the **Settings** tab, select **LCD Command Keypad** from the ***LED Mode*** menu.
4. (Optional) Check the **Biometric Verify** box.

To add the reader interface module in OnGuard as the SIM/DIM alternate reader:

1. In System Administration, go to ***Access Control > Readers and Doors***.
2. On the **General** tab, make the following settings:
   - From the ***Type*** menu, select **LNL-1300 (Single Interface)** or **LNL-1320 (Dual Interface)**.
   - Check the **Alternate Reader** box.
   - From the ***Primary Reader*** menu, select the primary reader that you created earlier.

Note: The alternate reader must be associated to a primary reader.

Configuration at the Command Keypad

Use the Setup mode in the command keypad to make the following configuration settings. For more information, refer to Command Keypad Configuration on page 469.

1. Disconnect and then reconnect the +12 VDC power.
2. When the screen displays “Press two keys for Setup,” simultaneously press the keys indicated to enter the setup screen. Follow the instructions on the LCD and press the [Configure] key.
3. Make the following settings and press the [Accept] key after each setting is made:
   - **Communication:** Set to **RS-485**.
   - **Baud Rate:** Set to **9600 bps.**

   Note: If the command keypad is connected to the downstream reader interface module, set the baud rate to 9600 bps. If the command keypad is connected directly to the controller, set the baud rate to 38400 bps.

   - **Protocol:** Set to **MSP1**.
   - **Communication Address: 00**.
   - **Backlight:** Set to **03**.
   - **LED:** Set to **1-Wire**.
4. At the “Save Configuration” prompt, select **Yes**.
   The display shows “Ready.”
5. As prompted by the command keypads, enter a valid cardholder PIN. If you have **Biometric Verify** configured, present your finger to the Bioscrypt alternate reader to gain successful biometric identification and access.

82.2 Hardware Revision and Firmware

The hardware revision can be determined in one of two ways:

- Check the circuit board revision label located on the backside of the board.
- Simultaneously press the center two keys of the top row on the keypad. The last character on the right of the top line is the hardware revision.

In order for the command keypad to function properly, the following firmware is required:

- LNL-CK rev. A uses firmware 1.3 or later.
- LNL-CK rev. B uses firmware 1.50 or later.
- LNL-CK rev. C uses firmware 1.50 or later. The command keypad currently ships with firmware version 1.63. This firmware is loaded in the factory and cannot be upgraded in the field.

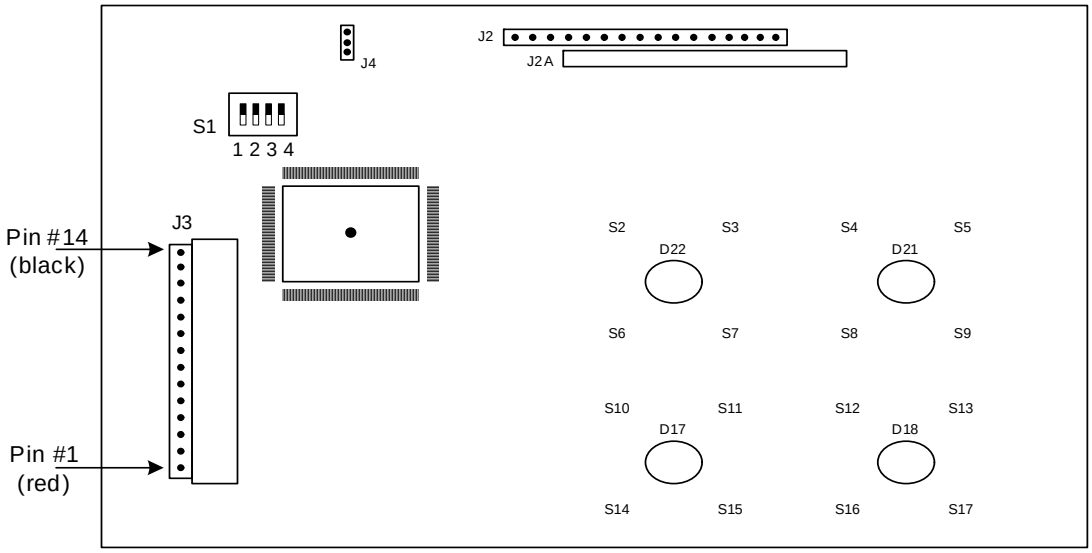
  Note: With firmware version 1.63, configuration options have changed. For more information, refer to Command Keypad Configuration on page 469.

- Reader interface module (firmware version 1.52.13 or later for the LNL-1300 Series 2, firmware version 1.57.5 or later for the LNL-1320 Series 2, or any LNL-1300 or LNL-1320 Series 3).

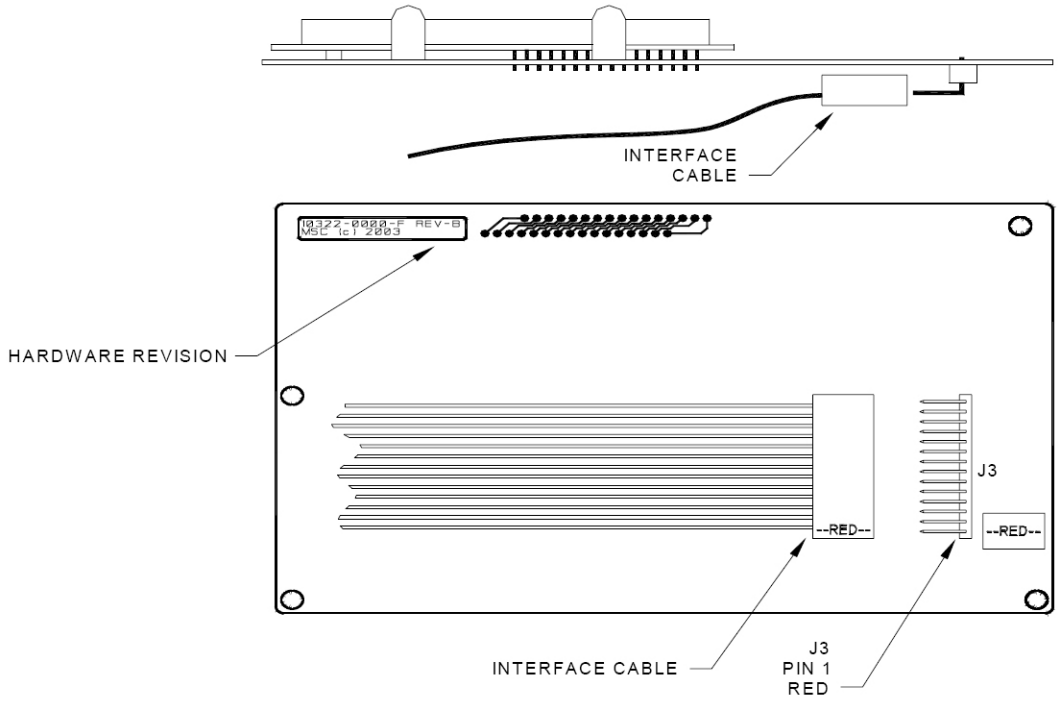
- Controller firmware version 1.26x or later for the LNL-X series; version 1.194 or later for the LNL-2210, LNL-2220, or LNL-3300; or version 3.099 or higher for the LNL-500.

82.3 Wiring the Command Keypad

When plugging the connector into the pin block, line up the red wire with pin #1 and the black wire with pin #14 (as marked on the back of the board).



Side and rear view of the command keypad board



Use the following table to connect the wires properly.

82.3.1 Command Keypad Power

The command keypad requires 12 VDC ± 15% for power. The power source must be regulated and isolated. Wires connected to pins 1-2 are for power.

Pin	Color	Signal
1	Red	12 VDC IN
2	Black	DC Ground

82.3.2 Command Keypad Communication

For controller RS-485 Connection

Wires connected to pins 3, 4 and 14 are used for units wired via 2-wire RS-485.

Pin	Color	Signal
3	Blue	RS-485 TR +
4	Gray	RS-485 TR -
14	Black	Signal Ground

For the Series 1 Reader Interface Connection

Wires connected to pins 5-8 are used for units connecting to the series 1 reader interface module.

Pin	Color	Signal
5	Green	DAT/D0 on the reader interface module
6	White	CLK/D1 on the reader interface module
7	Brown	LED on the reader interface module
8	Orange	BZR on the reader interface module
14	Black	Signal Ground

For the Series 2 and Series 3 Reader Interface, Intelligent Dual Reader Controller, or Intelligent Single Door Controller Connection

If you are using the Intelligent Dual Reader Controller, Intelligent Single Door Controller, Series 2 or Series 3 Dual Reader Interface Module, the wiring is different from the Series 1 board. Use the following chart.

Pin	Color	Signal
2	Black	GND

Pin	Color	Signal
3	Blue	CLK D1
4	Gray	DAT D0
1	Red	Connect to a separate +12 VDC power supply

The command keypad should use the following settings, which are available from the keypad configuration menu (see Command Keypad Configuration, on page 469 for details.)

- RS-485 mode
- 9600 baud
- Communication Address: 00

Wires connected to pins 9-14 are used for readers wired to this unit.

Pin	Color	Signal
9	Red	12 VDC pass through for reader (175 mA maximum)
10	Green	Reader Data (DATA 0)
11	White	Reader Clock (DATA 1)
12	Brown	Reader LED
13	Orange	Reader Buzzer
14	Black	Ground

When connecting this device via RS-485, there are no door inputs/outputs unless the following conditions are met:

- it is configured as an alternate reader
- it is linked to a primary reader which is connected to a reader interface module.

82.4 DIP Switches

This command keypad has four DIP switches that must be configured.

DIP switch	Setting	Used to configure:
1	OFF	RS-485: no termination
	ON	RS-485: 120 Ohms termination
2	OFF	Use configuration settings (done using programmable keypad)
	ON	Force the use of 38400 baud rate and address 31
3	OFF	Allow software configuration at startup
	ON	Disable software configuration at startup.

DIP switch	Setting	Used to configure:
4	OFF	not used

Proper termination is required for proper operation. If the command keypad is the first or last device on the RS-485 bus, DIP switch 1 should be ON.

Set DIP switch 3 to the ON position to disable the ability to use to keypad for changing the configuration during power-up. This decreases the possibility of unauthorized persons from altering the configuration.

82.5 Jumpers

Jumper J1, J5, and J6 are for factory use only. By default, this device is shipped with this jumper open and should not be changed.

Jumper J4 is for firmware flash upgrade. To allow flash upgrades on revision A boards, jumper pins 1-2. To disable this feature, jumper pins 2-3. If you have a revision B board, J4 is not present and no action is required to enable the programming of flash memory.

82.6 Command Keypad Configuration

Configuration of the command keypad is usually performed at the keypad during the startup process. When power is applied, the screen will flash a message: “Press two keys for Setup.” If the two keys indicated are pressed simultaneously, the setup screen will appear. Follow the instructions on the LCD.

Notes:

If you are using firmware version 1.50, selections include communication, baud rate, communication address, backlight, and LED.

If you are using firmware version 1.63, selections include communication, protocol, baud rate, communication address, backlight, and LED.

- **Communication mode:** Choose **RS-485**.
- **Baud rate:** This selection should match the baud rate of the controller (typically 38400 bps).
- **Protocol:** The options are **MSP1** or **OSDP** (OSDP is currently not supported). Choose **MSP1** if you are connecting to an RS-485 downstream connection.
- **Communication Address:** Set the communication address to a unique value between 0 and 31.
- **Backlight:** Select how long (in seconds) the backlight remains on after no activity:
  - 00=always off
  - 01-98=number of seconds
  - 99=always on
- **LED:** Select the LED drive type to match the reader connected to the reader port:
  - **1-Wire:** standard 1-wire interface (High=RED, Low=GREEN)
  - **2-Wire:** BRN wire controls red LED (High=Off, Low=On), ORG wire controls green LED (High=Off, Low=On), No Buzzer
  - **2-Wire/Special:** corresponds to Dorado LED control

82.7 Status Display

The command keypad can display a status report so that you can confirm settings, check the serial number, firmware revision number, or hardware settings. It also displays a communication status (on-line or off-line). To view the status display, simultaneously press the two center keys of the top row on the keypad:

(top line)
AAAAAAAAAA-BBBBB
(lower line)
CCCCCCCCSW-X234 D

- A represents the unit's ten-digit serial number
- B represents the firmware revision level. The right-most character represents the PCB revision level.
- C represents the current operating mode.
  - Reader port mode = rdr port
  - RS-485 mode = baud rate-address
- SW-X234 represents the current S1 DIP switch setting. X
- D represents the communication status (On-line = o).

82.8 OnGuard Configuration

82.8.1 Reader Type

When connecting the command keypad using RS-485, OnGuard allows for three possible choices to select for the reader type:

- RS-485 Command Keypad (LNL-1300T).
  The LNL-1300T is no longer available for sale. This selection is available in the software for legacy support.
- RS-485 Command Keypad (All Other Readers)
- RS-485 Command Keypad (Wiegand/Prox)
- RS-485 Command Keypad (Mag w/ Wiegand Output)

Use this field to configure the card reader that is wired into the command keypad. The LED mode for this type of reader will automatically be configured as LCD Command Keypad by the system and cannot be modified. This LED mode setting indicates that the attached reader is capable of LED/text. This is configured when attaching the command keypad to a reader interface module. Choosing "LCD Command Keypad" tells the system that it is the command keypad being connected to the reader interface module. The reader type in this case is the normal "Dual reader 1..." or "Dual reader 2..." reader type that is typically selected for the reader interface module, depending on if the reader is connected to the reader 1 port or the reader 2 port. The type of card reader connected into the command keypad determines which type is selected.

When connecting the command keypad using the dual reader interface module (Dual Interface Rdr 1/Dual Interface Rdr 2), the reader type must also be selected according to the card reader wired to the command keypad (All Other Readers, Wiegand/Prox, or Mag w/ Wiegand Output). Select **LCD Command Keypad** for the LED mode to identify the device connected to the reader interface module as an LCD-capable device, and not a typical card reader.

All door inputs (aux inputs, REX, door contact) and door outputs (aux outputs, strike) are controlled by reader interface module.

82.8.2 Text Display Options

The text displayed on the command keypad is configurable through the access control software. The display may include the time, status of default area, or any user definable text strings. It is limited to 8 strings, a maximum of 16 characters each.

82.8.3 Multi-level Command Authority

Commands may be enabled globally, or at a more advanced level. The authority levels may be configured as No authority, Level 1, or Level 2. These levels apply to the commands to view, disarm, arm, and force arm.

82.8.4 Macros

Macros may be used to define a key sequence. It is limited to the characters found on the keypad (0-9, *, #) and the function keys. Macros may be defined using the following combinations of function keys:

- Individual keys: F1, F2, F3, F4
- F1 + F2
- F3 + F4
- F1 + F4
- The F2 + F3 combination is used to determine the hardware revision.

Note: For detailed information, refer to the System Administration User Guide.

82.9 Command Programming

The command keypad allows PIN entry on standard keypad readers. If your PIN is shorter then the maximum length, press [#] after entering the PIN number.

Note: The typical [*] key on the keypad is labeled with an arrow and the [#] key is labeled with [COMMAND].

Commands are programmed in System Administration. The standard command string is [*], followed by a number (4-15), followed by [#]. Commands are executed according to the configuration of Local I/O function list(s).

82.10 Command Keypad Behavior

82.10.1 Time Displays

The command keypad supports two formats for time display: a 12-hour clock or 24-hour clock display. This is configured based on the Windows regional settings of the machine running the Communication Server.

- When the device is in Locked mode, “Locked” is displayed on line 1. The current time is displayed on line 2. This is an IDLE mode.
- When the device is in Unlocked mode, “Unlocked” is displayed on line 1. The current time is displayed on line 2. This is an IDLE mode.
- When the device in any mode other than locked or unlocked and waiting for input, “Ready” is displayed on line 1. The current time is displayed on line 2. This is also an IDLE mode.
- When an access or other attempt is denied, “Denied” is displayed on line 1. The current time is displayed on line 2. This text is displayed for 3 seconds. It is displayed in the following scenarios:
  - Access Denied on card/PIN access attempt
  - Timeout of second card request
  - Timeout while waiting for biometric verification
  - The [#] key is pressed while waiting for a pin, but no keys have been entered
  - Timeout during PIN or user command entry
- When access is granted, “Access Granted” is displayed on line 1. The current time is displayed on line 2.
- When there is a valid card swipe at a reader in card and PIN mode, “Enter PIN” is displayed on line 1. “?” is displayed on line 2. As keys are entered, a “*” is shown for each keystroke.
- When a valid PIN is entered at a reader in card and PIN mode, “Enter Badge” is displayed on line 1. This state only exists when using controller firmware 3.050 or later. In previous versions, no prompt is displayed here after entering the PIN.
- Whenever additional credentials are needed, “Next Badge” is displayed on line 1. The current time is displayed on line 2. Additional credentials can be required due to two-card control and APB occupancy issues (such two-man area control).
- When an access attempt is awaiting host based decision (global APB), “…” is displayed on line 1. This state only exists when using controller firmware 3.050 or later. In previous versions, “Enter Badge” would be displayed here.
- When there is an access attempt awaiting biometric data, “Enter Biometric” is displayed on line 1 in version 5.10.419. Or, if you are using a previous version of the OnGuard software, “Biometric Test” is displayed instead. This state only exists when using controller firmware 3.050 or later.
- When an extended held open command is denied due to invalid credentials or if it is not supported at the given reader, “Not Authorized” is displayed on line 1. The current time is displayed on line 2.
- When an extended held command is denied due to arguments entered out of range, “Invalid Data” is displayed on line 1. The current time is displayed on line 2.
- When the reader has entered extended held open mode, “Timed Door Open:” is displayed on line 1. The remaining number of minutes and seconds to alarm is displayed on line 2.
- Whenever a command has been entered and accepted for processing, “Command Accepted” will be displayed on line 1 and the current time on line 2. This simply means that a key stream has been sent to the controller for processing as a potential command sequence. It is simply verification that the entered data has been seen by the system and is NOT an indication of a command being executed.

82.10.2 Alarm Mask Groups

The control of alarm mask groups is accessible through command keypad devices. The command will allow a user to arm/disarm an alarm mask group from the keypad with visual feedback on the LCD.

To issue the command, you must receive a valid access grant at the reader and also have arm/disarm command authority. To use the feature:

1. Press [*] (on the command keypad, this is equivalent to the arrow key).
2. Enter the command sequence as programmed (defined in System Administration), followed by a two-digit alarm mask group ID.
3. To finalize the command press [#] (on the command keypad, this is represented with the [COMMAND] key.
4. Follow the prompts displayed on the LCD. They will be different, depending on if the alarm mask group was already armed or disarmed.

If it is armed...	If it is disarmed...

If you would like to disarm the alarm mask group, press [1]. The LCD will then display:
`*** DISARMED ***`
	The system will check to see if any points are active.
	• If no points are active, the LCD will display:
	`ALL SECURE`
	`<2> TO ARM`
	- If you would like to arm, press [2]. The LCD will display:
	`ARMING, EXIT NOW`
	- Otherwise, do not press anything (or if you press key other than [2]), it will remain disarmed.
	• If points are active, the LCD will display:
	nn `ZONES FAULTED`
	`<4> TO VIEW`
	(where *nn* is the number of points active).
	Press [4] to scroll through and view active points.
	After it is done, the LCD will display:
	nn `ZONES FAULTED`
	`<3> TO FORCE-ARM`
	- Press [3] to force-arm the alarm mask group. The LCD will display:
	`ARMING, EXIT NOW`
	- Do nothing (or if you press any key other than [3]) to leave it disarmed.

Advanced permission control allows the following commands to be enabled or disabled on a per-keypad basis:

- Default Alarm Mask Group Intrusion Commands
  - No mask group ID needs to be specified
  - Arm the default area.
  - Force-arm the default area (auto-bypass).
  - Disarm the default area.
  - View faulted zones in the default area.

- Any Alarm Mask Group Intrusion Commands
  - Mask group ID from 00 to 99 must be appended to the command.
  - Arm the specified area.
  - Force-arm the specified area (auto-bypass)
  - Disarm the specified area.
  - View faulted zones in the specified area.
- Features such as auto-bypass for forced arm should not be programmed for UL.

82.11 Specifications

** The command keypad is for use in low voltage, class 2 circuits only.

- Primary Power: (DC)
  - DC input: 12 VDC ± 15%. 175 mA
- Reader Ports:
  - Power: pass through
  - Interface: 2-wire, clock/data or data 1/data 0
  - LED control: 2-wire or 1-wire bi-color
  - Buzzer control: available only in 1-wire LED control mode
- Communication:
  - RS-485: 24 AWG, 4000 feet (1200 m) maximum, 120 ohms impedance
  - TTL: 18 AWG, 500 feet (152 m) maximum
- Environmental:
  - Temperature: 0º to 50° C operating, -20º to +70° C, storage
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6.75 x 5 x 1 in. (172 x 127 x 25 mm)
  - Weight: 14 oz. (400 g) nominal
- UL 294 Listed

These specifications are subject to change without notice.

TROUBLESHOOTING

Troubleshooting

83 System Issues

Issue	Possible Causes
Software Connection Error in Alarm Monitoring	1. TCP/IP Connection Errors – TCP/IP must be configured on all workstations running Alarm Monitoring. Use a static IP address, not DHCP. 2. The Access Control Driver may not be running, or was started improperly. Close Alarm Monitoring and start driver. 3. Workstation running Alarm Monitoring is not in the monitoring zone for the access panel. 4. Workstation name is incorrect in software configuration for access panel.
Access granted causes a communications loss to the reader	Make sure that you have not exceeded the maximum current draw of your power supply.
Client workstation unable to connect with the access database	Use the standard naming convention for database location (instead of mapped drive) in your ODBC settings (e.g. \\Server\accessct.mdb). This eliminates the need for mapped drives. Make sure the drive where the database resides is shared.
Unstable communication with system hardware	Check end of line termination jumpers. Only the first and the last device on each RS-485 communication line should be terminated.
Dial-up communication errors	1. Panel address must be set to “1.” 2. Check communication wiring per diagram. 3. Use recommended modems only; check DIP switch settings on modem.
Lantronix communication errors	1. Clear Lantronix memory and follow setup procedures *exactly* as written. 2. Check wiring between the ISC and the Lantronix box. 3. Dip switch 5 must be set to the “on” position. 4. “Autobaud” setting must be disabled.
Entry denied on valid badges	Panel memory in the software configuration must match the physical memory on the board. If unsure of panel memory, use “display panel capacity” in the Alarm Monitoring options menu to verify proper configuration.

84 Intelligent System Controller Issues

Issue	Possible Causes
Panel is offline	1. Port 1 communication wiring is incorrect. Use meter to check pin-outs, do not rely on coloring schemes. 2. Panel address does not match software configuration. 3. TLS encryption settings do not match Verify that the Data Security option on the configuration web page for the panel is set to **TLS Required** (TLS encryption is available for LAN connections only) and that the **TLS encryption** check box is selected on the Options sub-tab for the same panel in System Administration > Access Control > Access Panels. 4. TLS certificate signatures do not match Verify that the same TLS certificate is installed on both the Communication Server and the LenelS2 controller. 5. In software configuration, verify that the panel has been set "online." 6. Also verify that the baud rate is set for 38400. 7. Check for software connection error and see above.
Dial-up communication errors	1. Panel address must be set to "1." 2. Check communication wiring per diagram. 3. Use recommended modems only; check DIP switch settings on modem.
Lantronix communication errors	1. Clear Lantronix memory and follow setup procedures *exactly* as written. 2. Check wiring between the ISC and the Lantronix box. 3. Dip switch 5 must be set to the "on" position. 4. "Autobaud" setting must be disabled.
Entry denied on valid badges	Panel memory in the software configuration must match the physical memory on the board. If unsure of panel memory, use "display panel capacity" in the Alarm Monitoring options menu to verify proper configuration.

85 Reader Interface Modules and Reader Issues

Issue	Possible Causes:
Keypad is not responding, or "invalid badge" appears with each numeric entry	"Keypad type" in reader software configuration is incorrect. Refer to reader documentation for output format.

Issue	Possible Causes:
Reader is offline	"Reader type" in software configuration is incorrect. If using the dual interface module, be sure to specify RDR2 in the settings for RDR1. If interface module is incorrect (dual configured as a single), you will need to delete the reader entirely and add it again as a new reader. Restarting Alarm Monitoring may be necessary to view the reader online.
Reader settings have changed for no apparent reason	When using the "allow multiple selection" feature, *all* settings for the selected readers will be configured identically, *not* just the ones you modify. Use with caution.
"Invalid Card Format" alarm on magnetic cards encoded with application software	Check magnetic format setting in Badge Configuration. The sum of all field lengths should match the "total characters on track 2" setting. Verify field length setting for facility code correlates with what is being encoded on stripe.

Index

A

Alarm inputs
- general 24
- software configurable
  - LNL-1100 279
- supervised
  - LNL-1320 351
- unsupervised
  - LNL-1100 278
  - LNL-1200 290

B

Baud rate
- single reader interface module 311

Baud rate settings 273
Board components
- LNL-1100 276
- LNL-1200 288
- LNL-1300 298
- LNL-1300 Series 3 316
- LNL-1300e 325
- LNL-1320 348
- LNL-1320 Series 3B 370
- LNL-1324e 383
- LNL-2210 201
- LNL-2220 224
- LNL-3300 243
- LNL-4420 254
- LNL-M2210 90
- LNL-M2220 106
- LNL-M3300 122
- LNL-M4420 132
- LNL-X2210 148
- LNL-X2220 164
- LNL-X3300 178
- LNL-X4420 188
- Star Multiplexer 406

C

Cabinet tamper 41, 312
Command keypad
- behavior 472
- communication 459
- firmware 465
- overview 459
- status display 470
- wiring 466

Command programming 471
Configuration
- command keypad 469
- single reader interface module 308
- Star Multiplexer 409

D

Data encryption, troubleshooting 478
Device address
- single reader interface module 310

DIP switches
- command keypad 468
- control modules 272
  - baud rate 272
  - device address 272
  - encryption 272
- device address 272
- LNL-1300 310
- LNL-1300 Series 3 320
- LNL-1300e 338
- LNL-1320 Series 3B 375
- LNL-1324e 385
- setting for controller configuration web page login 65
- Star Multiplexer 409

Disable
- default user 77, 400
- SD card interface 78
- SNMP 78
- USB interface 77
- web server 77, 400
- zeroconf device discovery 77, 400

Downstream
- single reader interface module 303

Dual reader interface module (LNL-1320) 347

E

Elevator control
- LNL-1100 283
- LNL-1200 293
- LNL-1300e 340
- LNL-1320 364
- single reader interface module 307

Embedded web server configuration 65
Enable
- Aperio AH30 legacy mode port 1 77
- Aperio AH30 legacy mode port 2 78
- diagnostic logging 77
- door forced open filter 77
- gratuitous ARP 78

F

Firmware revision on device info web page 398

H

HandKey reader, LNL-1320
connection 361
Hardware installation guidelines 21

I

Input control module
LNL-1100 275
Installation
general guidelines 23
LNL-1100 278
LNL-1200 290
LNL-1300 299
LNL-1300 Series 3 315
LNL-1300e 326
LNL-1320 351
LNL-1320 Series 3B 369
LNL-1324e 381
LNL-2210 203
LNL-2220 225
LNL-3300 245
LNL-4420 255
Star Multiplexer 407
Intelligent dual reader controller
LNL-2220 223
LNL-4420 253
LNL-M2220 105
LNL-M4420 131
LNL-X2220 163
LNL-X4420 187
Intelligent single door controller
LNL-2210 201
LNL-M2210 89
LNL-X2210 147
Intelligent system controller
LNL-3300 243
LNL-M3300 121
LNL-X3300 177
IP Client 69
host communication configuration 72
MAC address 69

J

Jumpers
command keypad 469
LNL-1100 ..... 275, 280, 284
LNL-1200 294
LNL-1300 309
LNL-1300 Series 3 ..... 317, 319
LNL-1300e 337
LNL-1320 366
LNL-1320 Series 3B 375
LNL-1324e 385
LNL-2210 215
LNL-2220 236
LNL-3300 247
LNL-4420 263
LNL-M2210 92
LNL-M2220 108
LNL-M3300 123
LNL-M4420 134
LNL-X2210 149
LNL-X2220 166
LNL-X3300 179
LNL-X4420 190
Star Multiplexer 411

L

LEDs
single reader interface module 298
Lenel OpenCard
readers 451
XF100D,XF2100D,XF2110D 451
LenelProx
grounding 419
installation guidelines 418
installation kit 449
LPKP-6800 419
installation 419
specifications 422
LPKP-6840 425
installation 426
operating modes 428
specifications 429
LPLR-911 443
installation 444
specifications 449
surveillance zone 445
LPLRIN installation kit 449
LPMR-1824,LPMR-1824 MC 437
installation 437
maximum read range 440
specifications 442
LPRKP-4600 433
LPRKP-4600 installation 434
LPRKP-4600 specifications 436
LPSP-6820 422
LPSP-6820 installation 422
LPSP-6820 specifications 425
LPSR-2400 430
LPSR-2400 installation 430
LPSR-2400 specifications 433
power 418
read range 417
readers 417
wiring 419
wiring requirements 418

M

Maintenance
LNL-2210 218
LNL-2220 238
LNL-3300 249
LNL-4420 264

Maximum read range 440
Mounting
boards in enclosures 34
LNL-1300e 341
LNL-1324e 394

O

OSDP reader interface module (LNL-1324e) 395
Output control module (LNL-1200) 287
specifications 295

P

Power
general 23
LenelProx 418
LNL-1100 282
LNL-1200 292
LNL-1300 Series 3 316
LNL-1300e 328, 336
LNL-1320 363
LNL-1320 Series 3B 371
LNL-1324e 386
LNL-2210 214
LNL-2220 235
LNL-3300 246
LNL-4420 261
LNL-M2210 93
LNL-M2220 110
LNL-M3300 125
LNL-M4420 136
LNL-X2210 151
LNL-X2220 168
LNL-X3300 181
LNL-X4420 192
requirements 29
single reader interface module 307
Star Multiplexer 408

R

Reader power select
LNL-M2220 112
LNL-M4420 138
Reader wiring
LNL-1300e 328
LNL-2210 205
LNL-2220 228
LNL-4420 258
Relays
LNL-1100 281
LNL-1200 291
LNL-1300e 335
LNL-1324e 390
single reader interface module 302
RS-485 general overview 25

S

Single door IP interface module
LNL-1300e 325
Single door IP interface module (LNL-1300e)
input circuit wiring 335
jumpers 337
maintenance 342
public DHCP addressing 338
static IP addressing 338
System Administration
configuration of 340
Single reader interface module
board components 298
cabinet tamper 312
configuration 308
device address 310
downstream reader communication 303
elevator control 307
eol termination 312
interfaces 297
jumpers 309
LEDs 298
overview 297
power 307
relay outputs 302
specifications 312
supervised alarm inputs 299
upstream controller communication 300
wiring 299
SNMP
enable for LNL-1324e 400
Specifications
command keypad 474
LNL-1100 285
LNL-1300 312
LNL-1320 366
LNL-1320 Series 3B 378
LNL-1324e 391
LNL-2210 219
LNL-2220 240
LNL-3300 251
LNL-4420 266
LNL-M2210 100
LNL-M2220 117
LNL-M3300 128
LNL-M4420 142
LNL-X2210 158
LNL-X2220 173
LNL-X3300 184
LNL-X4420 197
Star Multiplexer 411
Star Multiplexer 405
Status LEDs
LNL-1100 277
LNL-1200 289
LNL-1300 298
LNL-1300 Series 3 321

LNL-1300e 342
LNL-1320 350
LNL-1320 Series 3B 377
LNL-1324e 391
LNL-2210 218
LNL-2220 238
LNL-3300 249
LNL-4420 264
LNL-M2210 98
LNL-M2220 115
LNL-M3300 127
LNL-M4420 141
LNL-X2210 156
LNL-X2220 172
LNL-X3300 183
LNL-X4420 196
Star Multiplexer 406
Supervised alarm inputs
single reader interface module 299

T

Termination
general 28
Star Multiplexer 409
Troubleshooting 477
intelligent controller issues 478
reader interface and reader issues 478

U

Upstream
single reader interface module 300

W

Web page configuration for intelligent controllers 65
apply and save settings 82
auto save settings 78
auxiliary authentication for LNL-4420 and LNL-X4420 83
display device information 74, 398
EntryPoint Embedded Authentication 85
firmware revision 398
HID pivCLASS embedded authentication 83
host communication settings 69
load security certificates 79
log out 83
network settings 68
restore settings 82
security settings 82
server busy error 67, 397
Time server, external 77
user accounts 74
create or edit 75
delete 76
user limit 67, 397
Wiring
command keypad 466
communication
LNL-1300 Series 3 319
LNL-1300e 328
LNL-1320 Series 3B 371, 375
LNL-1324e 386
LNL-2210 204
LNL-2220 227
LNL-3300 245
LNL-4420 258
considerations 29
control output wiring
LNL-1320 355
downstream communication
LNL-1300 303
LNL-1320 356
Star Multiplexer 408
F/2F
LNL-1300e 330
LNL-1320 357
LNL-2210 207
LNL-2220 229
LNL-X2210 147
LNL-X2220 163
LNL-X4420 187
LenelProx 418, 419
LNL-1100 278
LNL-1200 290
LNL-1300 299
LNL-1300 Series 3 317
LNL-1300e 327
LNL-1320 351
LNL-1324e 384
LNL-2210 204
LNL-2220 226
LNL-4420 256
multiple OSDP
LNL-1320 361
LNL-1324e 387
OSDP
4420 259
LNL-1300 307
LNL-1300 Series 3 ..... 316, 317, 318
LNL-1300e 334
LNL-1320 361
single reader interface module 299
Star Multiplexer 407
supervised inputs to F/2F reader 305, 306
upstream communication
LNL-1100 280
LNL-1200 290
LNL-1300 300
LNL-1320 353
Star Multiplexer 407



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