METASYS®

Circuit/Device Ratings and Connections

About This Manual **Page 3**

- *Location of Content Changes* *3*
- *Supported Products* *3*

Circuit/Device Ratings and Connections **5**

- *Wiring Requirements* *5*
- *Design Considerations* *5*
- *LIB SLC Loop Wiring Requirements* *6*
- *Ratings and Connections* *7*

Application and Clarification Notes **17**

- *Note 7: LIB SLC Loop Wiring Requirements* *18*

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About This Manual

Location of Content Changes

The product that this document supports is UL (Underwriter's Laboratories) Multiple Listed, which requires that the content of the documentation inherited from the manufacturer remain intact. In developing this document, minor changes have been made that clarify information such as vendor-specific product names and literature names and numbers. More significant changes to the original technical content, such as additions or corrections, are identified with Note Numbers **Nx**. For the Note content, refer to the *Application and Clarification Notes* section at the end of this document.

Supported Products

This document may contain references to some products that are not supported in Metasys® Release 9.01 or earlier releases. If you are using one of these releases, please ignore references to the following products:

- NAM-232
- LIB-200A
- LIB-400
- SIB-2048A

Also, the AVPS-24 and AVPS-24E have been replaced by the APS-6R.

Circuit/Device Ratings and Connections

Wiring Requirements

This document outlines the various circuits and devices that can be employed with the IFC-1010/2020.

Design Considerations

Each circuit type within an IFC-1010/2020 Fire Alarm Control System has a specific type of wire that must be used to ensure proper operation. In addition, the wire gauge of a particular circuit is contingent on the length of that circuit or the amount of cable used in the circuit. Use Table 1 to determine the specific wiring requirements for each circuit.

Notes: If the Signaling Line Circuit (SLC) loop is to be run in conduit or in close proximity with notification appliance circuits, the risk of encountering problems can be greatly reduced by using the LIB-200A[N5] or LIB-400[N5] or exclusively employing electronic sounders (such as the P2415W) instead of more electronically noisy notification appliances such as electromechanical bells or horns. Voice speakers operating at no more than 25 VRMS may also be run with SLC.

To comply with the Federal Communications Commission (FCC) regulations on electrical energy radiation when using the LIB-200, any wire entering or exiting the IFC-1010/2020 cabinet that is not in a conduit must be of the twisted-shielded type.[N6] For termination of the LIB-200 SLC loop shield, refer to the installation section of the manual originally supplied with the LIB-200.

LIB SLC Loop Wiring Requirements[N7]

Table 1: Wiring Selection Chart [N1, N2]

Circuit Type	Circuit Functions	Wire Requirements	Distance (feet)	Typical Wire Type
LIB-200 SLC Loop	Connects to addressable detectors, modules, and to XP Transponders	Twisted-shielded pair, 12 to 18 AWG. 40 ohms maximum per length of Style 6 and 7 loops. 40 ohms per branch maximum for Style 4.	10,000 8,000 4,875 3,225	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975
LIB-200A[N5] or LIB-400[N5] SLC Loop	Connects to intelligent and addressable modules, and to XP Transponders	Twisted unshielded or shielded pair, 12 to 18 AWG. 50 ohms maximum per length of Style 6 and 7 loops. 50 ohms per branch maximum for Style 4 loops.	12,500 9,500 6,000 3,700	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975
EIA-485[N3]	Connects to AMG-1 and to Annunciator Control System (ACS) Modules	Twisted-shielded pair with a characteristic impedance of approximately 120 ohms. 18 AWG minimum.	6,000 6,000 6,000 4,000	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975
EIA-232	Connects to CRTs and remote printer	Twisted-shielded pair. 18 AWG minimum.	See EIA-232D Standard	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975
M50xMJ XPM-8	Initiating Device Circuit	12 to 18 AWG. Maximum loop wire resistance is 20 ohms (M500MJ, M501MJ) or 100 ohms (XPM-8).	5,000 4,000 2,438 1,613	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975
M5x0CJ XPC-8	Notification Appliance Circuit (NAC)	12 to 18 AWG. MPS-24A: At alarm current level, no more than a 1.2 volt drop at the end of the circuit.	Installer Calculations Required	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975
Power Runs	To M5x0CJs To XPC-8s	12 to 18 AWG. Size wire so that no more than 1.2 volt drop across wire run from supply source to end of any branch.	Installer Calculations Required	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975
Power Runs	To annunciators	12 to 18 AWG. Size wire so that no more than 2.4 volts drop across wire run from supply source to end of any branch.	Installer Calculations Required	Belden 9583 (12 AWG) West Penn 999 Belden 9581 (14 AWG) West Penn 995 Belden 9575 (16 AWG) West Penn 991 Belden 9574 (18 AWG) West Penn 975

Ratings and Connections

Use this section as a reference guide. It outlines the various circuits and devices that can be employed with the IFC-1010/2020.

Table 2: Circuit Ratings/Connections

Type of Circuit	Devices/Ratings	Circuit Ratings	Connections
Main Supply Circuit: **A dedicated branch of the AC service that supplies primary AC power to the Fire Alarm Control Panel (FACP).**	MPS-24A Main Power Supply	120 VAC, 50/60 Hz, 1.8 A	TB1: Terminals 2 + 3 (Ground) Terminals 4 + 5 (Neutral) Terminals 6 + 7 (Hot)
	MPS-24B Main Power Supply	120 VAC, 50/60 Hz, 1.8 A	TB1: Terminal 2 (Ground) Terminal 3 (Neutral) Terminal 4 (Hot)
	AVPS-24 Audio/Visual Power Supply	120 VAC, 50/60 Hz, 1.0 A	TB1: Terminals 1 + 6 (Ground) Terminal 4 (Neutral) Terminal 5 (Hot)
	APS-6R Auxiliary Power Supply	120 VAC, 50/60 Hz, 2.5 A 240 VAC, 50 Hz, 1.2 A	TB1: Terminal 3 (Ground) Terminal 2 (Neutral) Terminal 1 (Hot)
	AA-30 Audio Amplifier	120 VAC, 50/60 Hz, 1.0 A	Plug P2: Terminals 1 + 8 (Ground) Terminals 3 + 4 (Neutral) Terminals 5 + 6 (Hot)
	AA-100/AA-120 Audio Amplifier	120 VAC, 50/60 Hz, 1.85 A	Plug P2: Terminals 1 + 8 (Ground) Terminals 5 + 6 (Neutral) Terminals 3 + 4 (Hot)
Main Supply Circuit: **A dedicated branch of the AC service that supplies primary AC power to the fire alarm control panel.**	MPS-24AE Main Power Supply	220/240 VAC, 50/60 Hz, 0.9 A	TB1: Terminals 2 + 3 (Ground) Terminals 4 + 5 (Neutral) Terminals 6 + 7 (Hot)
	MPS-24BE Main Power Supply	220/240 VAC, 50/60 Hz, 0.9 A	TB1: Terminal 2 (Ground) Terminal 3 (Neutral) Terminal 4 (Hot)
	AVPS-24E Audio/Visual Power Supply	220/240 VAC, 50/60 Hz, 0.5 A	TB1: Terminals 1 + 6 (Ground) Terminal 4 (Neutral) Terminal 5 (Hot)
	AA-30E Audio Amplifier	220/240 VAC, 50/60 Hz, 0.5 A	Plug P2: Terminals 1 + 8 (Ground) Terminals 3 + 4 (Neutral) Terminals 5 + 6 (Hot)
	AA-100E/AA-120E Audio Amplifier	220/240 VAC, 50/60 Hz, 0.9 A	Plug P2: Terminals 1 + 8 (Ground) Terminals 5 + 6 (Neutral) Terminals 3 + 4 (Hot)
Continued on next page . . .			

Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
Battery Charger Circuit: **Charges and maintains the secondary supply during non-fire alarm conditions.**	MPS-24A and MPS-24E Main Power Supplies and two PS-12260 (12 volt, 60 AH) Batteries	27.6 VDC. Float type battery charger (2.0 A maximum). Supervised and power-limited.	TB2: Terminal 1 (+) Terminal 2 (-)
	MPS-24B and MPS-24BE Main Power Supplies	27.6 VDC. Float type battery charger (750 mA maximum). Supervised and power-limited.	TB2: Terminal 5 (+) Terminal 6 (-)
	NR45-24 and NR45-24E Remote Battery Chargers with two LA-55 (12 volt, 55 AH) Batteries	27.6 VDC. Float type battery charger (2.0 A maximum). Supervised and power-limited.	TB1: Terminal 3 (+) Terminal 4 (-)
	CHG-120 Battery Charger. Charges two PS-121000 (100 ampere-hour) Batteries or four PS-12600 Batteries in series-parallel combination (120 ampere-hour Batteries)	27.6 VDC. Float type battery charger (4.5 A maximum). Supervised and power-limited.	TB2: Terminal 5 (-) Terminal 6 (+)
Battery Discharge Circuit **or** **Secondary Power Input:** **Supplies power to the fire alarm control panel during loss of primary AC power.**	AA-30 or AA-30E Audio Amplifier	3.0 A maximum draw in alarm. 25.0 A maximum screw terminal contact rating. Supervised. Battery leads are not power-limited.	Plug P1: Terminal 1 (+) Terminal 4 (-)
	AA-100/AA-120 or AA-100E/AA-120E Audio Amplifier	7.3 A maximum draw in alarm. 25.0 A maximum screw terminal contact rating. Supervised. Battery leads are not power-limited.	Plug P1: Terminals 3 + 4 (+) Terminals 1 + 2 (-)
	AVPS-24 or AVPS-24E Audio Visual Power Supply	3.0 A maximum draw in alarm. 25.0 A maximum screw terminal contact rating. Supervised. Battery leads are not power-limited.	TB1: Terminal 2 (+) Terminal 3 (-)
	APS-6R Auxiliary Power Supply	6.0 A maximum, draw in alarm. Battery leads are not power-limited. Supervised.	TB1: Terminal 1 (+) Terminal 2 (-)
	MPS-24A or MPS-24AE Main Power Supply	6.0 A maximum draw in alarm. 25.0 A maximum screw terminal contact rating. Supervised. Battery leads are not power-limited.	TB2: Terminal 1 (+) Terminal 2 (-)
	MPS-24B or MPS-24BE Main Power Supply	2.9 A maximum draw in alarm. 25.0 A maximum screw terminal contact rating. Supervised. Battery leads are not power-limited.	TB2: Terminal 5 (+) Terminal 6 (-)

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Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
Notification Appliance Power: **Provides power for NACs and remote signaling devices**	MPS-24A or MPS-24AE Main Power Supply; use with any UL Listed 24 VDC fire alarm notification appliance.	20.4 - 26.4 VDC (3.0 A maximum) Power-limited and supervised.	TB3 Terminal 3 (+) Terminal 4 (-)
	MPS-24B or MPS-24BE Main Power Supply; use with any UL Listed 24 VDC fire alarm notification appliance.	20.4 - 26.4 VDC (2.0 A maximum or regulated current available in alarm only). Power-limited and supervised with a UL Listed relay.	TB2: Terminal 3 (+) Terminal 4 (-)
	AVPS-24 or AVPS-24E Audio/Visual Power Supply. Note: See the list of compatible devices in *Device Compatibility Technical Bulletin (LIT-445130).*	20.4 - 32.0 V_{RMS} (6.0 A maximum). Full-wave, unfiltered. Power-limited and supervised.	TB2 – 1 (+) TB2 – 2 (-) TB2 – 3 (+) TB2 – 4 (-)
	APS-6R Auxiliary Power Supply; use with any UL Listed VDC fire alarm notification appliance.	20.4 - 32.0 V_{RMS} (6.0 A maximum). Power-limited and supervised.	TB2: Terminals 1, 3 (+) Terminals 2, 4 (-)
External Resettable Power	MPS-24A or MPS-24AE Main Power Supply	20.4 - 26.4 VDC (200 mV ripple), 1.0 A maximum (draws from the total of 3.0 A of MPS-24A regulated current available in standby or 6.0 A available in alarm). Power-limited and supervised with an A77-716B relay. Note: Optional jumper selectable.	TB3: Terminal 1 (+) Terminal 2 (-)
	FCSP-24	20.4 - 26.4 VDC (200 mV ripple), 2.0 A maximum (draws from the total of 3.0 A of MPS-24A regulated current available in standby or 6.0 A available in alarm). Power-limited and supervised with an A77-716B relay. Note: Optional jumper selectable.	TB3: Terminal 3 (+) Terminal 4 (-)
	MPS-24B or MPS-24BE Main Power Supply	20.4 - 26.4 VDC (200 mV ripple), 200 mA maximum (draws from the total of 750 mA of regulated current available in standby and alarm. Power-limited and supervised with a UL Listed relay.	TB2: Terminal 1 (+) Terminal 2 (-)
Municipal Box Circuit	M5x0CJ Control Module with an MBT-1 Municipal Box Trip Device and an A77-716B Power Supervision Relay	Local Energy Municipal Box connection. Supervised and power-limited (3.65 VDC nominal). (10 ohms maximum loop resistance. Trip current = 250 mA).	Refer to *Planning Considerations* in the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196).*
	XP Transponder XPC-8 Module with an MBT-1 Municipal Box Trip Device	Local Energy Municipal Box connection. Supervised and power-limited. (3.65 VDC nominal). (10 ohms maximum loop resistance. Trip current = 250 mA).	Refer to *Appendix A: NFPA Standard-Specific Requirements* in the *XP Transponder Technical Bulletin (LIT-448180).*

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Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
Notification Appliance Circuit: **A circuit or path directly connected to a notification appliance..**	M5x0CJ Control Module fed from an MPS-24A/MPS-24AE, MPS-24B/MPS-24BE, AVPS-24/AVPS-24E, APS-6R or other 24 VDC power supplies listed for fire protective signaling. Note: See the list of AVPS-24/AVPS-24E compatible devices in the *Device Compatibility Technical Bulletin (LIT-445180.*)	Operating voltage supplied dependent on the signal power source employed. ELR-47K, 1/2 watt, Part Number 47K (N-ELR) in Canada. NFPA Style Y or Style Z field wiring. Maximum Load is 2 A Resistive @ 24 VDC. Most notification appliances are resistive. Certain electromechanical devices exhibit inductive loading characteristics. For these types of devices, derate the outputs to 1 A @ 30 VDC (0.6 pf). Size wiring for no more than 1.2 volt drop at last device on circuit. Supervised. Power-limiting is a function of the power source.	NFPA Style Y Activated Polarity M5x0CJ Terminals 6 (+), 7 (-) NFPA Style Z Activated Polarity M5x0CJ Terminals 6, 9 (+); 7, 8 (-)
	XP Transponder XPC-8 Module fed from an MPS-24A/ MPS-24AE, MPS-24B/ MPS-24BE, APS-6R, or other 24 VDC listed power supply. Note: See the list of AVPS-24/AVPS-24E compatible devices in the *Device Compatibility Technical Bulletin (LIT-445180.)*	Operating voltage supplied dependent on the signal power source employed. ELR-47K, 1/2 watt, Part Number R-47K (N-ELR) in Canada. NFPA Style Y or Style Z field wiring. Maximum Load is 2 A Resistive @ 24 VDC. Most notification appliances are resistive. Certain electromechanical devices exhibit inductive loading characteristics. For these types of devices, derate the outputs to 1 A @ 30 VDC (0.6 pf). Size wiring for no more than 1.2 volt drop at last device on circuit. Supervised. Power-limiting is a function of the power source.	NFPA Style Y Activated Polarity (Eight zones on XPC-8 P2): Terminal 1 (+), 2 (-); 3 (+),4 (-); 5 (+), 6 (-); 7 (+), 8 (-); 9 (+), 10 (-); 11 (+), 12 (-); 13 (+),14 (-); 15 (+), 16 (-). NFPA Style Z Activated Polarity (Four zones on XPC-8 P2): Terminal 1, 3 (+), 2, 4 (-); 5, 7 (+), 6, 8 (-); 9, 11 (+), 10, 12 (-); 13, 15 (+), 14, 16 (-).
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Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
Speaker Circuits	M500CJ Control Module fed from an AA-30/AA-30E, AA-100/AA-100E or AA-120/AA-120E	Operating voltage dependent on amplifier employed. Maximum of 40 microseconds total speaker leakage current due to coupling capacitors. 48 watts maximum @ 25 VRMS maximum. ELR = 47K, 1/2 watt, Part Number A2143-20 (N-ELR in Canada). Maximum line resistance dependent upon wattage required at each speaker. NFPA Style Y field wiring. Supervised. Power-limiting is a function of the signaling power source.	NFPA Style Y supervised polarity: M5x0CJ Terminals 7 (+), 6 (-).
	M510CJ Control Module fed from an audio amplifier. Model A2143-20 Coupling Capacitor (10 microseconds leakage maximum) is required for NFPA Style Z connection. Refer to the M510CJ in *Installation Procedures section* in the *500 Series Intelligent Modules Technical Bulletin (LIT-408100).*	Operating voltage dependent on amplifier employed. 43.75 watts maximum, up to 70.7 VRMS. Maximum of 40 microseconds total speaker leakage current due to coupling capacitors. ELR = 47K, 1/2 watt, Part Number A2143-00 (N-ELR in Canada). Maximum line resistance dependent upon wattage required at each speaker. NFPA Style Y or Z field wiring. Supervised. Power-limiting is a function of the signaling power source.	NFPA Style Y supervised polarity: M5x0CJ Terminals 7 (+), 6 (-) NFPA Style Z supervised polarity: M5x0CJ Terminals 7, 8 (+); 6, 9 (-).
	XP Transponder XPC-8 Module fed from an audio amplifier.	Operating voltage dependent on amplifier employed. 48 watts maximum @ 70.7 VRMS maximum ELR = 47K, 1/2 watt, Part Number R-47K (N-ELR in Canada). Maximum line resistance dependent upon wattage required at each speaker. NFPA Style Y or Style Z field wiring. Supervised. Power-limiting is a function of the signal source.	NFPA Style Y supervised polarity (Eight zones on XPC-8 P2): Terminal 1 (-), 2 (+); 3 (-), 4 (+); 5 (-), 6 (+); 7 (-), 8 (+); 9 (-), 10 (+); 11 (-), 12 (+); 13 (-), 14 (+); 15 (-), 16 (+). NFPA Style Z supervised polarity (Four zones on XPC-8 P2): Terminal 1, 3 (-), 2, 4 (+); 5, 7 (-), 6, 8 (+); 9, 11 (-), 10, 12 (+); 13, 15 (-), 14, 16 (+).

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Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
Speaker Power (High-Level Audio)	AA-30/AA-30E, AA-10/AA-100E or AA-120/AA-120E Audio Amplifier feeding signal to a M5x0CJ Control Module or an XP Transponder XPC-8 Module. Use only UL Listed speakers rated for a minimum 25 VRMS (30 watts maximum with AA-30/AA-30E, 120 watts maximum with AA-120/AA-120E) or 70.7 VRMS minimum when using the AA-100/AA-100E (100 watts maximum).	25 VRMS audio amplifier output (70.7 VRMS for AA-100/AA-100E.) AA-30/AA-30E: 30 watts maximum. AA-120/AA-120E: 120 watts maximum. AA-100/AA-100E: 100 watts maximum. Frequency response: 800 Hz to 2,800 Hz. Two wire high level audio circuit is not supervised. Four wire high level audio circuit is supervised. AA-30/AA-30E, AA-100/AA-100E and AA-120/AA-120E are power-limited. Maximum wiring distance limited by wattage required at each speaker.	AA-30/AA-30E, AA-100/AA-100E, and AA-120/AA-120E Connector P6 to XPC-8 Connector P3. AA-30/AA-30E Connector P6 (or P8.5 (-) and P8.6 (+) to M5x0CJ Terminal 3 (-) and 4 (+). Wire optional supervisory return loop from M5x0CJ Terminal 3 (-) and 4 (+) to AA-30/AA-30E Connector P7 or P8.2 (-), P8.3 (+), or AA-120/AA-120E P8.2 (-), 8.3 (+). AA-100/AA-100E: connect 25 VRMS output P7.3 and P7.4 to transformer input P7.1 and P7.2 to obtain 70.7 VRMS output at P8.7 and P8.8. Connection not supervised.
Common Telephone Riser (FFT to XPC)	FFT-7/FFT-7S Fire Fighters Telephone to an XP Transponder XPC-8 Module	24 VDC (nominal), 1-VRMS maximum. 800 Hz to 2,800 Hz. Seven telephone handsets active at one time maximum including Master Telephone. Supervised and power-limited. Two wire circuit supervised via 27K ELR, Part Number R-27K (N-ELR for Canada). Optional return loop for four wire circuit. Maximum wiring resistance (including individual telephone zone to last handset) permitted is 40 ohms. 10,000 ft. maximum wiring distance at 12 AWG to last handset.	FFT-7/FFT-7S Connector P3 Terminal 3 (+) and 2 (-) to XPC-8 Connector P3.2 (+), P3.1 (-), and/or P4.2 (+), P4.1 (-), P5.2 (+), P5.1 (-), P6.2 (+), P6.1 (-), P7.2 (+), P7.1 (-), P8.2 (+), P8.1 (-), P9.2 (+) P9.1 (-), P10.2 (+), P10.1 (-). Optional four wire redundant return to FFT-7/FFT-7S Connector P3 Terminal 6 (+) and 5 (-) to XPC-8 Connector P10.
Individual Telephone Zones (XPC to Telephone Jacks)	XP Transponder XPC-8 Module fed from an FFT-7/FFT-7S: Employs phone jacks APJ-1 and FPJ; Firemans Handset FHS-1; Firemans Handset; AFAWS Series Enclosures.	No telephone jack maximum per circuit. Two wire circuit supervised via a 47K ELR, Part Number R-47K (N-ELR in Canada). No outboard ELR for four wire supervised circuit. Maximum resistance due to wiring is 40 ohms from FFT-7 to termination of the telephone circuit. Power limitation is a function of the signal source employed.	Two wire circuits (Eight telephone circuits on XPC-8 P2): Terminal 1 (-) 2 (+); 3 (-), 4 (+); 5 (-), 6 (+); 7 (-), 8 (+); 9 (-),10 (+); 11 (-), 12 (+); 13 (-), 14 (+); 15 (-), 16 (+). Four wire circuits (Four telephone circuits on XPC-8 P2): Terminal 1, 3 (-); 2, 4 (+); 5,7 (-); 6, 8 (+); 9,11 (-); 10,12 (+); 13, 15 (-); 14, 16 (+).
Continued on next page . . .			

Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
Low Level Audio Riser **(AMG-1, AMG-E or ATG-2 to AA-30/AA-30E, AA-100/AA-100E or AA-120/ AA-120E)**	AA-30/AA-30E, AA-100/AA-100E, AA-120/AA-120E ATG-2/ACT-1 fed from an AMG-1, AMG-E, ATG-2 Audio Message/Tone Generator	Power-limited/ supervised. 10,000 feet maximum distance at 12 AWG wire.	Internal two wire: AMG-1 P5 to AA-30 P2. External two wire: AMG-1 P4, Terminals 4 (-) and 5 (+) to AA-30 P3, Terminals 4 (-) and 5 (+). External four wire: Include return from AA-30 P8, Terminals 5 (-) and 6 (+) to AMG-1 P4, Terminals 1 (-) and 2 (+).
Form-C Dry Contacts	XP Transponder XPP-1: Dual Form-C Alarm and Trouble Relays	2 A resistive @ 30 VDC. 1 A inductive (0.6 pf) @ 24 VDC. Not supervised. Power limitation is a function of the signal source applied.	Refer to *XPP-1* in the *XP Transponder Technical Bulletin* (*LIT-448180).*
	XP Transponder XPR-8 : Eight Form-C Relays or Four Dual Form-C Relays	2 A resistive @ 30 VDC. 1 A inductive (0.6 pf) @ 24 VDC. Not supervised. Power limitation is a function of the signal source applied.	Refer to *XPR-8* in the *XP Transponder Technical Bulletin (LIT-448180).*
	M500CJ: One Form-C Relay	2 A resistive @ 30 VDC. 1A inductive (0.6 pf) @ 30 VDC.	Power: Terminal 2 (+), Terminal 1 (-) Normally open contacts use Terminal 4; normally closed contact use Terminal 5; common use Terminal 6 Break tabs for Form C-Relay.
	M510CJ: One Form-C Relay	2 A resistive @ 30 VDC. 1 A inductive (0.6 pf) @ 30 VDC. Pilot Duty: 0.6 A @ 30 VDC (0.35 pf); 0.3 A @ 110 VDC (0.35 pf); 0.3 A @ 120 VAC (0.365 pf)	Power: Terminal 2 (+), Terminal 1 (-) Normally open contacts use Terminal 4; normally closed contact use Terminal 5; common use Terminal 6. Break tabs for Form C-Relay.
LIB-200 SLC Loop: N2 **A circuit or path directly over which multiple signals are transmitted and received.**	LIB-200 Board: Employs intelligent detectors and addressable modules – 2551J, 2551THJ, 5551J, 1551HJ, M500MJ, M502MJ, M501MJ, M500CJ, M510CJ, BGX-101L, XPP- M500XJ. Ten SLC loops maximum per IFC-2020 system, four per IFC-1010. **N5**	24 volts DC nominal, 27.6 volts DC maximum. Maximum length is 10,000 ft. per channel (NFPA Style 4) or 10,000 ft. total twisted-shielded pair length (NFPA Style 6 and 7). Maximum loop current is 200 mA (short circuit) or 100 mA (normal). Maximum loop resistance is 40 ohms. Supervised and power-limited.	NFPA Style 4: LIB-200 Channel A – Terminal. 1 (+), 3 (-); Channel B – Terminal. 5 (+), 7 (-). NFPA Style 6, 7: LIB-200. Terminal. 1, 5 (+); 3, 7 (-).
Continued on next page . . .			

Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
LIB-200A and LIB-400 SLC Loop: **A circuit or path directly over which multiple signals are transmitted and received.**	LIB-200A/LIB-400 Board: Employs detectors and addressable modules - 2551J, 2551THJ, 5551J, 1551HJ, M500MJ, M502MJ, M501MJ, M500CJ, M510CJ, BGX-101L, XPP-1, M500XJ. Ten SLC loops maximum per IFC-2020 system, four per IFC-1010.**N5**	24 volts DC nominal, 27.6 volts DC maximum. Maximum length is 12,500 ft. per channel (NFPA Style 4) or 12,500 ft. total twisted-shielded pair length (NFPA Style 6 and 7). Maximum loop current is 200 mA (short circuit) or 100 mA (normal). Maximum loop resistance is 50 ohms. Supervised and power-limited	NFPA Style 4: LIB-200 Channel A – Terminal 1 (+), 3 (-); Channel B – Terminal 5 (+), 7 (-). NFPA Style 6, 7: LIB-200. Terminal 1, 5 (+); 3, 7 (-).
Metasys Fire Network SLC Loop: **A series of modules and products which allow a group of Fire Alarm Control Panels (FACPs) and other control equipment to connect, forming a true peer-to-peer network.**	MIB-W: Media Interface Board used to connect nodes with twisted-pair wire	NFPA Style 4 (Class B). 312.5 K baud transmission rate. Refer to the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196)* for distance limits.	Port A: TB - 1 and 2 Port B: TB - 3 and 4
	MIB-F: Media Interface Board used to connect nodes with fiber optic cable	NFPA Style 4 (Class B). Fiber Type: 62.5/125 micrometers. Wave length: 820 nanometers. Maximum Attenuation: 10 dB. 312.5 K baud transmission rate	Port A: U1 (Tx), U5 (Rx) Port B: U2 (Tx), U3 (Rx)
	MIB-WF: Media Interface Board used to connect from twisted-pair wire to fiber or fiber to twisted-pair wire at any network node	NFPA Style 4 (Class B). 312.5 K baud transmission rate. Port A - refer to the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196).* Port B - Fiber Type: 62.5/125 micrometers, Wave length: 820 nanometers, Maximum Attenuation: 10 dB.	Port A (wire): TB1 - 1 and 2 Port B (fiber): U2 (Tx), U3 (Rx)
	RPT-W: Repeater used to boost the data signal between network nodes supporting twisted pair wire only	NFPA Style 4 (Class B). Fiber Type: 312.5 K baud transmission rate. Refer to the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196)* for distance limits.	Port A: TB: 1 and 2 Port B TB: 3 and 4
	RPT-F: Repeater used to boost the data signal between network nodes supporting fiber optic cable	NFPA Style 4 (Class B). Fiber Type: 62.5/125 micrometers. Wave Length : 820 nanometers. Maximum Attenuation: 10 dB. 312.5 K baud transmission rate	Port A: U14 (Tx), U11 (RX) Port B: U15 (Tx), U12 (RX)
	RPT-WF: Repeater used to boost the data signal between network nodes supporting both twisted-pair wire and fiber optic cable	NFPA Style 4 (Class B). 312.5 K baud transmission rate. Refer to the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196)* for distance limits.	Port A (wire) - TB1 - 1 and 2 Port B (fiber) – U15 (Tx), U12 (Rx)

Continued on next page . . .

Type of Circuit (Cont.)	Devices/Ratings	Circuit Ratings	Connections
	NAM-232W: Network Adapter Module functioning as an interface between the IFC-200 FACP and the Fire Network with fiber optic cable	NFPA Style 4 (Class B). 312.5 K baud transmission rate. Refer to the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196)* for distance limits.	Port A: TB2 - 1 and 2 Port B: TB2 - 3 and 4
	NAM-232F: Network Adapter Module functioning as an interface between the IFC-200 FACP and the Fire Network with fiber optic cable	NFPA Style 4 (Class B). Fiber Type: 62.5/125 micrometers. Wave length: 820 nanometers. Maximum Attenuation: 10 dB. 312.5 K baud transmission rate	Port A: J2 (Tx), J1 (RX) Port B: J4 (Tx), J3 (RX)
Polarity Reversal: **For connection to a polarity reversal circuit of a remote station receiving unit**	M5x0CJ Control Module (two required) with an RPT-680 Reverse Polarity Trip device	Supervised/power-limited. Maximum distance and line impedance limited by Receiving Unit Ratings.	See the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196) in* the *Planning Considerations* section.
	XP Transponder XPP-1 module with two RPT-680 Reverse Polarity Trip devices	Supervised/power-limited. Maximum distance and line impedance limited by receiving unit ratings.	See the *XP Transponder Technical Bulletin (LIT-448180).*
EIA-485 Interface and EIA-232 Interface	SIB-2048, SIB-2048A, SIB-N2, and SIB-NET Serial Interface Boards: Employ AMG-1 Audio Message Generator and annunciator modules -ACM-16AT (AEM-16AT), ACM-32A (AEM-32A).	+/- 5 volts peak-to-peak. Supervised and power-limited. 6,000 ft. maximum distance. Terminating resistor = 120 ohms, 1/4-watt (Part Number 71244). Characteristic impedance of the wiring is 120 ohms. Transmission rate of 20.833 K bps.	See the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196).*
	SIB-2048, SIB-2048A, SIB-N2, and SIB-NET Serial Interface Boards: Employ CRT-2.	+/- 12 volts peak-to-peak. Supervised and power-limited. Maximum distance limited by capacitance of wire (refer to EIA-232E Standard). Transmission rate of 2,400 bps.	See the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196).*
	SIB-2048, SIB-2048A, SIB-N2, and SIB-NET Serial Interface Boards: Employ PRN-3 and Keltron 40-column printers.	+/- 12 volts peak-to-peak. Power-limited but not supervised. Maximum distance limited by capacitance of wire (refer to EIA-232E Standard). Transmission rate of 2,400 bps.	See the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196).*
	SIB-2048 **N3**, SIB-N2, and SIB-NET Serial Interface Boards: Employ UL EDP **N4** Listed equipment (display monitors and printers).	+/- 12 volts peak-to-peak. Power-limited but not supervised. Maximum distance limited by capacitance of wire (refer to EIA-232E Standard). Transmission rate of 2,400 bps.	See the *Metasys Intelligent Fire Network Technical Bulletin (LIT-448196).*

Continued on next page . . .

Type of Circuit (Cont.)	Devices/Ratings	Circuits Ratings	Connections
Initiating Device Circuit: **A circuit to which automatic or manual signal-initiating devices are connected where the signal received does not identify the individual device being operated.**	XP Transponder XPM-8 module: Employs 2-wire smoke detectors and contact-type devices - manual pull stations, heat detectors, supervisory or waterflow switches, and 4-wire smoke detectors.	24 VDC (nominal), 200 mV ripple. ELR = 2.2K, 1/2 watt, Part Number R-2.2K (N-ELR in Canada). NFPA Style B or Style D field wiring. 100 ohms maximum loop resistance. Supervised and power-limited (50 microseconds). See the *Device Compatibility Technical Bulletin (LIT-445180)* for a list of compatible 2-wire detectors.	NFPA Style B (Eight zones on XPM-8 P2) NFPA Style D (Four zones on XPM-8 P2)
	XP Transponder XPM-8L module: Employs dry-contact type devices only - manual pull stations, heat detectors, supervisory or waterflow switches, and 4-wire smoke detectors.	24 VDC. ELR=10K, 1/2 watt, Part Number R-10K (N-ELR in Canada). NFPA Style B field wiring. 1000 ohms maximum loop resistance. Supervised and power-limited.	NFPA Style B (Eight zones on XPM-8L P2)
	M502MJ Monitor Module: Maximum of 40 M502MJ modules per LIB. Employs dry-contact type devices only - manual pull stations, heat detectors, supervisory or waterflow switches, and 4-wire smoke detectors.	24 VDC Input 12-18 AWG. See the *500 Series Intelligent Modules Technical Bulletin (LIT-408100)* for limits. Supervised. Power-limiting is a function of the 24 VDC source.	M502MJ Terminals 3 (-) and 4 (+)
		NFPA Style B or D Initiating Device Circuit 12-18 AWG 25 ohms maximum (including 24 VDC input wiring above). Supervised and power limited (90 microseconds). 3.9K, 1/2 watt end-of-line resistor required at Terminals 8 and 9 for NFPA Style D operation. See the *500 Series Intelligent Modules (LIT-408100)* for additional limits. For a list of compatible 2-wire detectors, see the *Device Compatibility Technical Bulletin (LIT-445180).*	NFPA Style B M502MJ Terminal 6 (-) and 7 (+). NFPA Style D M502MJ Terminals 6, 9 (-) and 7, 8 (+).

Application and Clarification Notes

The IFC-1010/2020 product is listed as a UL Multiple Listing, in association with its original manufacturer. This allows Johnson Controls to provide the latest products, upgrades, and updates available from the manufacturer to the customer at the fastest rate and lowest cost. To conform to this UL Multiple Listing process, this documentation must closely reflect that which is distributed by the product's original manufacturer.

To supplement the UL Multiple Listed text given in this document, the following table of descriptive Number Notes has been added.

Table 3: Note Number Reference Table

Note Number	Section	Note
N1	LIB SLC Loop Wiring Requirements	M5x0CJ is the generic term for these control modules: • M500CJ • M510CJ M50xMJ is the generic term for these monitor modules: • M500MJ • M501MJ • M502MJ
N2	LIB SLC Loop Wiring Requirements Ratings and Connections	The term "loop" is used in a general sense and does not necessarily indicate a Class A, looped circuit, unless specifically referencing Style 6/7 for an SLC, Style D for an Initiating Device Circuit (IDC), or Style Y for a Notification Appliance Circuit (NAC). In the case of the EIA-485 Annunciator Trunk circuit, the circuit is not looped. The circuit simply runs from the SIB serially (daisy-chained) through all of the devices on the circuit, to the 470-ohm end-of-line resistor located at the last device on the circuit. In the case of the EIA-485 Data Trunk circuit, used for the LCD-80 operating in Terminal mode, the circuit is actually looped from the FACP to the LCD-80s and back to the panel.
N3	LIB SLC Loop Wiring Requirements Ratings and Connections	This is the EIA-485 Annunciator Trunk circuit, not the EIA-485 Data Trunk circuit, which is associated with the LCD-80 operated in Terminal mode. See the *LCD Liquid Crystal Display Technical Bulletin (LIT-445155)* for details on the configuration parameters applicable to the EIA-485 Data Trunk circuit.
N4	Ratings and Connections	EDP was the old designation under the new UL 478 standard. The new testing standard is UL 1950, *Safety of Information Technology Equipment.*
Continued on next page . . .		

Note Number (Cont.)	Section	Note
N5	Design Considerations LIB SLC Loop Wiring Requirements Ratings and Connections Note 7: LIB SLC Loop Wiring Requirements	The LIB-200A and LIB-400 require merge firmware to operate correctly.
N6	Design Considerations	Non-shielded wire may also be used on the LIB-200 as long as the Noise Suppression Module (NSM) is used.
N7	LIB SLC Loop Wiring Requirements	Refer to *Note 7: LIB SLC Loop Wiring Requirements*, following this table.

Note 7: LIB SLC Loop Wiring Requirements

Branch Resistance Requirements

Use this procedure to determine branch resistance:

1. Short the termination point of one branch at a time and measure the DC resistance from the beginning of the channel to the end of that particular branch.
   - The total DC resistance from the LIB-200 panel to branch end cannot exceed 40 ohms.
   - The total DC resistance from the LIB-200A panel or the LIB-400 panel to branch end cannot exceed 50 ohms.
   - Refer to Figure 1 for Style 4 and Figure 2 for Style 6.
2. Repeat this procedure for all remaining branches.

Notes: Digital meters tend to produce inaccurate resistance readings due to the circuit capacitance. Use an analog meter for resistance readings.

Meters connected at the control panel measures to the end of a branch, which has the SLC conductors shorted together for the measurement.

For Each Channel Add the lengths of all the branches on one SLC loop channel.

LIB-200

(Branch A) + (Branch B) + (Branch C) + (Branch D) + (Branch E) = 3048 meters (10,000 feet) or less

On the LIB-200, this sum cannot exceed 3048 meters (10,000 feet) per channel.

LIB-200A or LIB-400^{N5}

(Branch A) + (Branch B) + (Branch C) + (Branch D) + (Branch E) = 3810 meters (12,500 feet) or less

On the LIB-200A or the LIB-400, this sum cannot exceed 3810 meters (12,500 feet) per channel.

Table 4: Maximum Wire Length

Wire Gauge	Maximum Branch Length
18 AWG	3,225 feet
16 AWG	4,875 feet
14 AWG	8,000 feet
12 AWG	10,000 feet

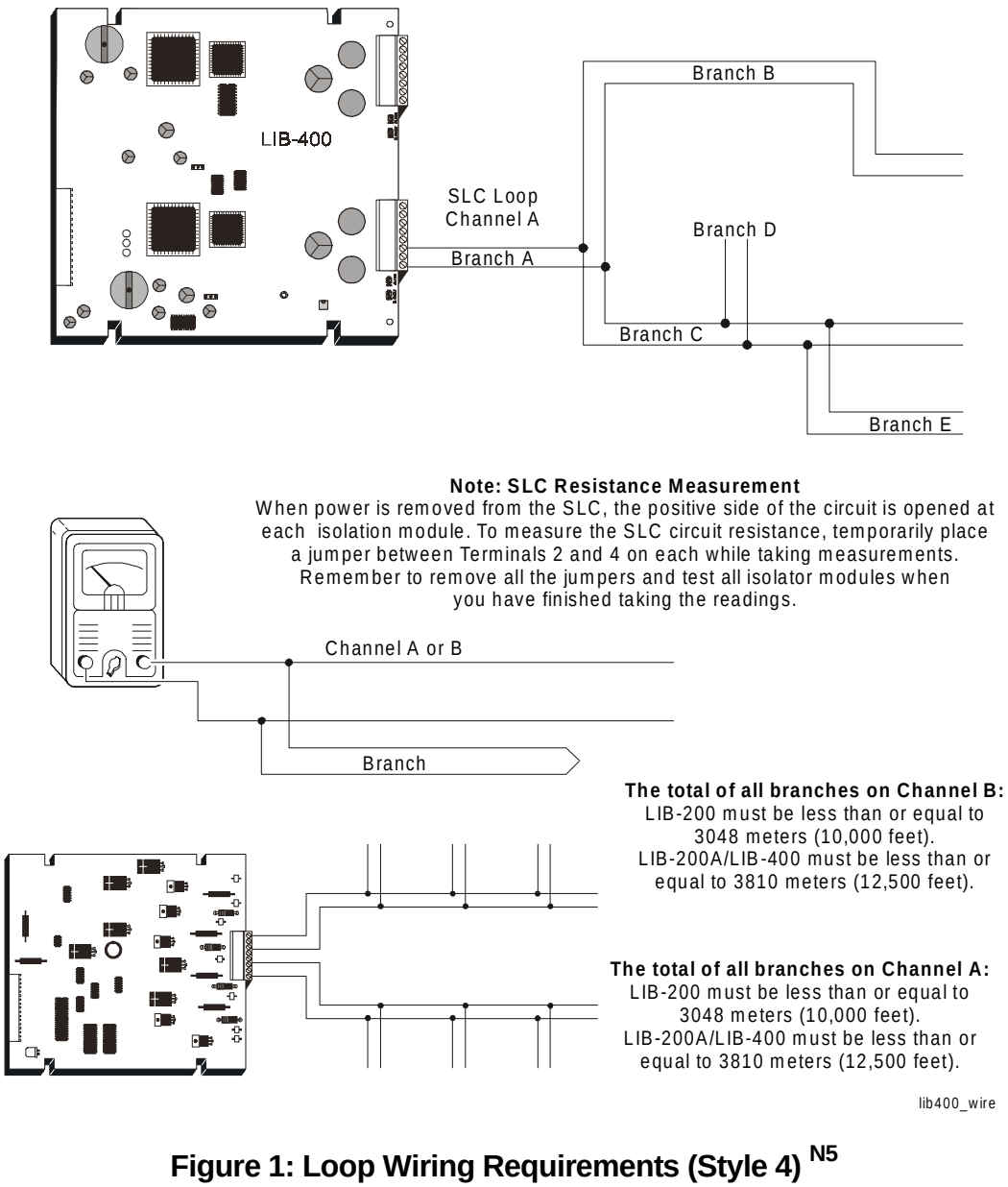
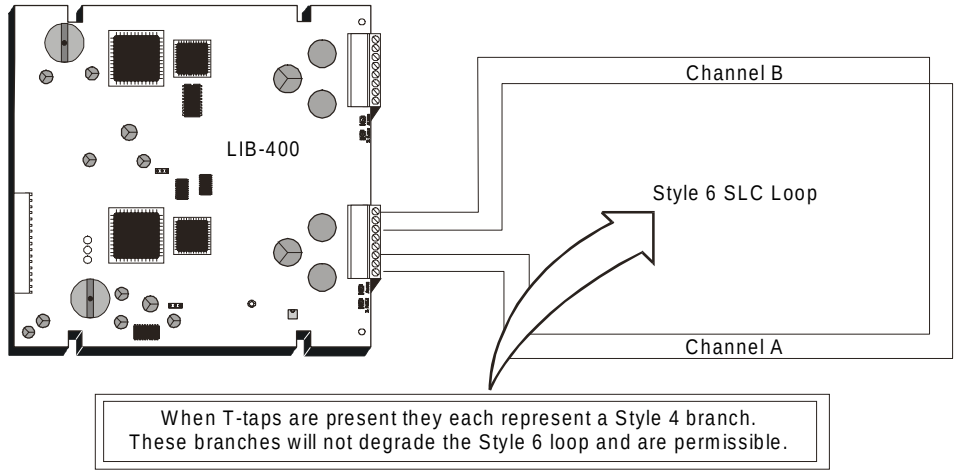
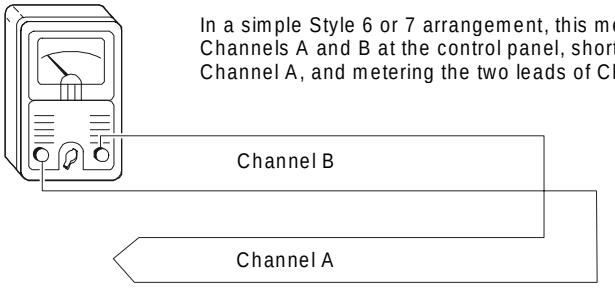


Figure 1: Loop Wiring Requirements (Style 4) N5





In a simple Style 6 or 7 arrangement, this measurement may be made by disconnecting Channels A and B at the control panel, shorting the two leads at the input of Channel A, and metering the two leads of Channel B.

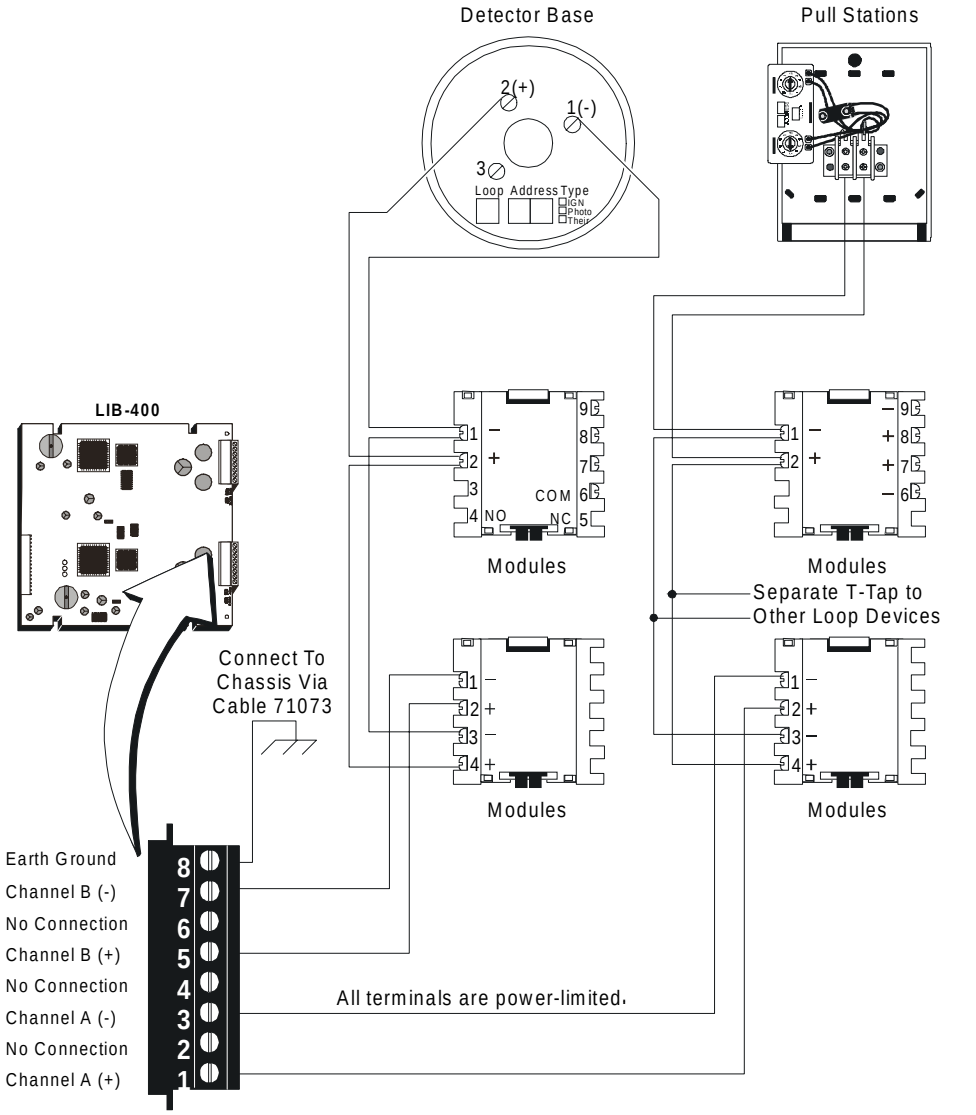
When Style 4 branches are present, complete the measurement by opening the short which was placed at the input of Channel A and perform the Style 4 measurement shown in Figure 1.

lib400_wire2

Figure 2: SLC Loop Wiring Requirements (Style 6 or 7)

Typical National Fire Protection Association (NFPA) SLC Loops

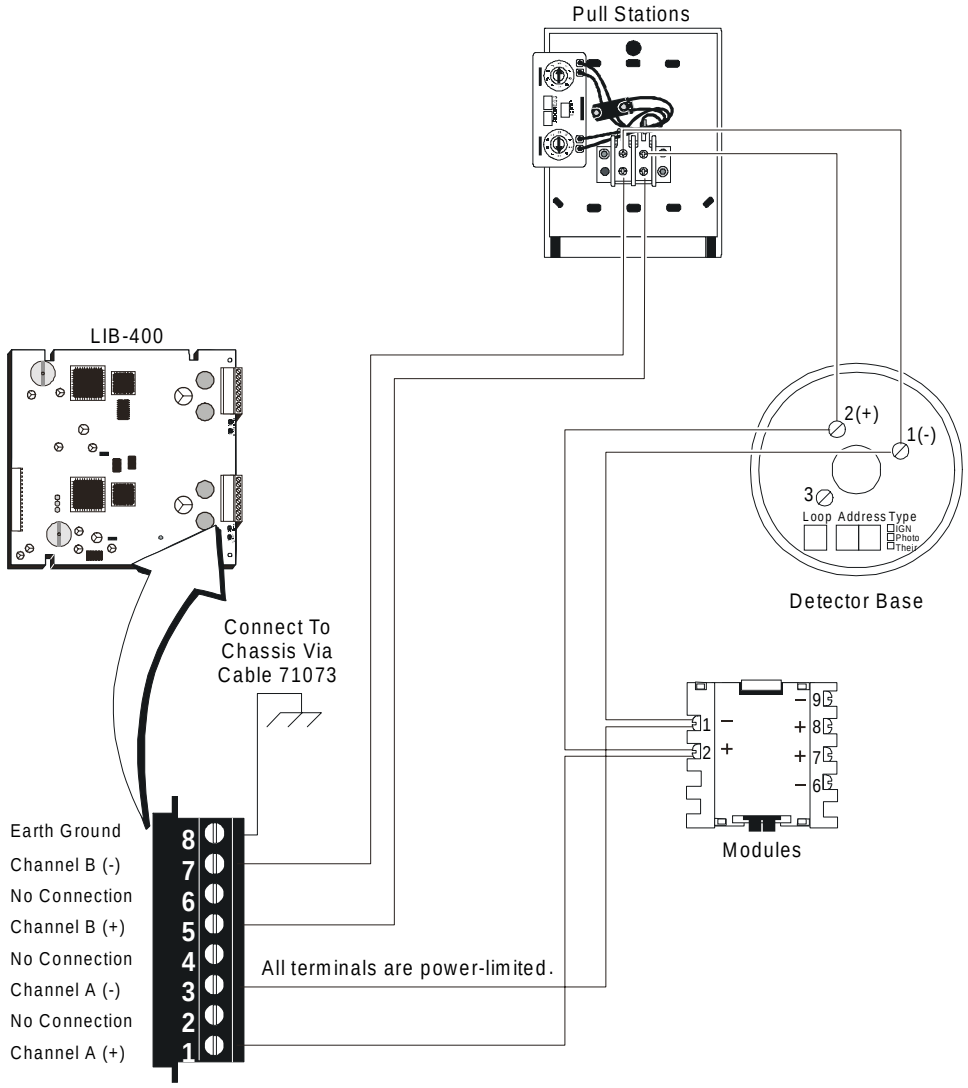
Loop Interface Board (LIB) Signaling Circuit (SLC) loops can be wired to meet the requirements of an NFPA Style 4 (Figure 3), Style 6 (Figure 4), or Style 7 (Figure 5) SLC.



Note: Refer to Table 2 and installation drawings supplied with each loop device for rating and specification information.

NfpaLib400_4

Figure 3: Typical NFPA Style 4 Loops



Note: Refer to Table 2 and installation drawings supplied with each loop device for rating and specification information.

NfpaLib400_6

Figure 4: NFPA Style 6 LIB SLC Loop

Note: Functions in accordance with NFPA Style 6 SLC.

Operation

By flanking each SLC loop device, creating zones with a pair of fault isolator modules, each device is protected from opens and shorts on all other zones. A zone is defined as one device or equipment enclosure containing addressable points.

For instance, a short circuit on Zone 2 will not affect Zones 1 and 3. The isolator modules on either side of Zone 2 will open the SLC loop. Zone 1 will still operate from power on Channel A and Zone 3 will operate from Channel B. Since the control panel will no longer be able to communicate with the SLC loop device on Zone 2, a trouble signals will be generated.

When Style 7 is not required and some level of insulation is still desired, the number of SLC loop devices between modules must not exceed 25.

The circuit illustrated in Figure 5 is a variation of an NFPA Style 6 SLC. In this case, no T-tapping or branching is allowed. The ratings and characteristics are the same as for Style 6 circuit.

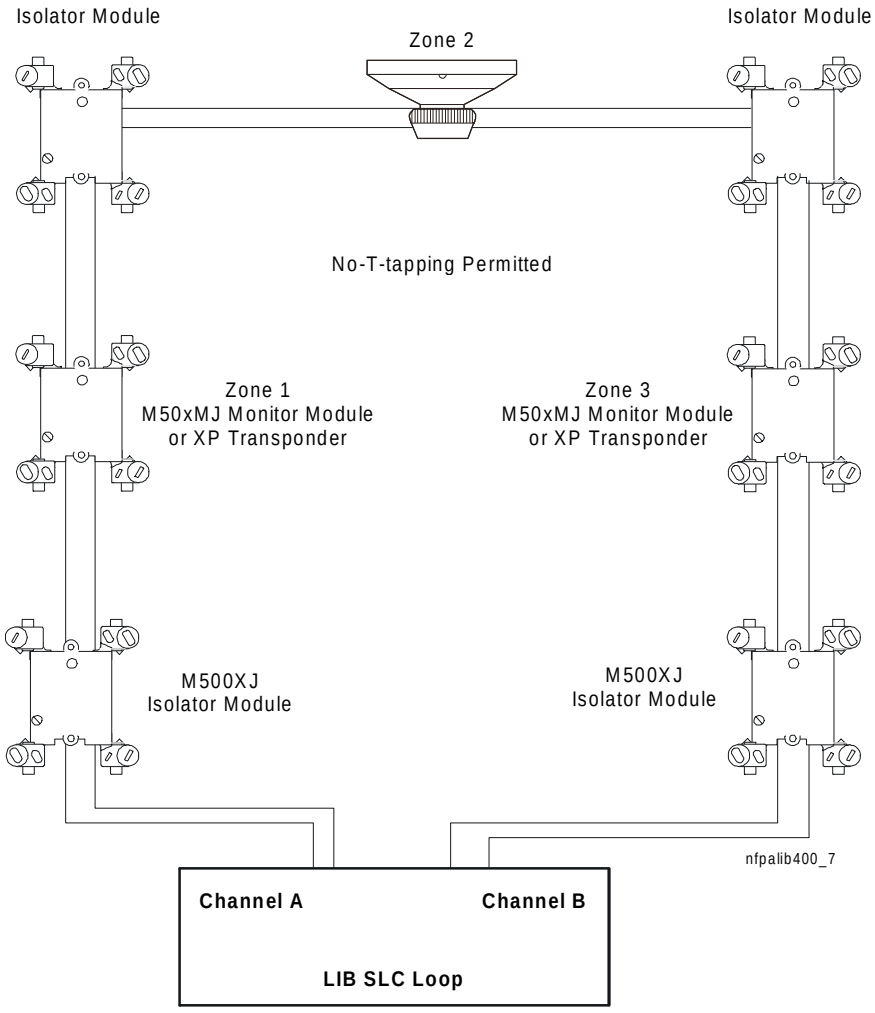


Figure 5: NFPA Style 7 SLC

Note: When more than 100 isolator modules\isolator bases are connected to an SLC loop, decrease the 198 address capacity by two addresses for every isolator in excess of 100.

Length of Notification Appliance Circuit, 4-Wire Smoke Detector, and Annunciator Power Cables

The steps for determining the length of a Notification Appliance Circuit (NAC) cable (including the run from the power supply to the control module), 4-wire smoke detector power cable, or power cable to the ACM, LDM, or LCD type annunciators follow. The same rules are used for the MPS-24A, MPS-24B, APS-6R, and the remote power supply (PS5-BFS-24-UL or FCPS-24).

> **CAUTION:** The installation of 12 AWG solid conductor cable may cause damage to the NAC device. Take caution when connecting 12 AWG cable to the terminals of the notification appliance.

1. Determine the number of notification appliances on the NAC.
2. Look at the minimum rated voltage of the notification appliances as listed in the product bulletin or technical bulletin for the device.
3. Look at the current draw when the device is in alarm. If only one value of the current draw is given, use that. If a range of values is given, use the highest or selected value. Convert the value into amperes.
4. Determine the maximum number of feet of cable using the following formula. For detailed sizing information, refer to the *Installing the IFC-1010/2020 Technical Bulletin (LIT-448155).*

Number of feet of NAC cable = [(24 - Dv) x 1000] / [(Dn x A) x (Rc x 2)]

Where:

Dv = The minimum rated voltage from the product data sheet. Term must be expressed in volts DC.

Dn = The number of devices in the NAC.

A = The amount of current draw per device when it is in alarm; expressed in amperes.

Rc = The cable resistance per conductor per 1,000 feet. Refer to Table 5.

For the notification appliance minimum rated voltage and current information, refer to the *Initiating Devices* section of the *Fire Initiating Devices and Notification Appliances Technical Manual (FAN 408).*

Table 5: Cable Resistance Per Conductor Per 1,000 Feet

Gauge of Cable	Resistance Per Conductor Per 1,000 Feet at 25°C (77°F)
18 AWG	6.5 ohm
16 AWG	4.1 ohm
14 AWG	2.6 ohm
12 AWG	1.6 ohm

Once you know the length and gauge of the cable, you can select the cable type. Most Notification Appliance Circuits operate satisfactorily with non-shielded twisted pair cable. However, some installations with a high level of electrical noise require shielded cable. Table 1 lists the recommended cable types.

CAUTION: If an MPS-24A or PS5-BFS-24-UL or FCPS-24 has one or more DH1851AC-2 or DH2851AC-2 duct detectors that have been converted to 24 VDC, 4-wire operation, you must use an uninterruptable power supply to provide secondary power. Since the minimum voltage supplied by batteries is 20.6 VDC and the minimum operating voltage tested by UL was 20.6 VDC, there would not be enough voltage left for line loss.

Notes

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