Honeywell

HONEYWELL FORGE GATEWAY

Installation Instruction

TABLE OF CONTENT

GENERAL SAFETY INFORMATION

- When performing any work (installation, mounting, start-up), all manufacturer instructions and in particular the Installation and Commissioning Instructions (EN1B-0205IE10) are to be observed.
- Gateway may be installed and mounted only by authorized and trained personnel.
- Rules regarding electrostatic discharge should be followed.
- If the HFB-FC-FGW gateway is modified in any way, except by the manufacturer, all warranties concerning operation and safety are invalidated.
- Make sure that the local standards and regulations are observed at all times. Examples of such regulations are VDE 0800 and VDE 0100 or EN 60204-1 for earth grounding.
- Use only accessory equipment which comes from or has been approved by Honeywell.
- It is recommended that devices be kept at room temperature for at least 24 hours before applying power.
  This is to allow any condensation resulting from low shipping/storage temperatures to evaporate.
- The HFB-FC-FGW gateway must be installed in a manner (e.g., in a lockable cabinet) ensuring that uncertified persons have no access to the terminals.
- Investigated according to United States Standard UL-60730-1, UL-916, and UL60730-2-9.
- Investigated according to Canadian National Standard(s) C22.2, No. 205-M1983 (CNL-listed).
- Do not open the HFB-FC-FGW gateway, as it contains no user-serviceable parts inside!
- CE declarations according to LVD Directive 2014/35/EU and EMC Directive 2014/30/EU.
- Product standards are EN 60730-1 and EN 60730-2 9.

General Information

The HFB-FC-FGW gateway is intended for residential, commercial, and light-industrial environments.

The HFB-FC-FGW gateway is an independently mounted electronic control system with fixed wiring.

The HFB-FC-FGW gateway is suitable for mounting in fuse boxes conforming with standard DIN43880, and having a slot height of max. 45 mm.

It is suitable for panel rail mounting on 35 mm standard panel rail (both horizontal and vertical rail mounting possible).

The HFB-FC-FGW gateway is used for the purpose of building HVAC control and is suitable for use only in non-safety controls for installation on or in appliances.

Table 1. Safety Information

Electric Shock Protection	PELV
Pollution Degree	Pollution Degree 2, suitable for use in industrial environments.
Installation	Class 3
Over voltage Category	24 VAC/VDC powered controls: Category I
Rated Impulse Voltage	330 VAC for Category I (SELV).
Software Class	Class A
Enclosure	IP20 according to EN-60529
Ball-pressure Test Temperature	>75 °C for all housing and plastic parts >125 °C in the case of devices applied with voltage-carrying parts, connectors, and terminals.
Electromagnetic Interference	Tested at 230 VAC, with the modules in normal condition.
System Transformer	Europe: safety isolating transformers according to IEC61558-2-6 U.S.A. and Canada: NEC Class-2 transformers.

Dimensions

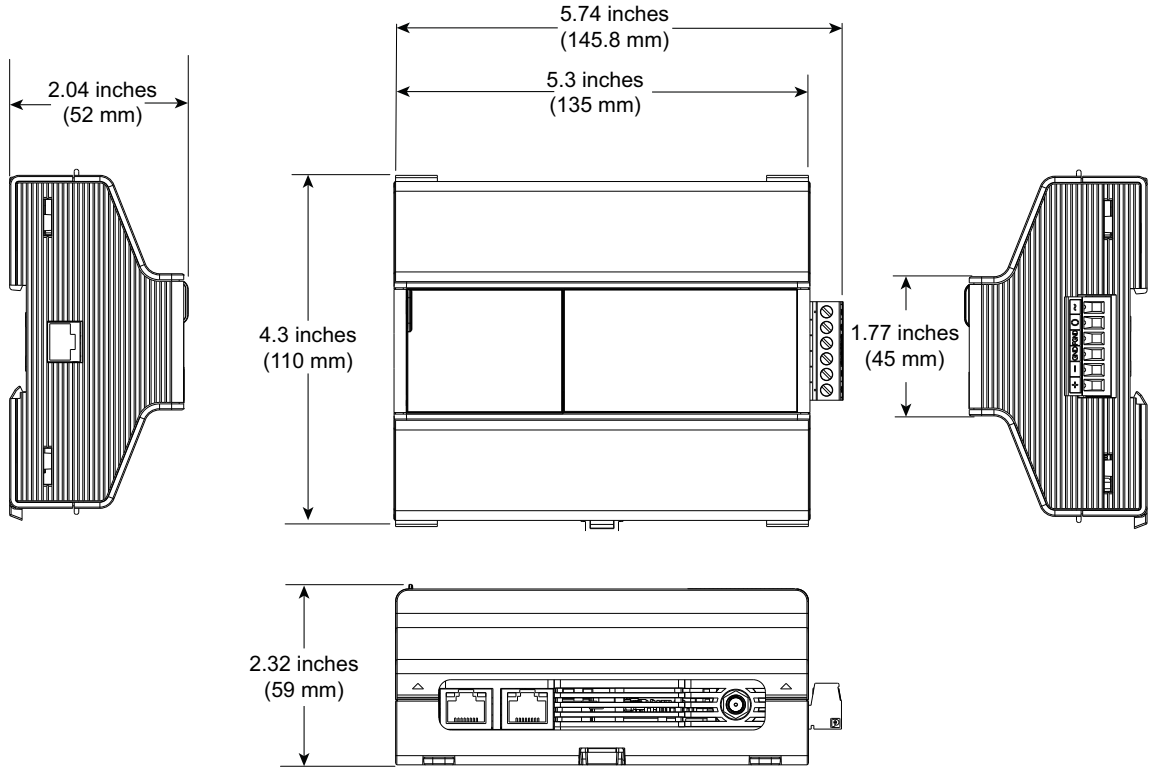

Figure 1. Forge Gateway Dimensions

Part Number Description

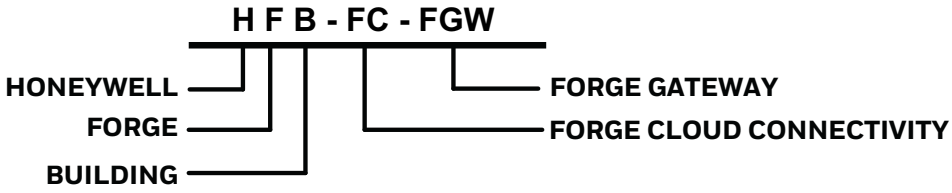

Figure 2. Forge Gateway Part Number

Ordering Information

Table 2. Forge Gateway Part Number

Parameter	Specification
HFB-FC-FGW	Forge Gateway for Honeywell Forge Cloud Connectivity

Table 3. Accessories/Replacement Parts

Parameter	Specification
GW-TCVR	Replacement Terminal Covers (Small) (Pack Quantity of 4)
GW-EXT-TCVR	Extended Terminal Covers (Large) (Pack Quantity of 4)

REGULATORY INFORMATION

FCC Regulation

To commission the controller, follow any one of the Workflow explained in the two Workflow.

1. This device may not cause harmful interference.
2. this device must accept any interference received, including interference that may cause undesired operation.

NOTE:

In This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. 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 the instruction manual, may cause harmful interference to 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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio or TV technician for help.

WEEE Directive 2012/19/EC Waste Electrical and Electronic Equipment directive

At the end of the product life, dispose of the packaging and product in an appropriate recycling center. Do not dispose of the device with the usual domestic refuse. Do not burn the device.

- At the end of the product life, dispose of the packaging and product in an appropriate recycling center.
- Do not dispose of the device with the usual domestic refuse.
- Do not burn the device.

PRODUCT SPECIFICATION

Electrical Data

Table 4. Electrical Data

Parameter	Specification
Operating Voltage (AC)	19 to 29 VAC (50/60Hz)
Operating Voltage (DC)	19 to 29 VDC
Screw-type Terminals	0.0038 inch (2.5 mm^2)
Overvoltage Protection	Protected against overvoltages of max. 29 VAC or 40 VDC, terminals protected against short-circuiting.

Power Consumption

Table 5. Power Consumption

Gateway	Power	
	24 VAC	24 VDC
HFB-FC-FGW	Max. 35 VA	Max. 15 W

Current Consumption

Table 6. Current Consumption

Gateway	Power	
	24 VAC	24V DC
HFB-FC-FGW	1430 mA	620 mA

Default IP Address

Table 7. Default IP Address

Parameter	Specification
LAN1	192.168.0.201
LAN2	192.168.10.202
Gateway	192.168.0.1

Operational Environment

Table 8. Operational Environment

Parameter	Specification
Ambient Operating Temperature	(32 to 122 °F) 0 to 50 °C
Ambient Operating Humidity	5 to 95 % relative humidity (non-condensing)
Ambient Storage Temperature	(-22 to 158 °F) -30 to +70°C
Ambient Storage Humidity	5 to 95 % relative humidity (non-condensing)
Vibration Under Operation	0.024” double amplitude (2 to 30 Hz), 0.6 g (30 to 300 Hz)
Dust, Vibration	According to EN60730-1
RFI, EMI	Residential, commercial, and light-industrial environments
MTBF (Mean Time Between Failure)	11.5 years

Standards

Table 9. Standards

Parameter	Specification
Protection Class	IP20
Product Standards	UL60730-1, UL60730-2-9, UL916, EN60730-1, EN60730-2-9, CAN/CSA-E60730-1
Testing Electrical Components	IEC68
Certification	UL60730-1, UL916, CE, FCC Part15, Subpart B, CAN ICES-3 (B)/NMB-3(B), RCM, RoHS III
System Transformer	The system transformer(s) must be safety isolating transformers according to IEC 61558-2-6. In the U.S.A. and Canada, NEC Class 2 transformers must be used.

INTERFACES

The HFB-FC-FGW gateway can communicate with a wide range of devices and systems with its interfaces and is configurable for a variety of protocols.

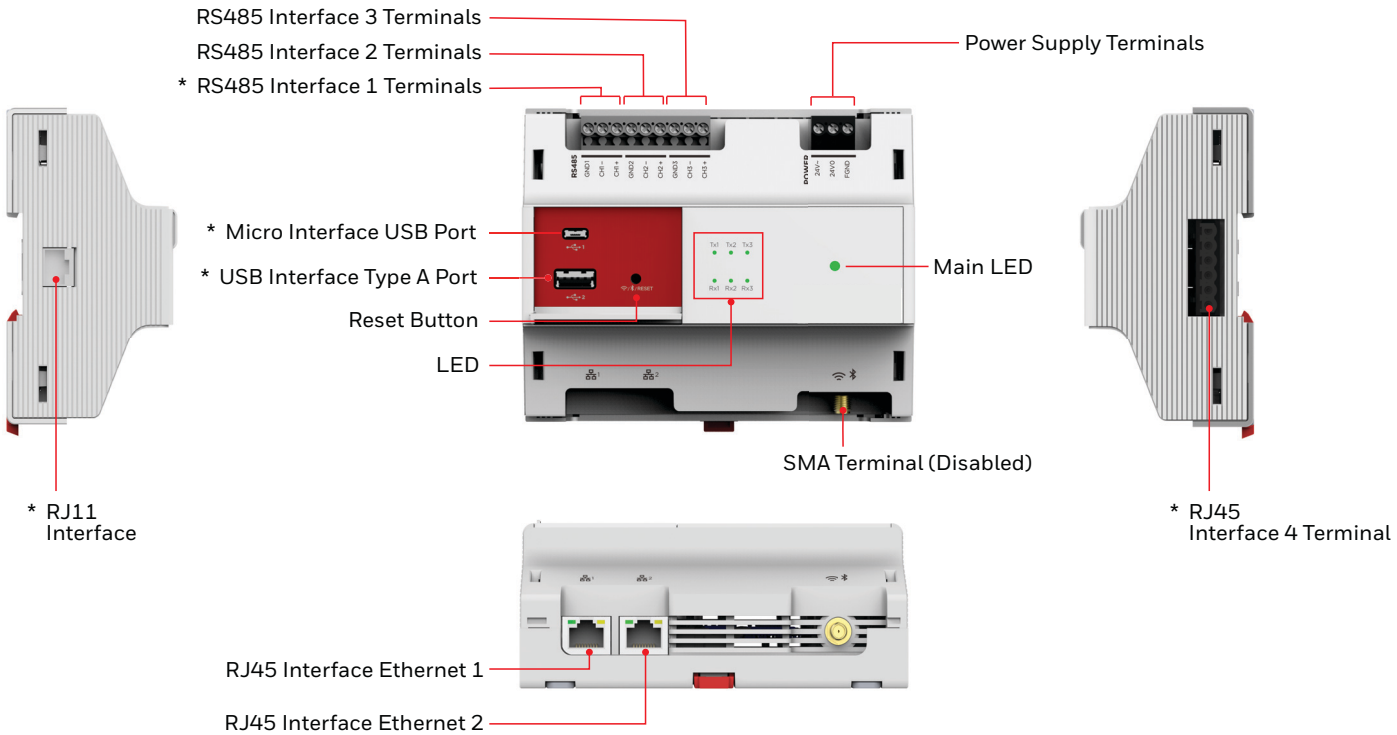

Figure 3. Honeywell Forge Gateway Interface

Table 10. Gateway Terminals

Type	Signal	Comment
Power Supply Terminals	FGND	Connect to earth ground in the field
	24V0	Power supply common
	24V~	Power supply (24 VAC/VDC)
RS485 Interface 3 Terminals	CH3+	(+) for RS485 interface 3
	CH3-	(-) for RS485 interface 3
	GND3	GND3 for RS485 interface 3
RS485 Interface 2 Terminals	CH2+	(+) for RS485 interface 2
	CH2-	(-) for RS485 interface 2
	GND2	GND2 for RS485 interface 2

Type	Signal	Comment
RS485 Interface 1 Terminals	CH1+	(+) for RS485 interface 1
	CH1-	(-) for RS485 interface 1
	GND1	GND1 RS485 interface 1
LED	Tx1 LED (green)	Transmit and receive indication for RS485 interfaces 1 to 3
	Rx1 LED (green)	
	Tx2 LED (green)	
	Rx2 LED (green)	
	Tx3 LED (green)	
	Rx3 LED (green)	
	Main LED	Indicates the operational status of the Gateway
RJ45 Interface	Ethernet 1	Dedicated to Internet/Cloud connectivity (10/100/1000BASE-T)
	Ethernet 2	Dedicated to BACnet IP network connection (10/100/1000BASE-T)
RS485 Interface 4 Terminals	~ (24V~)	Communication and power bus for expansion modules
	24V0	
	FGND	
	GND	
	(-) for RS485 interface 4	
	(+) for RS485 interface 4	
RJ11 Interface	(+) for RS485 interface 5	
	(-) for RS485 interface 5	
USB Interface	Micro USB	Micro USB port to connect with laptops, mobile, and tablets
	Type A	USB Type A port
Reset Button		Reset button to reset the device to factory default

Tx LEDs and Rx LEDs

The HFB-FC-FGW gateway is equipped with three Tx LEDs and three corresponding Rx LEDs. These LEDs indicate the transmission and reception of data by the three RS485 interfaces.

Table 11. Behavior and meaning of RS485 LEDs

LED Status	Description
OFF	No communication over the given RS485 interface.
Tx ON	Transmit data over the given RS485 interface.
Rx ON	Receive data over the given RS485 interface.

Reset Button

There are two levels of resets available.

- Pressing the reset button for at least 5 seconds (maximum 15 seconds) will reset only the IP addresses of LAN1 and LAN2 to defaults, as well as reset the login password to factory settings.

- Pressing the reset button for more than 30 seconds will initiate a full factory reset and return the gateway to an unregistered condition. The latest firmware version will be preserved.

General Information on the RS485 Standard

According to the RS485 standard (TIA/EIA-485: “Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems”), only one driver communicating via an RS485 interface may transmit data at a time. Further, according to U.L. requirements, each RS485 interface may be loaded with a max. of 32 unit loads.

RS485 systems frequently lack a separate signal reference wire. However, the recommended wiring is to provide a solid signal ground (signal reference) connection in order to ensure error-free communication between drivers and receivers – unless all of the devices are electrically isolated and no earth grounding exists.

Under ideal conditions, the RS485 connection can have a max. length of 1200 meters. However, the longer the cable, the lower the transmission rate. As a rule of thumb, the transmission rate (in bps) multiplied by the cable length (in meters) should not exceed 100 million. For example, a system with a cable (3280.84 ft) 1000 meters long should not be required to transmit data at rates exceeding 100 Kbps. The following table provides a few examples.

Table 12. Baud rate vs. max. cable length for RS485

Baud Rate	Max. Cable Length (L)
9.6 Kbps	(3937.01 ft) 1200 m
19.2 Kbps	(3937.01 ft) 1200 m
*38.4 Kbps	(3937.01 ft) 1200 m
***56 Kbps	(3937.01 ft) 1200 m
76.8 Kbps	(3937.01 ft) 1200 m
**115.2 Kbps	(2624.67 ft) 800 m
** In the case of configuration of RS485 interfaces 1, 2, 3, and 4 of the HFB-FC-FGW gateway.	

NOTE:
For information on wire gauge, max. permissible cable length, possible shielding and grounding requirements, and the max. number of devices which can be connected to a bus, refer to standard EIA-485.

Main LED

Table 13. Main LED Pattern

LED Behavior	Visual	Meaning
Green-Yellow-Red cycling (Alternate Green, Yellow, Red every 1.0 sec)		Factory default • No Configuration in Gateway and Not Registered
Solid Green		Working properly • Firmware Running and Connected to Cloud
Yellow - Breathing		Internet connection Status • Internet is connected
Blink every 0.2 Sec Green		Firmware download or device configuration is in progress
Blink every 0.2 Sec Red		Total communication failure
Three Blinks in 1.5 sec interval and then Pause for 2 sec Red		Internet/Cloud connection failure
2 Red Blinks and Pause		OS booting

Ethernet Interfaces and LEDs

The two Ethernet interfaces 1 and 2 are internally connected to a single Ethernet switch.

Ethernet 1 is used for Cloud connectivity and Ethernet 2 is to connect BACnet/IP network.

Both Ethernet 1 and 2 can connect the Gateway with laptop/PC using Ethernet crossover cable. They are RJ45 female interfaces, each with a yellow activity status LED (located to the left) and a green activity LED (located to the right). The possible behaviors and corresponding meanings of these LEDs are explained in the following table.

Table 14. Behavior and meaning of Ethernet Interfaces 1 and 2

Case	LED Behavior	Meaning	Remedy
1	Yellow LED is ON steadily	Ethernet is working with connectivity up to 100Mbps.	If communication problems persist, then check the green LED. See Case 3 and Case 4 given below.
2	Yellow LED is OFF	• If the green LED is ON or flashing, then Ethernet is working with connectivity up to 10Mbps. • If the green LED is OFF, then Ethernet is disconnected.	Connect the cable between the Gateway and the switch.
3	Green LED is flashing	Normal operation. The Gateway is transmitting/receiving data to/from the switch via cable.	If communication problems persist, the Ethernet parameter configuration may be defective: Check IP address, MAC address, and firmware.
4	Green LED is ON	Ethernet connectivity exists but no data flow.	Check the software configuration.

Case	LED Behavior	Meaning	Remedy
5	Green LED is OFF	Ethernet port link is down.	• Check the cable connection between the Gateway and the switch. • Check the switch. • Use good a laptop or good cable to directly connect the Gateway and the switch

The following can be connected to these two Ethernet interfaces:

- Web browser

Communication Baud Rates

Table 15. Communication Baud Rates

Protocols	Description
Ethernet	10/100 Mb/s, RJ45
Modbus	0.3 to 115.2 Kbps

POWER SUPPLY

Transformers

Honeywell Transformers

A transformer can power the HFB-FC-FGW gateway. When determining total current consumption and selecting the appropriate transformer, take into account the number of connected modules, accessories, and field devices..

NOTE:
In Europe, system transformer(s) must be safety isolating transformers according to IEC61558-2-6. In the U.S.A. and Canada, NEC Class-2 transformers must be used.

Table 16. Honeywell CRT Series Transformers (Europe)

Part No.	Primary Side	Secondary Side
CRT 2	220/230 VAC	24 VAC, 50 VA, 2 A
CRT 6	220/230 VAC	24 VAC, 150 VA, 6 A
CRT 12	220/230 VAC	24 VAC, 300 VA, 12 A

NOTE:
Gateway is not intended to power up through USB. In the U.S.A and Canada, NEC Class-2 transformers must be used.

Table 17. Honeywell 1450 Series Transformers (N. America)

Part No. 1450728 7	Primary Side	Secondary Side
-001	120 VAC	24 VAC, 50 VA
-002	120 VAC	2 x 24 VAC, 40 VA; 100 VA from separate transformer
-003	120 VAC	24 VAC, 100 VA; 24 VDC; 600 mA
-004	240/220 VAC	24 VAC, 50 VA

Table 17. Honeywell 1450 Series Transformers (N. America) (Continued)

Part No. 1450728 7	Primary Side	Secondary Side
-005	240/220 VAC	2 x 24 VAC, 40 VA; 100 VA from separate transformer
-006	240/220 VAC	24 VAC, 100 VA; 24 VDC, 600 mA

NOTE:
Standard commercially available transformers can also power the Forge Gateway.

Switch Power Supply

The Forge Gateway can be powered by a switch-mode DC power supply (rather than by a transformer) to reduce overall current consumption.

Fusing

The choice of appropriate fusing is dependent upon the given connection scenario (i.e., cable lengths and the use of a primary and/or secondary transformer) and the type of connected bus.

Table 18. Fusing

Designation	Description
F1	4 A, time-lag fuse (slow-blow), e.g., LittleFuse type 218.004.
F2	Depends upon field devices.
F3 (Field Bus, only)	8 A, time-lag fuse.
F4 (I/O Module Bus, only)	8 A, time-lag fuse or 12.5 A, time lag fuse.

Power Supply of Field Devices

Field devices can be powered via the Forge Gateway.

When determining the total current consumption and selecting the appropriate transformer, consider the number of connected modules, accessories, and field devices. Employing an additional transformer may be necessary. The fusing (F2) of active field devices depends on loads in use. Single-sided (secondary-sided) earth connection of the transformer is also possible.

WIRING AND SET-UP

General Safety Considerations

- When connecting the HFB-FC-FGW gateway, VDE, National Electric Code (NEC) or equivalent, and any local regulations concerning grounding must be observed.
- Only qualified electricians may carry out electrical work.
- The electrical connections must be made at the terminals of the HFB-FC-FGW gateway.
- For Europe, only: To comply with CE requirements, devices with a voltage in the range of 50 to 1000 VAC or 75 to 1500 VDC and which are not provided with a supply cord and plug or with other means for disconnection from the supply having a contact separation of at least (0.118 in) 3 mm in all poles must have the means for disconnection incorporated in the fixed wiring.
- Only copper conductors should be used for electrical connection.
- Only electrical cables/wires with operating temperature at least 75° C should be used for electrical connection.

NOTE:

For Europe, only: To comply with CE requirements, devices with a voltage in the range of 50 to 1000 VAC or 75 to 1500 VDC and which are not provided with a supply cord and plug or with other means for disconnection from the supply having a contact separation of at least (0.118 in) 3 mm in all poles must have the means for disconnection incorporated in the fixed wiring.

- Only copper conductors should be used for electrical connections.
- Only electrical cables/wires with an operating temperature at least (167 °F) 75 °C should be used for electrical connection.

WARNING

Risk of electric shock or equipment damage!

- Do not touch any live parts in the cabinet.
- Disconnect the power supply before connecting or removing connections from gateway terminals.
- Do not use spare terminals as wiring support points.
- Do not reconnect the power supply until you have completed the installation and proper connection.

CAUTION

Observe the precautions for handling electrostatic devices.

Wiring Terminals

The Gateway are supplied with Screw terminals and can also be retrofitted with Push fit terminals if required.

NOTE:

In some regions I/O modules can be ordered directly with either screw or push fit terminals.

Table 19. RS-485 Interfaces 1,2, and 3 Wiring Terminals Specifications

Terminal Type	Stripping Length	Torque Value	Max. Plug Gauge
Screw (Type P1)	(0.236 in) 6 mm	3.1 to 3.5 lb-in (0.350 to 0.395 Nm)	28 to 14 AWG (0.0804-2.075 mm^2)

Table 20. RS-485 Interface 4 Wiring Terminals Specifications

Terminal Type	Stripping Length	Torque Value	Max. Plug Gauge
Screw (Type J4)	(0.276 in) 7 mm	5 to 7lb-in (0.564 to 0.790 N-m)	Cable without ferrule: (0.0176 - 0.0591 in) 0.2-2.5 mm^2 Cable with ferrule: 0.25-2.5 mm^2

Table 21. Power Supply Wiring Terminals Specifications

Terminal Type	Stripping Length	Torque Value	Max. Plug Gauge
Screw (Type P2)	(0.236 in) 6 mm	3.1 to 3.5 lb-in (0.350 to 0.395 N-m)	28 to 14 AWG (0.0197 - 0.0591 in) (0.0804-2.075 mm^2)

Terminals support both flexible and solid cables. Wires can be equipped additionally with ferrules.

Connecting Power Supply

Connect the power supply to the power supply terminals of the HFB-FC-FGW gateway.

The factory default Gateway must be powered ON for a minimum of 10 hours for the first time to make the RTC function as intended.

Earth Grounding

The HFB-FC-FGW gateway comply with SELV (Safety Extra-Low Voltage), so protective earth grounding is not required. However, a functional earth grounding for EMC is mandatory.

Cable Specifications

Power Supply Cable Specifications

The length of the power supply cable includes the length of the cables to connected modules.

NOTE:
The supply voltage must, in any case, be at least 19.2 VAC (24 VAC -20 %).

Table 22. Power Supply Cable Specifications

Device	Cable Length (Max.)	Cable cross-section (Min.)
Gateway	(9.84 ft) 3 m	(0.016 ft^2) 1.5 mm^2

Communication Bus Cable Specifications

Table 23. Communication Cable Specifications

Interface (Buses)	Cable Type
RS-485 interfaces 1, 2, 3	One or two pairs (depending on the application) of twisted pair complying with EIA485 standard (level IV, 22 AWG, solid core, non-shielded), e.g., J-Y-Y 2 x 2 x 0.8, or shielded wire.
Ethernet 1, 2 (Ethernet Bus)	Forge Gateway can be used with CAT5 and CAT6 cabling. Standard Ethernet cross-over cable, CAT5, min. 10/100 MBaud, max. length of 100 m

RS-485 Bus Cable Specifications

- An MS/TP EIA-485 network shall use shielded, twisted-pair cable with a characteristic impedance between 100 and 130 ohms.
- Distributed capacitance between conductors shall be less than (30 pF per foot) 100 pF per meter.
- Distributed capacitance between conductors and shield shall be less than (60 pF per foot) 200 pF per meter.

CONNECTION EXAMPLES

Connection to Modbus RTU

The HFB-FC-FGW gateway can communicate with power meters, Inverters and other devices through Modbus.

The current consumption of the individual Modbus devices varies according to model. For more information onS Modbus devices

Connection to Modbus Modules

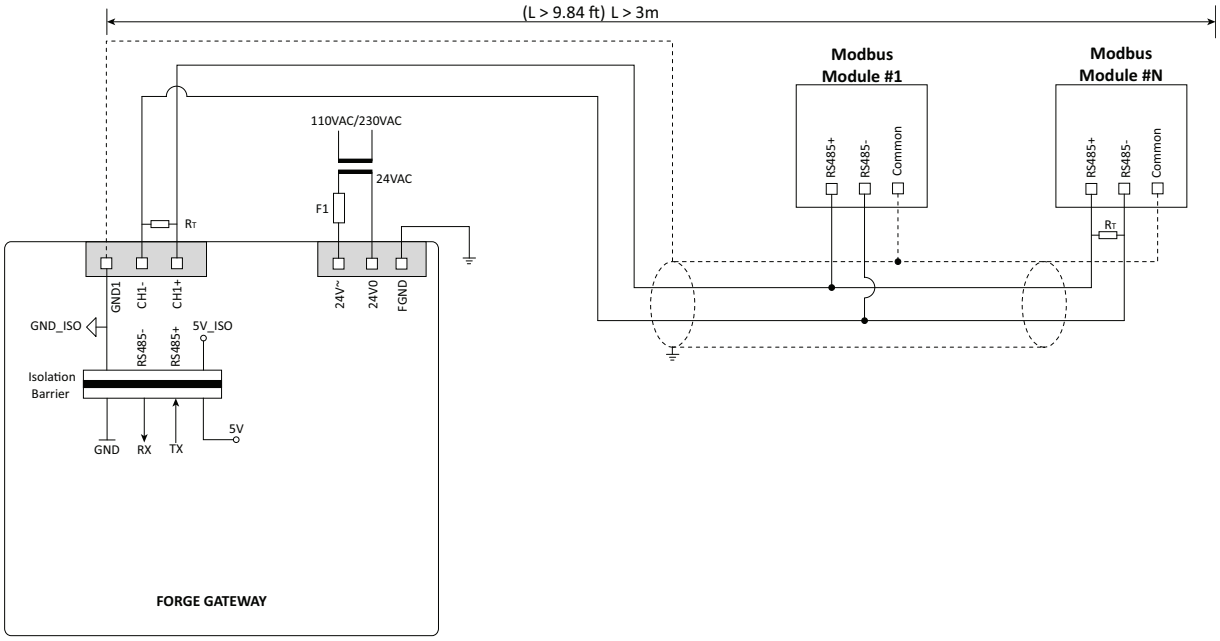

Figure 4. Connection (L > 9.84 ft) L > 3 m of RS-485 to a Modbus

NOTE:

— N = max. 30 unit loads. Always power the HFB-FC-FGW gateway and connected Modbus modules with separate transformers. Termination resistors must be inserted directly into the terminals of the individual Modbus modules.

Connection to Modbus devices with non-isolated RS485 interfaces

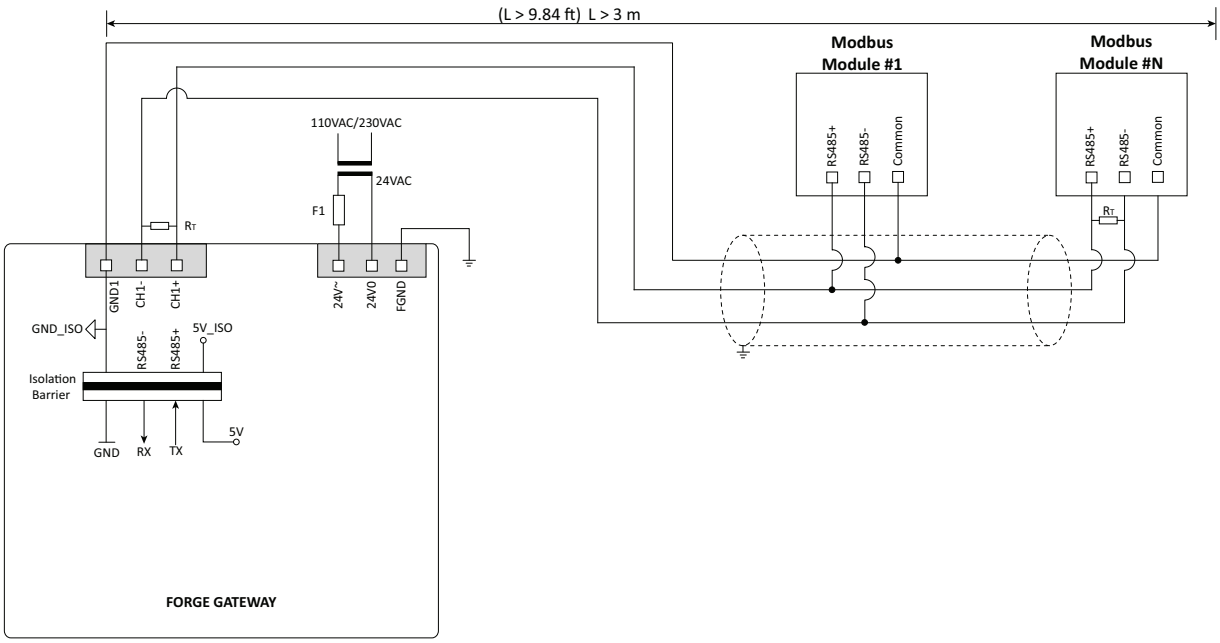

Figure 5. Connection (L > 9.84 ft) L > 3 m of RS485 interfaces 1, 2, or 3 (RS485 interface 1 shown) to a Modbus

NOTE:

— N = max. 30 unit loads. Always power the HFB-FC-FGW gateway and connected Modbus modules with separate transformers. Termination resistors must be inserted directly into the terminals of the individual Modbus modules.

TROUBLESHOOTING

Troubleshooting with LEDs of RS-485 Interfaces 1, 2, 3

Table 24. HFB-FC-FGW gateway Tx and Rx LEDs of RS485 Interfaces 1,2, and 3

Case	LED Behavior	Meaning	Remedy
1	Both LEDs of given interface flashing.	Bus is functioning properly.	No action is necessary.
		Bus is not functioning properly.	Check termination. Check the polarity of bus connections. Check for EM interference.
2	Both LEDs of given interface are OFF.	No communication over given interface.	Use SMB tool to check interface assignment in the application. Check the wiring.

Troubleshooting with the Ethernet Interface LEDs

Table 25. HFB-FC-FGW gateway link and activity LEDs of Ethernet interfaces 1 and 2

Case	LED Behavior	Meaning	Remedy
1	Yellow LED is ON steadily.	Ethernet is working with connectivity below 100Mbps.	If communication problems persist, then check the green LED. See Case 3 and Case 4 given below.
2	Yellow LED is OFF	If the green LED is ON or flashing, then Ethernet is working with connectivity below 10Mbps. If green LED is OFF, then Ethernet is disconnected.	Connect the cable between the Gateway and the switch.
3	Green LED is flashing.	Normal operation. The Gateway is transmitting/receiving data to/from the switch via cable.	If communication problems persist, the Ethernet parameter configuration may be defective: Check the IP address, MAC address, and firmware.
4	Green LED is ON	Ethernet connectivity exists but no data flow.	Check the software configuration.
5	Green LED is OFF	Ethernet port link is down.	Check the cable connection between the Gateway and the switch. Check the switch. Use good a laptop or good cable to directly connect the Gateway and the switch.

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