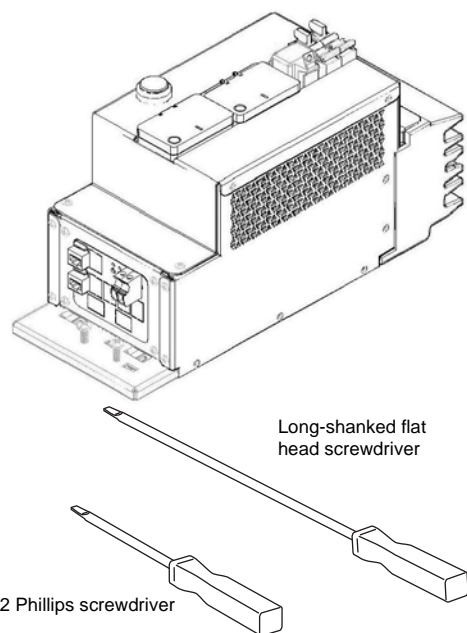


## I-Line™ Smart Cell Installation

### Class 2110

Retain for future use.

### Kit Contents / Necessary Tools



#### Glossary of Terms

**Circuit Breaker Communication Module (BCM or BSCM)**—A module which, when installed in a circuit breaker, receives and transmits information on the communication network.

**Energy Reduction Maintenance System (ERMS)**—Square D™ brand Powerpact™ P-, R-Frame, and Masterpact™ circuit breakers, manufactured by Schneider Electric™, provide arc flash protection characteristics. Additional components can be integrated to increase the options available to reduce the arc flash incident energy (AFIE).

**Interface Ethernet Module (IFE)**—A module that helps customers view, control, and streamline data from electrical equipment assets to help reduce costs and improve uptime.

**Modbus Communication Interface Module (IFM)**—This module, required for connection to the network, contains the Modbus address (1 to 99) declared by the user using the two rotary switches on the front of the unit. It automatically adapts (baud rate, parity) to the Modbus network in which it is installed.

**Low Voltage Current Transformer (LVCT)**—The Powerlogic™ LVCTxxx series of 1 and 0.333 volt split-core current transducers provide secondary voltage AC proportional to the primary (sensed) current.

**Micrologic™**—The family of electronic trip systems available on molded case circuit breakers, insulated case circuit breakers, and low-voltage power circuit breakers

**MXI**—One Schneider Electric version of a shunt trip. This is an accessory which trips the circuit breaker from a remote location using an external voltage source.

**NSX Cord**—A shielded communication cable consisting of two twisted pairs of stranded wire that is typically black/red and blue/white color. This specific cord set has one free end and the opposite end has an RJ45 connector. It is typically provided as part of the BCM or BSCM field installation kit.

**Universal Logic Plug (ULP) Cable**—A shielded communication cable consisting of two twisted pairs of stranded wire that is typically black/red and blue/white color. This specific cord set has one free end and the opposite end has an RJ45 connector. It is typically provided as part of the BCM or BSCM field installation kit.

**XF**—One Schneider Electric version of a shunt trip. This is an accessory which trips the circuit breaker from a remote location using an external voltage source.

Table 1: Catalog Number and Features

Catalog Number	Voltage Vac	Features
ICWL2222E1M0	120–240	IFE, Modbus™ serial to TCP Gateway with basic web page
ICWL2422E1M0	277–480	IFE, Modbus serial to TCP Gateway with basic web page
ICWL2222M01	120–240	IFM, Modbus serial communications
ICWL2422M01	277–480	IFM, Modbus serial communications
ICWL2222ERMS	120–240	ERMS (branch circuit breaker)
ICWL2422ERMS	277–480	ERMS (branch circuit breaker)
ICWL22XSERMS	120–240	ERMS (backfed main circuit breaker)
ICWL24XSERMS	277–480	ERMS (backfed main circuit breaker)
ICWL263X3555	120–600	EM3555 meter
ICWL263X3560	120–600	EM3560 meter

## ⚠ DANGER

### HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, or NOM-029-STPS.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Read and understand this entire instruction bulletin before installing, operating, or maintaining this equipment.
  - Local codes vary, but are adopted and enforced to promote safe electrical installations.
  - A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.
- Replace all devices, doors and covers before turning on power to this equipment.

**Failure to follow these instructions will result in death or serious injury.**

## I-Line™ Smart Cell Installation

### NOTICE

#### HAZARD OF IMPROPER PLUG ON CONNECTION

- Do not adjust jaws
- Do not remove joint compound (if applied)

Failure to follow these instructions can result in equipment damage.

Refer to Figure 1 for the following instructions:

1. Turn off all power to the panelboard.
2. Remove the deadfront and interior trim barrier.
3. Turn the fused disconnect to the "OFF" position. Position the jaws against the bus bar stack (A) so that the guiding boss on the bottom of the I-Line Smart Cell is oriented towards the alignment groove in the bus insulator base, and the "mounting guides" of the I-Line Smart Cell base fit into the keyslots in the pan.
4. Place long-shanked screwdriver through the rectangular holes in the I-Line Smart Cell base and into the screwdriver slot in the mounting pan (B). Ratchet the I-Line Smart Cell firmly into the bus bar stack (C) and align the retaining screw with the 0.219 (5.6mm) mounting hole in the pan.
5. Tighten the retaining screw securely (D) to prevent the I-Line Smart Cell from moving.  
**NOTE:** Ensure the retaining screw is tight, but do not tighten it enough to bend the mounting base.
6. Reinstall the deadfront and interior trim barrier.
7. For I-Line Smart Cell units that utilize power connections from the "LINE" side of the main circuit breaker (refer to circuit breaker manufacturing documentation), attach the "DANGER—Remote Power" label to the interior trim barrier.
8. Turn the fused disconnect switch to "ON".

Figure 1: I-Line Installation

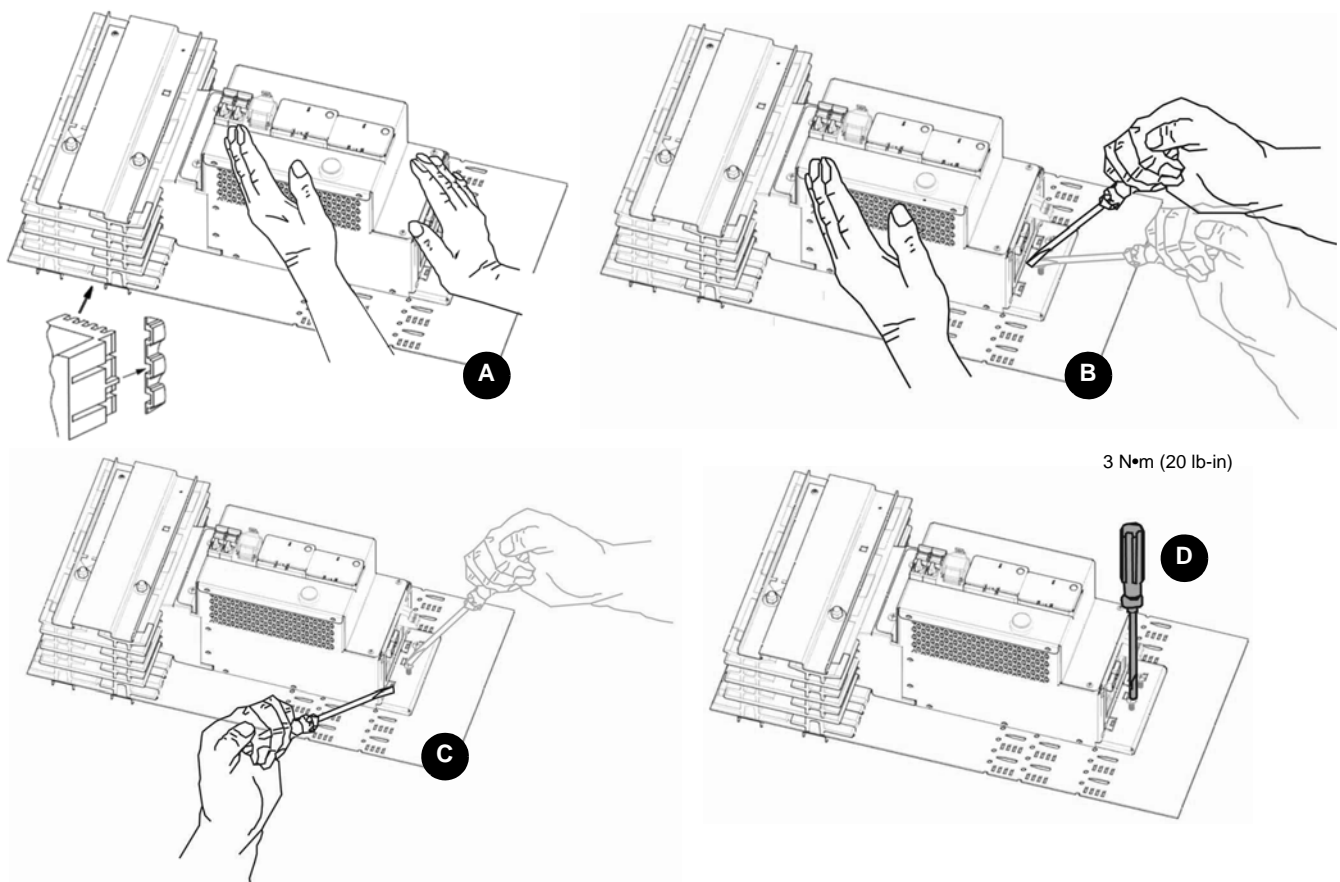


Figure 2: I-Line Smart Cell Basic Dimensions

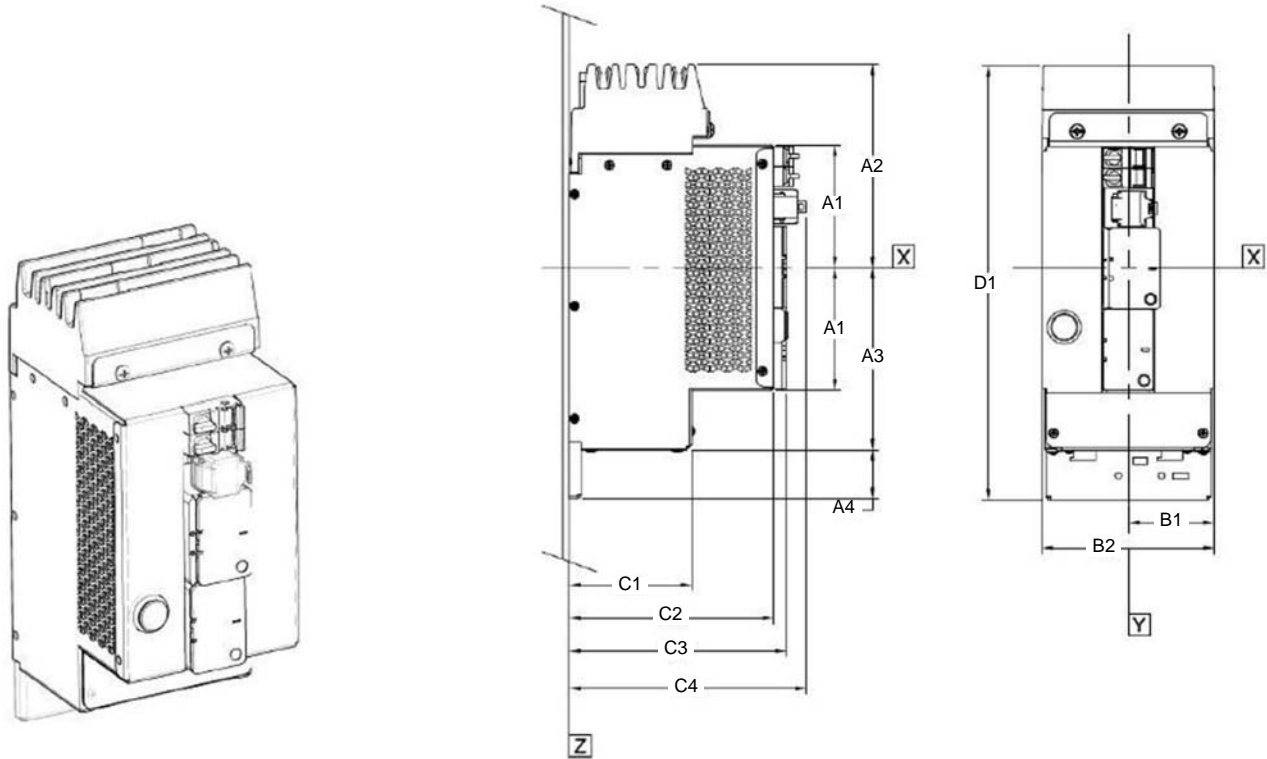


Table 2: I-Line Smart Cell Basic Dimensions

	A1	A2	A3	A4	B1	B2	C1	C2	C3	C4	D1
inch	4.25	7.04	6.28	1.68	3.00	6.00	4.24	7.07	7.5	8.22	15.00
mm	108	179	160	43	76.5	153	108	180	191	209	381.5

### Wiring Connection—Screw Terminal

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

Do not allow conductor strands or wire insulation to interfere with threads of wire binding screw(s).

**Failure to follow these instructions will result in death or serious injury.**

Figure 3: Screw Terminal

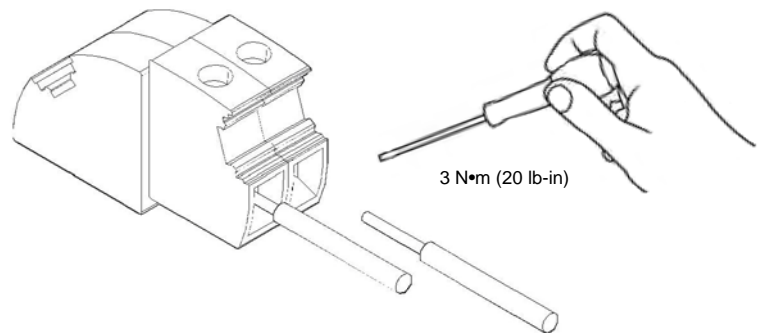


Table 3: Connector Usage—Minimum Wire Size/Type

Description	Wire Size	Wire Type
24 Vdc Power Supply	24 AWG	600 Vac Rated Twisted Pair
Neutral Connection	14 AWG	600 Vac THHN or MTW
Used with Main Circuit Breaker Connection	14 AWG	600 Vac THHN or MTW

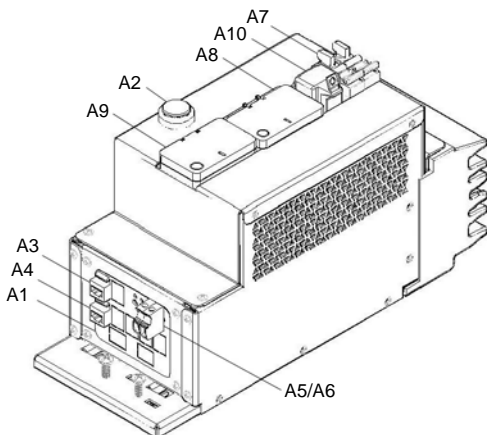
## Energy Reduction Maintenance System (ERMS) Accessory and Control Wiring

**Table 4: ERMS Catalog Numbers**

Catalog Number	Voltage Vac	Feature
ICWL2222ERMS	120–240	ERMS (branch circuit breaker)
ICWL2422ERMS	277–480	ERMS (branch circuit breaker)
ICWL22XSERMS	120–240	ERMS (backfed main circuit breaker)
ICWL24XSERMS	277–480	ERMS (backfed main circuit breaker)

**NOTE:** ERMS units to be utilized with P or H level Micrologic® trip units only.

**Figure 4: Energy Reduction Maintenance System**



**NOTE:** Refer to the bulletins shipped with each component and included in the I-Line Smart Cell installation packet for detailed set-up instructions.

1. Connect the 24 Vdc power to the Micrologic trip unit of the circuit breaker by stripping the power supply wires of the trip unit and installing the wire into the appropriate 24 Vdc connection screw terminal plug from the accessory panel of the I-Line Smart Cell.

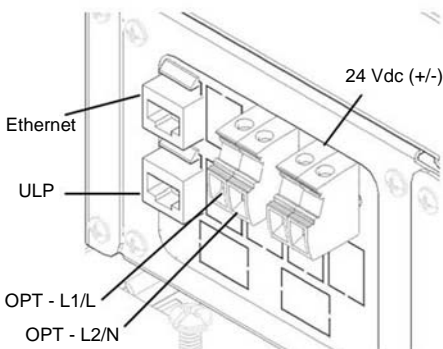
**NOTE:** Refer to the instructions provided with the circuit breaker and/or trip unit for details. Refer to installation instructions Figure 1 for I-Line Smart Cell mechanical mounting details [red=positive(+) / black=negative (-)].

2. Connect the RJ45 ULP cable from the Micrologic trip unit to the RJ45 connector labeled "ULP" located on the accessory panel of the I-Line Smart Cell.
3. **Optional:** Connect the Ethernet cable to the RJ45 female connector labeled "ETHERNET" located on the accessory panel of the I-Line Smart Cell for remote set-up of the ERMS (refer to Appendix—*ERMS Connections*, on Figure 13, for additional wiring connection details).
4. **Back Fed Main:** Connect supply power wires (14 AWG minimum) from the "LINE" side of the MAIN circuit breaker (refer to circuit breaker installation instructions for proper connection points and methodology) to the external power supply connections on the accessory plate of the I-Line Smart Cell. These connections will be labeled as L1/L and L2/N.

**Table 5: Energy Reduction Maintenance System Characteristics**

A1	Accessory Plate	Location of accessory operation connections.
A2	Ethernet Connection	Connection for initial set-up and monitoring of trip unit setting during ERMS mode (factory preset = 2X instantaneous).
A3	Tyco 2111122-1—Ethernet Connection	Permanent connection to Ethernet for remote set-up and monitoring (factory preset = 2X instantaneous).
A4	Tyco 2111122-1—Modbus (ULP) Connection	Connection for communication to the trip unit.
A5/A6	Phoenix Contact 3073393—Qty. 2, Feed-Through Terminals for 24 Vdc	Provides connection point to the 24 Vdc power supply to the trip unit.
A7	2-Pole Fused Disconnect	Provides ability to remove power from unit while installed on the I-Line bus stack. (5 ampere FNQ-R-5 CC fuse).
A8	LV434063—I/O Module	Provides ability to switch trip unit to ERMS setting.
A9	LV434011—IFE Gateway Module (Ethernet)	Provides Ethernet communication gateway.
A10	ERMS Switch (Padlockable Cover)	Manual switch to turn the ERMS setting ON/OFF. <b>NOTE:</b> Trip unit in ERMS mode when lit.

## Documentation References for Energy Reduction Maintenance Setting (ERMS)



For additional information see the following user guides available on the Schneider Electric website:

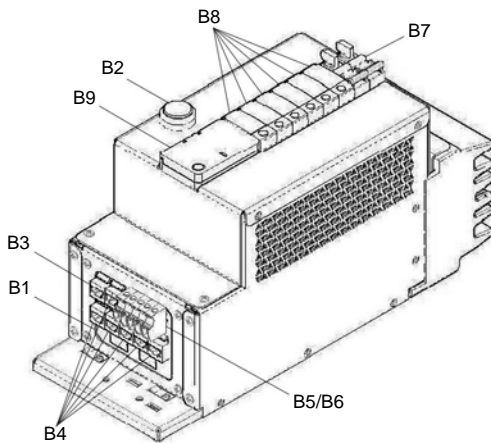
- NHA67346—*Energy Reduction Maintenance Setting (ERMS) System Installation and User Guide*
- 48049-251-01—*PowerPact M-frame Circuit Breakers*
- 48049-148-05—*PowerPact P-frame and NS-630b–NS1600 Circuit Breakers*
- 48049-243-04—*PowerPact R-frame and NS-1600b–NS3200 Circuit Breakers*
- 48049-330-03—*Micrologic 5.0H and 6.0H Electronic Trip Units*
- 48049-137-05—*Micrologic 5.0P and 6.0P Electronic Trip Units*
- 1040IB1401—*IFE Ethernet Interface for LV Circuit Breakers User Guide (UL)*
- 0613IB1317—*IO Module – Input/Output Interface for LV Circuit Breakers – User Guide*

## Communications Package Accessory and Control Wiring

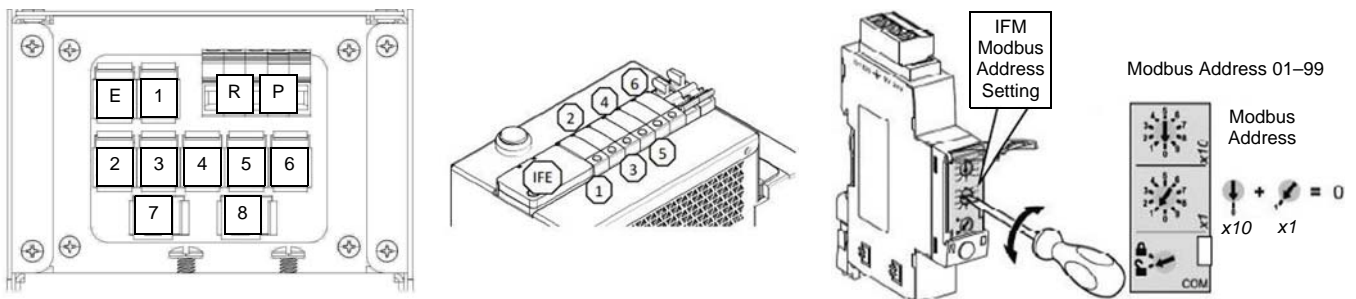
**Table 6: Communication Catalog Numbers**

Catalog Number	Voltage Vac	Feature
ICWL2222E1M0	120–240	IFE, Modbus serial to TCP Gateway with basic web page
ICWL2422E1M0	277–480	IFE, Modbus serial to TCP Gateway with basic web page
ICWL2222M01	120–240	IFM, Modbus serial communications
ICWL2422M01	277–480	IFM, Modbus serial communications

**Figure 5: Communications Unit**



**Figure 6: IFM Connections Identification**



To access the website go to: <http://www.schneider-electric.com>  
For application assistance, please call 1-888-778-2733.

**NOTE:** Refer to the bulletins shipped with each component and included in the I-Line Smart Cell installation packet for detailed set-up instructions.

1. Connect 24 Vdc power to the Micrologic trip unit of the circuit breaker by stripping the power supply wires of the trip unit and installing the wire into the appropriate screw terminal plug from the accessory panel of the I-Line Smart Cell.

**NOTE:** Refer to the instructions provided with the circuit breaker and/or trip unit for details. Refer to installation instructions on Figure 1 for I-Line Smart Cell mechanical mounting details [Red=positive(+) / Black=negative (-)].

2. Repeat for multiple trip units by utilizing a multi-conductor terminal strip such as Phoenix Contact 3007110 or equivalent.
3. Connect the RJ45 ULP cable(s) from the Micrologic trip unit(s) to the RJ45 connector labeled “ULP” located on the accessory panel of the I-Line Smart Cell (refer to *Appendix* for additional wiring details).
4. The ID number of the ULP connectors mounted on the accessory panel will match the Modbus address that is set on the face of the IFM (refer to Figure 6 for more detail).
5. For remote data collection, connect the customer supplied Ethernet cable to the RJ45 connector labeled “ETHERNET” located on the accessory panel of the I-Line Smart Cell (refer to *Appendix—IFE Communications Connections*, on page 10, for additional wiring details).
6. Refer to *Documentation References for Communications Packages*, on Figure 14, for set-up and usage information.

**Table 7: Communications Package Characteristics**

B1	Accessory Plate	Location of accessory connections.
B2	Ethernet Connection	Front Ethernet connection.
B3	Tyco 2111122-1—Ethernet Connection	Ethernet connection.
B4	Tyco 2111122-1—Modbus (ULP) Connection	Connection for ULP communication.
B5/B6	Phoenix Contact 3073393 —Qty. 2, Feed-Through Terminals for 24 Vdc	Connection from internal 24 Vdc power supply.
B7	2-Pole Fused Disconnect	Provide ability to remove power from unit while engaged on the I-Line bus stack. (5 ampere FNQ-R-5 CC fuse)
B8	STRV00210 —IFM Module	ULP to Modbus serial converter.
B9	LV434011—IFE Gateway Unit	Provides Ethernet communications and web server to Modbus serial and ULP.

**Table 8: Accessory Panel Connection Identification**

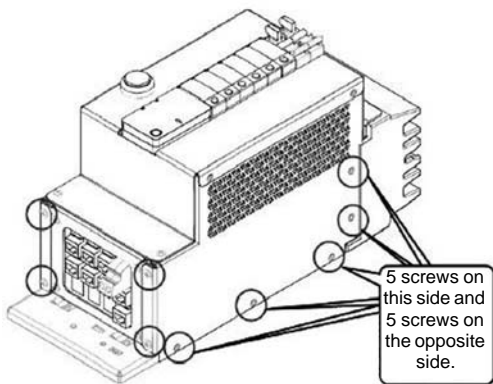
E	Ethernet Connection	Cat5e Shielded
P	24 Vdc Power Supply	24 AWG–14 AWG wire
R	RS-485 Connection	24 AWG–14 AWG wire
1	ULP 1 – IFM 1	Cat5e Shielded
2	ULP 2 – IFM 2	Cat5e Shielded
3	ULP 3 – IFM 3	Cat5e Shielded

4	ULP 4 – IFM 4	Cat5e Shielded
5	ULP 5 – IFM 5	Cat5e Shielded
6	ULP 6 – IFM 6	Cat5e Shielded
7	ULP 7 – IFM 7	Cat5e Shielded
8	ULP 8 – IFM 8	Cat5e Shielded

## Expanding the Communication Package—Single Unit

**NOTE:** Refer to the bulletins shipped with each component and included in the I-Line I-Line Smart Cell installation packet for detailed set-up instructions.

**Figure 7: Cover Removal**



### NOTICE

#### HAZARD OF IMPROPER FUNCTIONALITY

Read ULP system bulletin (catalog number TRV99101) before activating any ULP components.

**Failure to follow this instruction can result in equipment damage.**

1. Turn off all power supplying this equipment before working on or inside equipment. Remove I-Line Smart Cell from equipment prior to removing covers.
2. Refer to Table 9 for necessary components to install additional IFMs to I-Line Smart Cell.  
**NOTE:** Not all I-Line Smart Cells can add IFMs.
3. Remove top and side covers by removing the 14 screws identified in Figure 7 using a #2 Phillips head screwdriver.
4. Remove DIN mounted spacers (MG27062)—two spacers equals the same width of one IFM.
5. Install stacking accessory (TRV00217) to DIN rail as shown in steps 1 and 2 of Figure 8.
6. Remove cover from bottom of IFM unit as shown in step 3 of Figure 8.
7. Place IFM onto installed stacking accessory and DIN rail, as shown in steps 5, 6, and 7 of Figure 8.
8. Repeat steps 4 through 7, above, for multiple IFM installations.
9. Install Ethernet patch cable to IFM RJ45 port (refer to Figure 9).
10. Install ULP line terminator (TRV00880) in other RJ45 port (refer to Figure 9).
11. Remove appropriate tab (refer to Figure 6 for factory locations) from accessory panel and install in-line RJ45/RJ45 coupler (Tyco# 2111122-1).
12. Connect the other end of the Ethernet patch cable from step 9 to the RJ45/RJ45 coupler.
13. Replace top and side covers using #8-32 x 3/8 inch long screws as shown in Figure 7.
14. Adjust the IFM Modbus address as shown in Figure 6.
15. Unit is now ready to install for multiple circuit breakers according to *Communications Package Accessory and Control Wiring* on page 5.
16. Refer to *Documentation References for Communications Packages* on page 7 for set-up and usage information.

**Table 9: Components for IFM Install**

Part Number	Description	Qty
STRV00211	IFM module	1
TRV00217	Stacking accessory	1
2111122-1	Internal coupler RJ45 to RJ45	1
TRV00880	ULP line terminator	1
TRD855STR-1	Ethernet patch cable	11

<sup>1</sup> Requires two when adding the first IFM to an IFE only I-line Smart Cell unit.

Figure 8: IFM Installation

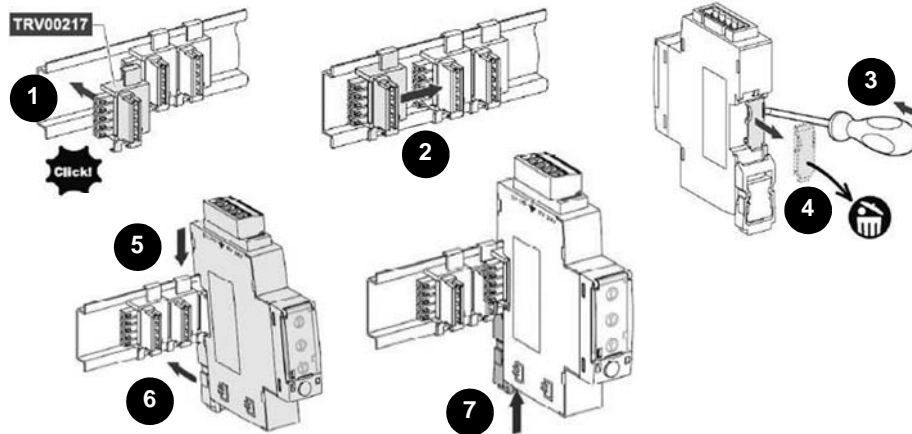
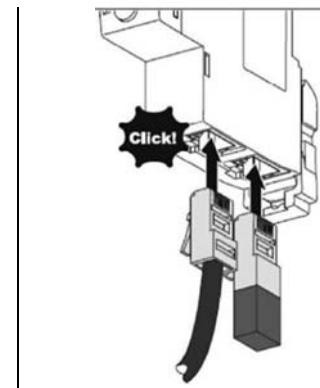
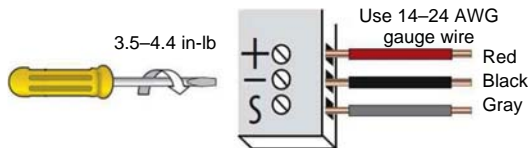


Figure 9: IFM RJ45 Ports



## Connecting Multiple Communication I-Line Smart Cells

Figure 10: RS-485 Pinout



### NOTICE

#### HAZARD OF IMPROPER FUNCTIONALITY

Read ULP system bulletin (catalog number TRV99101) before activating any ULP components.

Failure to follow this instruction can result in equipment damage.

1. Turn off all power supplying this equipment before working on or inside equipment.
2. When connecting two communication I-Line Smart Cells, they will utilize an RS-485 connection type.
3. When connecting two I-Line Smart Cell (IFE Smart Cells and IFM only I-Line Smart Cell), connect using a standard RS-485 Cable (i.e. Belden 9841), such as shown in Figure 10. Refer to *Appendix* for additional wiring schemes.
4. If the connection is between an I-Line Smart Cell and any other gateway or Modbus equipment, the receiving components should be capable of accepting an RS485 Connections.
5. Refer to *Documentation References for Communications Packages* below for set-up and usage information.

## Documentation References for Communications Packages

For additional information see the following user guides available on the Schneider Electric website:

- Catalog TRV99101—*ULP (Universal Logic Plug) System*
- 0611CT1001—*PowerPact H-, J- and L-frame Circuit Breakers*
- 48049-251-01—*PowerPact M-frame Circuit Breakers*
- 48049-148-05—*PowerPact P-frame and NS-630b – NS1600 Circuit Breakers*
- 48049-243-04—*PowerPact R-frame and NS-1600b – NS3200 Circuit Breakers*
- 48049-330-03—*Micrologic 5.0H and 6.0H Electronic Trip Units*
- 48049-137-05—*Micrologic 5.0P and 6.0P Electronic Trip Units*
- 1040IB1401—*IFE Ethernet Interface for LV Circuit Breakers User Guide (UL)*
- 48940-326-01—*Modbus Interface Module (IFM) for PowerPact H-, J-, and L-frame Circuit Breakers*

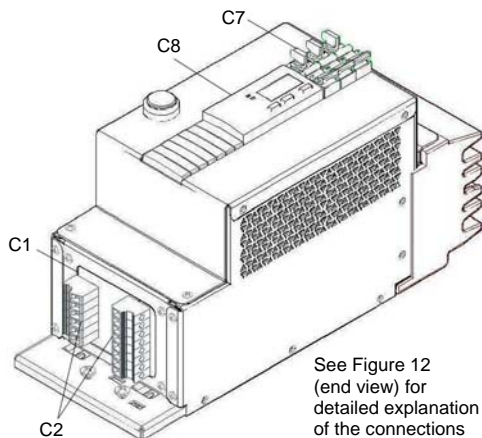
To access the website go to: <http://www.schneider-electric.com>.  
For application assistance, please call 1-888-778-2733.

## Metering Package Accessory and Control Wiring

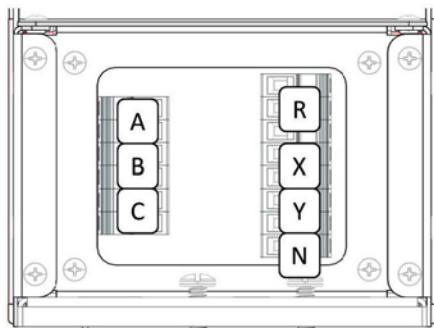
**Table 10: Catalog Numbers of Metering Units**

Catalog Number	Voltage Vac	Feature
ICWL263X3555	120–600	EM3555 Meter Modbus
ICWL263X3560	120–600	EM3560 Meter (BacNET)

**Figure 11: Metering Package**



**Figure 12: Metering Connections Identification**



**NOTE:** Refer to the bulletin shipped with each accessory for installation instructions.

1. Connect the low voltage current transducers (LVCTs) (1 or 0.333 Vac) to the lower male screw terminal plugs provided and identified in Figure 12 as A, B, and C (meters are factory set to 0.333 Vac).

**NOTE:** Refer to the instructions provided with the transducer for details. Refer to installation instructions on page 2 for I-Line Smart Cell mechanical mounting details.

2. If the system utilizes an alarm output, connect to the appropriate normally-open (NO) or normally-closed (NC) connectors, identified as X and Y in Figure 12.
3. If the voltage system requires a neutral, the remote connection, as identified in Figure 12 as "N" and labeled "NEUT", must be used.
4. If you are connecting the metered I-Line Smart Cell unit to a communications I-Line Smart Cell unit with IFE gateway, you may connect the RS-485 connections (see Figure 10) using a standard 2-wire RS-485 shielded cable such as Belden# 9841 (refer to *Appendix—Meter Connections*, Figure 16, for additional details).
5. When connecting the LVCTs to the metering I-Line Smart Cell units, please note that "X1"="WHITE"="+" and "X2"="BLACK"="-".

**NOTE: For EM3560 (BACnet), refer to ZL0094-0A for BACnet protocol and compatibility details.**

6. Refer to *Documentation References for Metering Packages* below for additional set-up and usage information.

**Table 11: Metering Package System Characteristics**

C1	Accessory Plate	Location of accessory operation connections.
C2	Phoenix Contact # 3073393—Terminals	Data connections for Meter.
C7	3-Pole Fused Disconnect	Provide ability to remove power from unit while engaged on the I-Line bus stack. (3 amp FNQ-R-3 CC fuse)
C8	Energy Meter (EM3555—Modbus or EM3560—BACnet)	Provides data logging and communications. (Refer to meter documentation for detailed capabilities.)

**Table 12: Metering Accessory Panel Connection Identification**

R	RS-485 / BACnet Connection	Cat5e shielded
N	Neutral Connection (as required)	14 AWG wire
X	EM3555—NO Output, EM3560—Pulse 2 Input	24 AWG twisted pair
Y	EM3555—NC Output, EM3560—Pulse 1 Input	24 AWG twisted pair
A	A-phase LVCT Connections (refer to Figure 16 for part numbers)	24 AWG–14 AWG
B	B-phase LVCT Connections (refer to Figure 16 for part numbers)	24 AWG–14 AWG
C	C-phase LVCT Connections (refer to Figure 16 for part numbers)	24 AWG–14 AWG

## Documentation References for Metering Packages

For additional information see the following user guides available on the Schneider Electric website:

- ZL0093-0A—*EM3555 Bi-directional Compact Powered Energy Meter Installation Guide*
- ZL0094-0A—*EM3560 Compact Power and Energy Meter Installation Guide*
- 48940-329-01—*ULP (Universal Logic Plug) System - User Guide*
- 3000HO1201—*EM3500 Series DIN Rail meter Technical Data Sheet*
- Z205398-0B—*Powerlogic LVCT 1 VAC and .333VAC Current Transducers Installation Guide*

To access the website go to: <http://www.schneider-electric.com>

For application assistance, please call 1-888-778-2733.

Appendix

NOTE: The notice below pertains to all four figures in this appendix.

**NOTICE**

**HAZARD OF EQUIPMENT DAMAGE, LOSS OF OPERATION**

- Maximize the distance between and segregate the 24 Vdc and communications wiring from potentially noisy circuit breaker power cables.
- If 24 Vdc and communications wiring must cross power cables, cross as close to 90 degrees to the power cables as possible.
- Limit parallel runs of control cable and power cables to the absolute minimum possible.
- Flatten control cables and route along metallic structure when possible.

Failure to follow these instructions may result in equipment damage or loss of operation.

Figure 13: ERMS Connections

- A BSCM or BCM Module
- B OF, SDE... Microswitches
- C Internal terminal block for communications via NSX cord
- D MX1 and XF communicating voltage releases
- E Micrologic Trip Unit X.0P or H
- F ULP cable
- G 24 Vdc power—24 AWG twisted pair
- H Ethernet cable
- J ERMS I-Line Smart Cell Unit

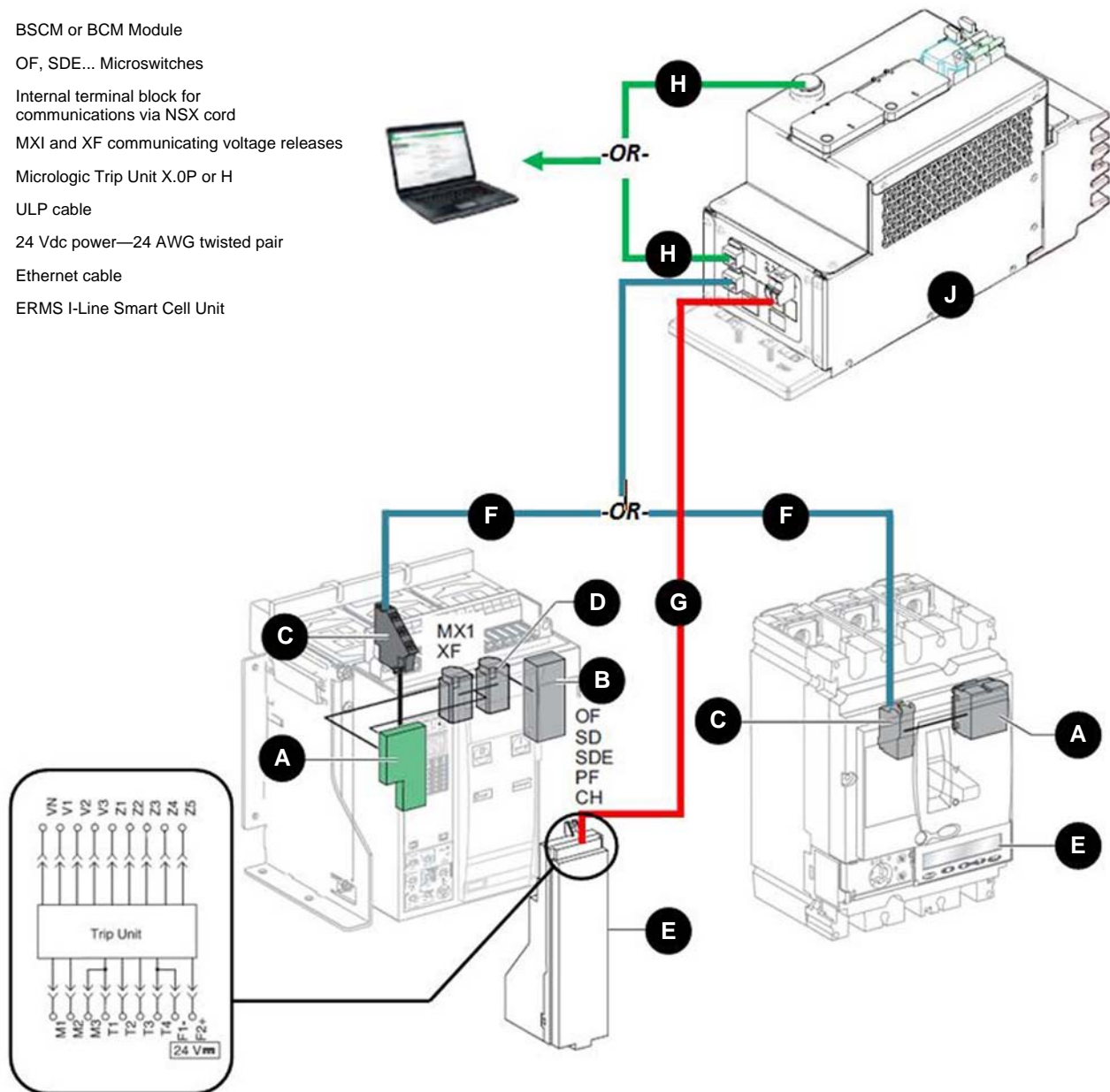
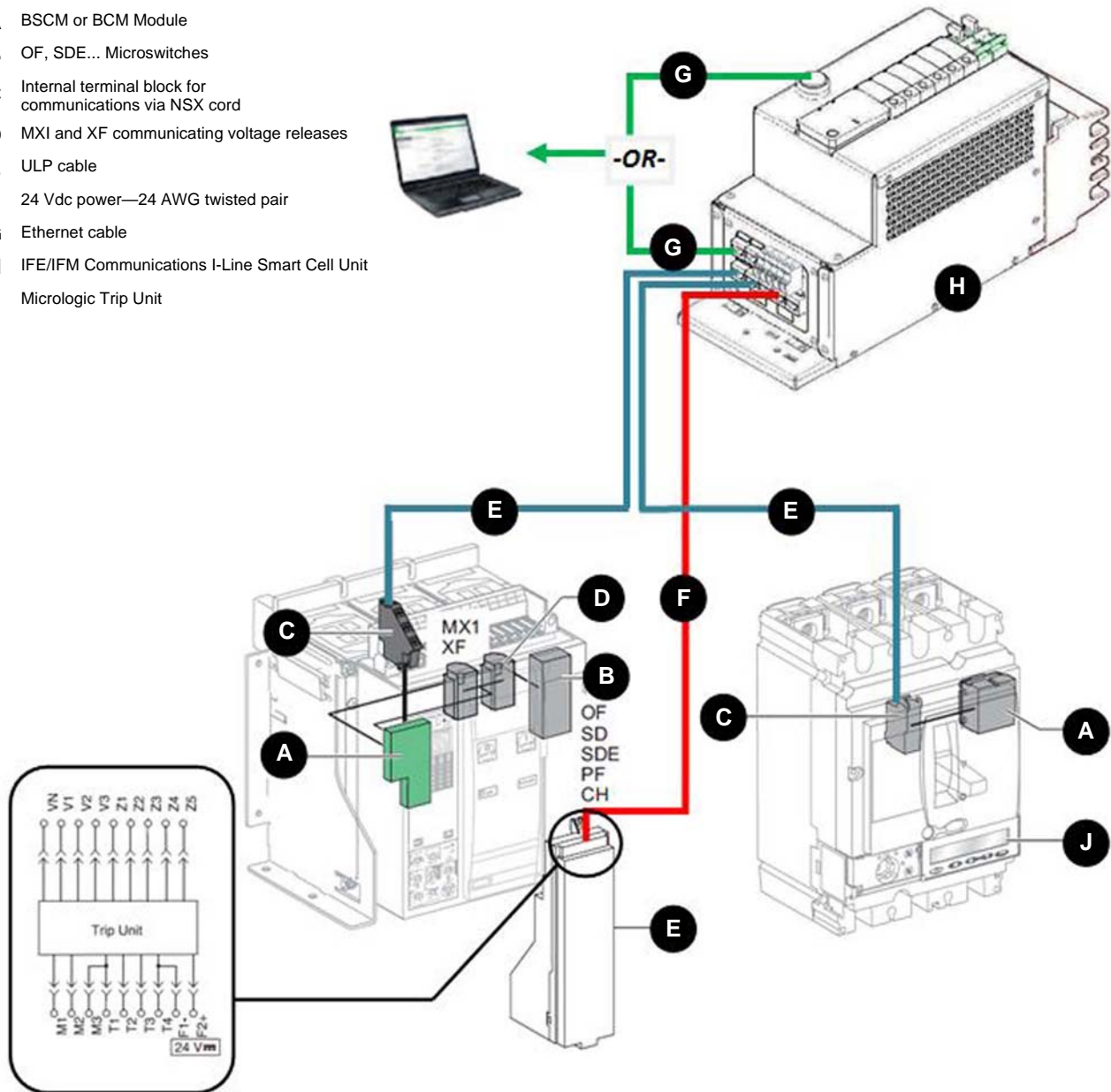


Figure 14: IFE Communications Connections

- A BSCM or BCM Module
- B OF, SDE... Microswitches
- C Internal terminal block for communications via NSX cord
- D MX1 and XF communicating voltage releases
- E ULP cable
- F 24 Vdc power—24 AWG twisted pair
- G Ethernet cable
- H IFE/IFM Communications I-Line Smart Cell Unit
- J Micrologic Trip Unit



**Figure 15: Multi-Unit Communications Connections**

- A** BSCM or BCM Module
- B** Internal terminal block for communications via ULP cord
- C** Micrologic Trip Unit
- D** ULP cable
- E** RS-485 cable (screw terminals)
- F** Ethernet cable
- G** IFE/IFM Communications I-Line Smart Cell Unit
- H** IFM Communications I-Line Smart Cell Unit

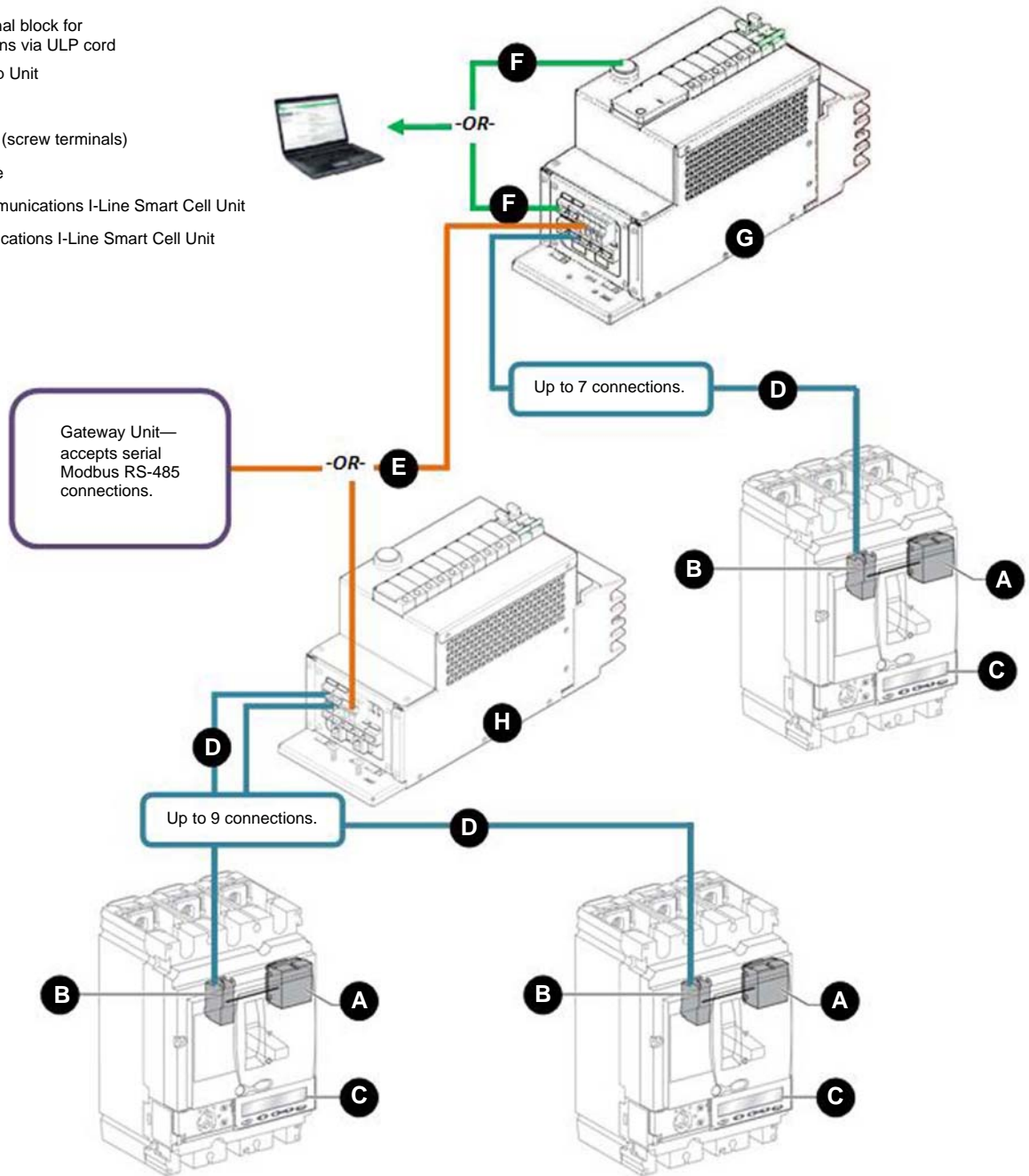
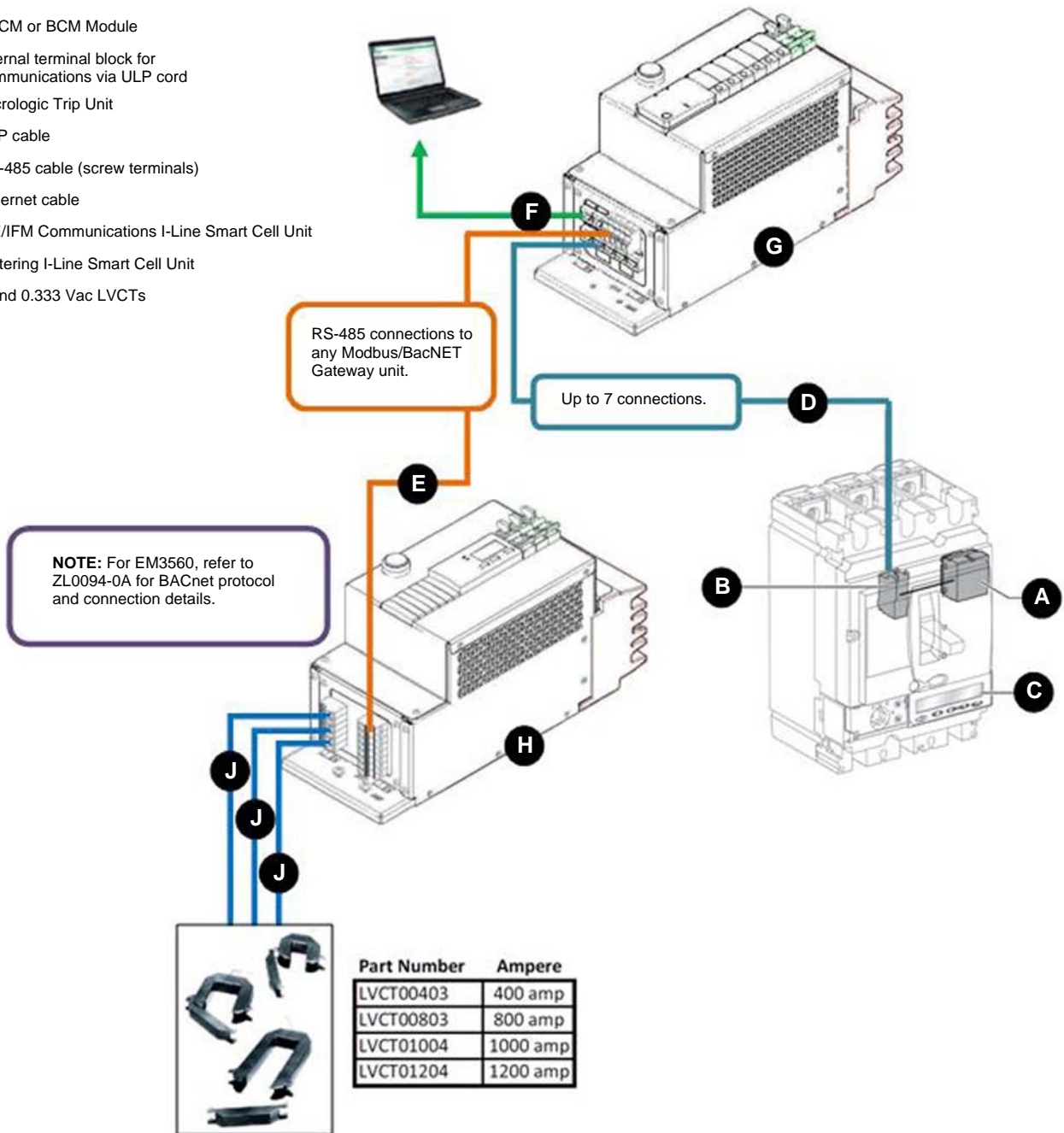


Figure 16: Meter Connections

- A BSCM or BCM Module
- B Internal terminal block for communications via ULP cord
- C Micrologic Trip Unit
- D ULP cable
- E RS-485 cable (screw terminals)
- F Ethernet cable
- G IFE/IFM Communications I-Line Smart Cell Unit
- H Metering I-Line Smart Cell Unit
- J 1 and 0.333 Vac LVCTs



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