# I-Line<sup>™</sup> Enable Module

## **Class 2110**

## **Instruction Bulletin**

This bulletin contains instructions for installing Square D<sup>™</sup> brand I-Line Enable Modules.

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## **Safety Information**

Read these instructions carefully and examine the equipment to become familiar with the device before attempting to install, operate, service, or maintain it. The following special messages may appear throughout this user guide or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

### 

**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

#### **A**WARNING

**WARNING** indicates a hazardous situation which, if not avoided, **could result** in death or serious injury.

### **A**CAUTION

**CAUTION** indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

### NOTICE

NOTICE is used to address practices not related to physical injury.

**NOTE:** Provides additional information to clarify or simplify a procedure.

## **Please Note**

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Electrical equipment should be transported, stored, installed, and operated only in the environment for which it is designed.

## **About the Book**

# Primary Range: EcoStruxure™

*EcoStruxure* is Schneider Electric's IoT-enabled, plug-and-play, open, interoperable architecture and platform, in Homes, Buildings, Data Centers, Infrastructure and Industries. Innovation at Every Level from Connected Products to Edge Control, and Apps, Analytics and Services.

### **Document Scope**

Use this document to:

• Install Square D I-Line Enable Modules.

### **Validity Note**

This instruction bulletin is valid for Square D I-Line installations in the North American region only.

For product compliance with environmental directives such as RoHS, REACH, PEP, and EOLI, go to www.se.com/green-premium.

For technical characteristics of the physical modules described in this bulletin, go to www.se.com.

The technical characteristics presented in this bulletin should be the same as those that appear online. We may revise content over time to improve clarity and accuracy. If you see a difference between the information contained in this bulletin and online information, use the online information.

# **I-Line Enable Definition**

I-Line Enable Modules are a range of I-Line stack-mounted modular units. The modular unit is a mechanical and electrical assembly containing one or more devices to perform a function in a panelboard (or switchboard). Its built-in electronics and devices are suited for monitoring, metering, communication, and protection features.

With the footprint of an L-Frame PowerPacT Circuit Breaker, all I-Line Enable Modules mount inside a standard panelboard to provide a compact, space saving installation.

The product name "I-Line Enable Module" (also called "I-LEM") applies to both the enclosure and the device with which it is provided and gives it the name.

For the fullest description and technical characteristics of devices, refer to the related documents listed in Appendix C - Documentation References, page 77.

## Terminology

The terminology used in this document is defined in the following table.

#### Table 1 - Terminology

Term	Definition
IFM	IFM Device
IFM I-LEM	IFM I-Line Enable Module. The modular unit featuring the IFM Modbus communication.
U-PaS	U-PaS Device
U-PaS I-LEM	U-PaS I-Line Enable Module. The modular unit featuring the Universal Panel Server.
ERMS	Energy Reduction Maintenance Setting Switch + IFE
ERMS I-LEM	ERMS I-Line Enable Module. The modular unit featuring the ERMS function along with Ethernet communication via IFE.
ERM2	Energy Reduction Maintenance Setting Switch + IFM
ERM2 I-LEM	ERM2 I-Line Enable Module. The modular unit featuring the ERMS function along with Modbus Serial communication via IFM.
MMS	Maintenance Mode Setting Switch
MMS I-LEM	MMS I-Line Enable Module. The modular unit featuring the MMS function. Does not feature communication.
PM	Power Meter Device
PM I-LEM	PM I-Line Enable Module. The modular unit featuring either Power Meter 5563 or Power Meter 8244.

# **Catalog Numbers and Features**

The I-Line Enable Module is available with a variety of solutions.

**NOTE:** Panelboards can use either Bottom Feed or Top Feed. Switchboards use only Bottom Feed versions.

#### Table 2 - I-Line Enable Catalog Numbers

Segment	Character	Description	I	С	w	R	2	4	2	х	U-PaS	
Product	1	I-Line										
	С	I-Line Enable Module	I-Line Enable Module									
Mounting side	W	Wide Side										
on I-Line Panel	N	Narrow Side										
Panelboard	L	Left (Bottom Feed)										
Teeu	R	Right (Top Feed)				-						
I-Line Enable Module Height	2	6 in					-					
	2	240 V						-				
	4	480 V						-				
	6	600 V										
Stabs	2	2 Phase Stabs										
	3	3 Phase Stabs										
Power Supply	Х	No Isolated Power Supply (No 24VDC C	utput	for Tr	ip Unit	:)						
system	2	Isolated 24VDC Power Supply										
	M01	IFM(s)									1	
	ERMS	ERMS + IFE (Ethernet version)										
	ERM2	ERMS + IFM (Modbus version)										
	5563	PM5563 Meter										
8244 PM8244 Meter												
MMS MMS												
	U-PaS	Universal Panel Server										

#### Table 3 - I-Line Enable Commercial References

Catalog Number	Voltage VAC	Features
ICNL2222MMS	240	Narrow Side, Left (Bottom Feed), Maintenance Mode Switch
ICNR2222MMS	240	Narrow Side, Right (Top Feed), Maintenance Mode Switch
ICNL2422MMS	480	Narrow Side, Left (Bottom Feed), Maintenance Mode Switch
ICNR2422MMS	480	Narrow Side, Right (Top Feed), Maintenance Mode Switch
ICWL2222MMS	240	Wide Side, Left (Bottom Feed), Maintenance Mode Switch
ICWR2222MMS	240	Wide Side, Right (Top Feed), Maintenance Mode Switch
ICWL2422MMS	480	Wide Side, Left (Bottom Feed), Maintenance Mode Switch
ICWR2422MMS	480	Wide Side, Right (Top Feed), Maintenance Mode Switch
ICWL2622MMS	600	Wide Side, Left (Bottom Feed), Maintenance Mode Switch
ICWR2622MMS	600	Wide Side, Right (Top Feed), Maintenance Mode Switch
ICWL2222ERMS	240	Wide Side, Left (Bottom Feed), ERMS - Ethernet communications
ICWR2222ERMS	240	Wide Side, Right (Top Feed), ERMS - Ethernet communications
ICWL2422ERMS	480	Wide Side, Left (Bottom Feed), ERMS - Ethernet communications
ICWR2422ERMS	480	Wide Side, Right (Top Feed), ERMS - Ethernet communications
ICWL2222ERM2	240	Wide Side, Left (Bottom Feed), ERMS - Modbus communications
ICWR2222ERM2	240	Wide Side, Right (Top Feed), ERMS - Modbus communications
ICWL2422ERM2	480	Wide Side, Left (Bottom Feed), ERMS - Modbus communications
ICWR2422ERM2	480	Wide Side, Right (Top Feed), ERMS - Modbus communications
ICWL2622ERM2	600	Wide Side, Left (Bottom Feed), ERMS - Modbus communications
ICWL2622ERM2	600	Wide Side, Right (Top Feed), ERMS - Modbus communications
ICNL2222M01	240	Narrow Side, Left (Bottom Feed), IFM, Interface for Modbus-SL communications
ICNR2222M01	240	Narrow Side, Right (Top Feed), IFM, Interface for Modbus-SL communications
ICNL2422M01	480	Narrow Side, Left (Bottom Feed), IFM, Interface for Modbus-SL communications
ICNR2422M01	480	Narrow Side, Right (Top Feed), IFM, Interface for Modbus-SL communications
ICWL2222M01	240	Wide Side, Left (Bottom Feed), IFM, Interface for Modbus-SL communications
ICWR2222M01	240	Wide Side, Right (Top Feed), IFM, Interface for Modbus-SL communications
ICWL2422M01	480	Wide Side, Left (Bottom Feed), IFM, Interface for Modbus-SL communications
ICWR2422M01	480	Wide Side, Right (Top Feed), IFM, Interface for Modbus-SL communications
ICWL2622M01	600	Wide Side, Left (Bottom Feed), IFM, Interface for Modbus-SL communications
ICWR2622M01	600	Wide Side, Right (Top Feed), IFM, Interface for Modbus-SL communications
ICWL243X5563	120–480	Wide Side, Left (Bottom Feed), PM5563 meter
ICWR243X5563	120–480	Wide Side, Right (Top Feed), PM5563 meter
ICWL263X5563	600	Wide Side, Left (Bottom Feed), PM5563 meter
ICWR263X5563	600	Wide Side, Right (Top Feed), PM5563 meter
ICWL243X8244	120–415	Wide Side, Left (Bottom Feed), PM8244 meter
ICWR243X8244	120–415	Wide Side, Right (Top Feed), PM8244 meter
ICWL263X8244	480–600	Wide Side, Left (Bottom Feed), PM8244 meter
ICWR263X8244	480–600	Wide Side, Right (Top Feed), PM8244 meter

#### Table 3 - I-Line Enable Commercial References (Continued)

Catalog Number	Voltage VAC	Features
ICNL222XUPAS	240	Narrow Side, Left (Bottom Feed), Universal Panel Server
ICNR222XUPAS	240	Narrow Side, Right (Top Feed), Universal Panel Server
ICNL242XUPAS	480	Narrow Side, Left (Bottom Feed), Universal Panel Server
ICNR242XUPAS	480	Narrow Side, Right (Top Feed), Universal Panel Server
ICWL222XUPAS	240	Wide Side, Left (Bottom Feed), Universal Panel Server
ICWR222XUPAS	240	Wide Side, Right (Top Feed), Universal Panel Server
ICWL242XUPAS	480	Wide Side, Left (Bottom Feed), Universal Panel Server
ICWR242XUPAS	480	Wide Side, Right (Top Feed), Universal Panel Server
ICWL262XUPAS	600	Wide Side, Left (Bottom Feed), Universal Panel Server
ICWR262XUPAS	600	Wide Side, Right (Top Feed), Universal Panel Server

**NOTE:** Narrow side I-Line Enable Modules can be installed in the narrow side of HCJ, HCP, and HCR I-Line Panelboards, as well as Switchboard QED2 I-Line Distribution Section. Wide side I-Line Enable Modules can be installed in the wide side of HCP, HCPSU, and HCR I- Line Panelboards, I-Line Combo Panelboards, as well as Switchboard QED2 I-Line Distribution Section.

## Precautions

Read and understand the following precautions before performing any procedures in this guide.

### **A**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 only be installed and serviced 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 that all power is off.
- Read and understand this entire Instruction bulletin and the latest edition of the included NEMA PB 1.1 standards publication 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.



**WARNING:** This product can expose you to chemicals including Nickel compounds, which are known to the State of California to cause cancer and Bisphenol A (BPA), which is known to the state of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

## **Qualified Personnel**

Only appropriately trained persons who are familiar with and understand the content of this guide and all other related product documentation are authorized to work on and with this product.

The qualified person must be able to detect possible hazards that may arise from modifying parameter values and generally from mechanical, electrical, or electronic equipment. The qualified person must be familiar with the standards, provisions, and regulations for the prevention of industrial accidents, which they must observe when designing and implementing the system.

The use and application of the information contained in this guide requires expertise in the design and programming of automated control systems. Only you, the user, the machine builder, or the integrator, can be aware of all the conditions and factors present during installation, setup, operation, and maintenance of the machine or process, and can therefore determine the automation and associated equipment and the related safeties and interlocks which can be effectively and properly used.

When selecting automation and control equipment (and any other related equipment or software) for a particular application, you must also consider applicable local, regional, or national standards and/or regulations.

Pay particular attention to adhere to any safety information, electrical requirements, and normative standards that apply to your machine or process in the use of this equipment.

### **Intended Use**

The products described in this instruction bulletin, together with software, accessories, and options, are communications and metering devices, intended for industrial use according to the instructions, directions, examples, and safety information contained in this document and other supporting documentation.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements, and the technical data.

Before using the product, you must perform a hazard analysis and risk assessment of the planned application. Based on the results, appropriate safety related measures must be implemented.

Since the product is used as a component of a machine or process, you must ensure the safety of persons by means of the overall system design.

Operate the product only with the specified cables and accessories. Use only genuine accessories and spare parts.

Any use other than the use explicitly permitted is prohibited and can result in unanticipated hazards.

## Cybersecurity

**NOTE:** Schneider Electric adheres to industry best practices in the development and implementation of control systems. This includes a "Defense-in-Depth" approach to secure an industrial Control System. This approach places the controllers behind one or more firewalls to restrict access to authorized personnel and protocols only.

### **A**WARNING

# UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION

- Evaluate whether your environment or your machines are connected to your critical infrastructure and, if so, take appropriate steps in terms of prevention, based on Defense-in-Depth, before connecting the automation system to any network.
- · Limit the number of devices connected to a network inside your company.
- · Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.
- Monitor activities within your systems.
- Prevent subject devices from direct access or direct link by unauthorized parties or unauthenticated actions.
- Prepare a recovery plan including backup of your system and process information.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

# **Moisture Contamination Avoidance and Mitigation**

### 

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

- Store the equipment in a clean, dry (including no condensation), well-ventilated area with an ambient temperature from -4 °F (-20 °C) to 167 °F (75 °C).
- If the area is cold and damp, use a temporary heating source.
- Avoid greasy, smoky heaters that can deposit carbon on insulation, which could lead to tracking and insulation breakdown.
- If moisture, condensation, or chemical ingress is observed, do not energize the equipment. If the equipment is already energized, de-energize it immediately.

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

#### **A**WARNING

#### FIRE HAZARD

• Remove all flammable material in the vicinity of the heaters, such as packaging, accessories in boxes, and documentation, before energizing the heaters.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

### **Shipping and Storage Requirements**

This equipment does not achieve its ratings until it is installed per record drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be stored in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage.

- The equipment should be treated as if it is in storage until it is installed and operational. The storage area should be clean, dry (75% or less relative humidity), and with proper ventilation.
- To keep the equipment dry, the use of heaters is required in some cases (for example, during seasonal or low periods of electrical loading and equipment deenergization).

— Consult the Engineer of Record for the appropriate environmental control settings or means to mitigate environmental influences.

— If heaters are being used, they must be clean and free of debris and grease. Greasy and/or smoky heaters can contaminate electrical insulation and lead to dielectric breakdown and/or tracking.

• The factory shipping wrap around the equipment on shipping pallets is not suitable for non-enclosed over-the-road transportation that risks exposing the equipment to the elements. The factory shipping wrap around the equipment should remain on the equipment until the equipment is ready to be inspected and stored or inspected and installed. Upon receipt of the equipment, immediately inspect it for damage that may have occurred in transit. If damage is found or suspected, immediately file a claim with the carrier and notify your Schneider Electric representative.

- When receiving equipment, the equipment may be at a lower temperature than
  the ambient air temperature. Allow time for the equipment to rise to ambient air
  temperatures before making openings in or otherwise disturbing the packaging.
  Condensation can occur on and inside the equipment if warm air contacts cold
  surfaces of the equipment. Moisture damage can occur, destroying the dielectric
  capabilities of the equipment and rendering it unusable. Once the equipment is
  unwrapped, follow the instructions contained in this document.
- Follow these guidelines every time the equipment is moved to a new storage location or to its final destination.

### Installation, Operation, and Maintenance Requirements

This equipment does not achieve its ratings until it is installed per record drawings, installed per the instructions contained in this document, and has operational environmental controls with appropriate settings to help mitigate environmental influences. This equipment can also be operated in a climate controlled area that uses both heating and cooling to maintain acceptable environmental conditions. Indoor and outdoor rated equipment is not suitable for outdoor storage.

In some cases (such as seasonal electrical loading, de-energized equipment, and standby/alternate power sources), the heat generated by equipment loading is insufficient to prevent condensation and alternate heat sources are required. If environmental controls such as a thermostat or humidistat are used, ensure their settings are sufficient to mitigate condensation and remain operational at all times. Consult the Engineer of Record for the appropriate environmental control settings.

### **Exposure to Moisture and Chemicals**

If liquids such as moisture or chemicals contact the electronics, circuit breaker, fuses, bussing, or other electrical components, do not attempt to clean or repair the equipment as this may lead to unrepairable damage. If the equipment is energized, de-energize it. If equipment is not energized, do not energize it. Contact the Schneider Electric Customer Care Center at 888-778-2733.

## **General Information**

## Introduction

This bulletin contains instructions for installing Square D brand I-Line Enable Modules. These I-Line Enable Modules are Underwriters Laboratories (cURus) approved and are suitable to be installed in I-Line Panelboards or QED2 I-Line Distribution Sections.

## Assistance

For technical support on the installation of this I-Line Enable Module, contact Schneider Electric customer support at 1–888–778–2733.

Refer to https://www.se.com.

## **Kit Contents / Necessary Tools**





# **I-Line Enable Module Installation**

### 

#### 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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.

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

## NOTICE

#### HAZARD OF EQUIPMENT DAMAGE

- Do not adjust jaws.
- Do not remove joint compound.
- If necessary, use Square D joint compound PJC7201.

Failure to follow these instructions can result in equipment damage.

## **I-Line Enable Module Installation Instructions**

Follow this procedure to install the I-Line Enable Module. Refer to the Figures at the end of this section to assist with the installation instructions:

- 1. Turn off all power to the equipment.
- 2. Remove doors, covers, trims, and/or dead fronts to access the I-Line interior.

3. Turn the fused disconnect switch of the I-Line Enable Module off. Position the I-Line Enable Module jaws against the bus bar stack so the guide rib on the bottom of the I-Line Enable Module is oriented towards the alignment groove in the bus insulator base, and make sure the fingers of the I-Line Enable Module bracket fit into the key slots in the pan.





- 4. Place a long-shanked slotted screwdriver through the rectangular hole in the I-Line Enable Module mounting bracket and into the screwdriver slot in the mounting pan.
- 5. Ratchet the I-Line Enable Module firmly onto the bus bar stack and align the retaining screw with the 7/32 in. (5.6 mm) mounting hole in the pan.

**NOTE:** Do not force the I-Line Enable Module onto the bus stack.





6. Tighten the retaining screw securely to prevent the I-Line Enable Module from moving.

Torque the screw to 3 N•m (20 lb-in).

**NOTE:** Ensure the retaining screw is tight, but do not tighten it enough to bend the mounting bracket.

#### Figure 4 - Tighten Retaining Screw



- 7. Make all necessary electrical and communication connections. Refer to Appendix A System Communication Schematics, page 51 and Appendix B Installation Schematics, page 66 for appropriate connections.
- 8. Reinstall interior dead front, trim barriers, and the door pans (when applicable).
- 9. Re-energize the equipment.
- 10. Turn the fused disconnect switch of the I-Line Enable Module on.

**NOTE:** I-Line Enable Modules are supplied with factory-applied joint compound on the plug-on connectors. The compound must not be removed because it contributes to the overall performance of the connection.

**NOTE:** Whenever an I-Line Enable Module is removed and reinstalled, the joint compound must be reapplied. Use joint compound PJC-7201. A two-ounce container of this compound especially formulated for I-Line plug-on connectors is available for purchase (catalog number PJC-7201).

### I-Line Enable Module Installation Graphics

Figure 5 - I-Line Enable Module Installation



#### Table 4 - Legend — Graphics

Α	Mounting Bracket Retaining Hook (fingers)
В	Pan Key Slots
С	Retaining Screw
D	Mounting Bracket
E	I-Line Enable Module Rectangular Hole
F	Guide Rib
G	Alignment Grove

### I-Line Enable Module Basic Dimensions

#### Figure 6 - I-Line Enable Module

Wide side version shown.



#### Figure 7 - I-Line Enable Module Basic Dimensional Diagrams

Wide side version shown.



Table 5 - I-Line Enable Module Basic Dimensions

		A1	A2	A3	A4	B1	B2	C1	C2	C3	C4	D1
Wide	inch	4.25	7.04	6.28	1.54	3.00	6.00	4.24	7.07	7.5	8.47	14.86
Side	mm	108	179	160	39	76	153	108	180	191	215	378
Narrow	inch	2.74	5.52	4.77	1.54	3.00	6.00	4.24	7.07	7.5	8.47	11.83
Side	mm	70	140	121	39	76	153	108	180	191	215	301

# **Wiring Connection**

### 

#### 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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.

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

## NOTICE

#### HAZARD OF FALSE TORQUE INDICATION

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

Failure to follow these instructions can result in equipment damage.

#### Table 6 - Connector Usage Information

Connector	Description		Conductor			Torraus	Neter
Connector	Description	Туре	Qty	Size	Length	Torque	Notes
		AI	1 per pole				Two conductors, with the
	Terminal Block — Multiple Poles	Cu	1 per pole	24 AWG-14 AWG (0.2-2.5 mm²)	0.28 in. 4.43–5.31 lb (7 mm) (0.5–0.6 N•r	4.43–5.31 lb-in (0.5–0.6 N•m)	be used per pole by utilizing TWIN ferrules with plastic sleeve and having a combined cross section between 2x24 AWG-2x18 AWG (0.5–1.5 mm <sup>2</sup> ).
	RJ45–RJ45 Inline Coupler (Shielded)	Cu	Up to 8 wires (or 4 pairs)	Cat 5e (28–22 AWG)	N/A	N/A	These connectors are used for various protocol connections. Refer to specific catalog type and location information for details.

# **Safety Packages**

## Maintenance Mode Setting (MMS) Switch I-LEM Package Accessory and Control Wiring

#### **A**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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.
- Proper use of MMS (Maintenance Mode Switch) requires engineering analysis, appropriate PPE, and safe electrical work practices.
- See Instruction Bulletin MFR70008 for additional information and hazard messages.

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

Catalog Number	Voltage VAC	Features
ICNL2222MMS	120–240	Narrow Side, Bottom Feed, Maintenance Mode Switch
ICNR2222MMS	120–240	Narrow Side, Top Feed, Maintenance Mode Switch
ICNL2422MMS	277–480	Narrow Side, Bottom Feed, Maintenance Mode Switch
ICNR2422MMS	277–480	Narrow Side, Top Feed, Maintenance Mode Switch
ICWL2222MMS	120–240	Wide Side, Bottom Feed, Maintenance Mode Switch
ICWR2222MMS	120–240	Wide Side, Top Feed, Maintenance Mode Switch
ICWL2422MMS	277–480	Wide Side, Bottom Feed, Maintenance Mode Switch
ICWR2422MMS	277–480	Wide Side, Top Feed, Maintenance Mode Switch
ICWL2622MMS	480–600	Wide Side, Bottom Feed, Maintenance Mode Switch
ICWR2622MMS	480–600	Wide Side, Top Feed, Maintenance Mode Switch

#### Table 7 - MMS I-LEM Switch Catalog Numbers

#### Figure 8 - MMS I-Line Enable Module



Table 8 - MMS I-LEM System Characteristics

G1	Accessory Panel	Location of accessory operation connections					
G2	24 VDC Output - PCB Connector. Phoenix Contact 1778043	Provides 24 VDC from Power Supply to the Trip Unit					
G3	PCB Connector Multiple Poles. Phoenix Contact 1757019	Connections for MMS Switch to MicroLogic Trip Unit ZSI terminals					
G4	MMS (Maintenance Mode Setting) Switch	Switch for activation "ON" / deactivation "OFF" of MMS function					
G5	2-Pole Fused Disconnect Switch	Provides the ability to remove power from the inside of the unit while installed on the I-Line bus stack or connected to the LINE side power source. It doesn't remove power from I-Line bus stack. Fuses: 5A, FNQ-R-5 CC					
N	NOTE: Refer to Connector Usage Information, page 22 for connector details.						

#### Figure 9 - MMS I-LEM Accessory Panel



#### Table 9 - MMS I-LEM Accessory Panel Connection Identification

Ρ	24 VDC Power Outputs Connections	24 AWG-14 AWG (0.2-2.5 mm <sup>2</sup> ) twisted pair cable
Z	ZSI Connections (Z3 and Z4)	24 AWG-14 AWG (0.2-2.5 mm <sup>2</sup> ) twisted pair cable

#### **MMS I-LEM Connections**

**NOTE:** Refer to the Maintenance Mode Switch Instruction Bulletin (MFR70008) for operation and testing instructions.

- Locate the circuit breaker that will be using the MMS. The intended circuit breaker must be within visual range of the switch (MMS functions with trip units that have the Short-time Zone Selective Interlocking (ST-ZSI) capability).
- 2. Install the MMS I-Line Enable Module according to the I-Line Enable Module installation instructions.
- 3. Prepare the intended circuit breaker. Follow the instructions provided with the circuit breaker for all PPE, safe electrical work practices, and hazard messages.
  - a. Remove the plastic cover of the circuit breaker (P- or R-Frame). The number of fasteners will vary depending on the frame size of the circuit breaker.
  - b. Remove the connector block from the top of the trip unit.
  - c. Locate the "Z" connections of the trip unit (typically the left-most section of the 12-pole connector located on the top of the trip unit).
  - d. Provide wires from the Z3 and Z4 connections and route them through the wiring conduit provided on the left-most portion of the molded case of the circuit breaker. Provide a 2 in. jumper between the Z5 and Z3 connection locations. Refer to Connector Usage Information, page 22 for wire size and strip length details. (The wire length should be in excess of the wire-routing path distance from the circuit breaker to the MMS I-Line Enable Module).
  - e. You can also provide 24 VDC power to the trip unit by connecting to the "F" connections (typically the right-most section of the 12-pole connector located on the top of the trip unit).
  - f. Provide wires from the F1 and F2 connections and route them through the wiring conduit provided on the left-most portion of the molded case of the circuit breaker. Refer to Connector Usage Information, page 22 for wire size and strip length details. (The wire length should be in excess of wire-routing path distance from the circuit breaker to the MMS I-Line Enable Module).
  - g. Replace the connector on the top of the trip unit.
  - h. Replace the plastic cover of the circuit breaker.
- 4. Connect the wires from Z3 and Z4 (described in step 3-d above) to the MMS I-Line Enable Module ZSI connections (refer to GDE8239900—MMS I-Line Enable Module (240, 480, and 600 VAC), page 66 for location). Refer to Connector Usage Information, page 22 for wire size and strip length details.
- Connect the wires from F1 and F2 (described in step 3-f above) to the MMS I-Line Enable Module 24 VDC output connections (refer to GDE8239900—MMS I-Line Enable Module (240, 480, and 600 VAC), page 66 for location). Refer to Connector Usage Information, page 22 for wire size and strip length details.

### Energy Reduction Maintenance Setting (ERMS) I-LEM Accessory and Control Wiring

## 

#### 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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.
- Proper use of ERMS (Energy Reduction Maintenance Setting) switch requires engineering analysis, appropriate PPE, and safe electrical work practices.
- Refer to Instruction Bulletin NHA67346 for additional information and hazard messages.

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

#### Table 10 - ERMS I-LEM Catalog Numbers

Catalog Number	Voltage VAC	Features	
ICWL2222ERMS	120–240	Wide Side, Bottom Feed, ERMS - Ethernet communications	
ICWR2222ERMS	120–240	Wide Side, Top Feed, ERMS - Ethernet communications	
ICWL2422ERMS	277–480	Wide Side, Bottom Feed, ERMS - Ethernet communications	
ICWR2422ERMS	277–480	Wide Side, Top Feed, ERMS - Ethernet communications	
ICWL2222ERM2	120–240	Wide Side, Bottom Feed, ERMS - Modbus communications	
ICWR2222ERM2	120–240	Wide Side, Top Feed, ERMS - Modbus communications	
ICWL2422ERM2	277–480	Wide Side, Bottom Feed, ERMS - Modbus communications	
ICWR2422ERM2	277–480	Wide Side, Top Feed, ERMS - Modbus communications	
ICWL2622ERM2	480–600	Wide Side, Bottom Feed, ERMS - Modbus communications	
ICWL2622ERM2	480–600	Wide Side, Top Feed, ERMS - Modbus communications	
<b>NOTE:</b> ERMS units are to be used with X.0 P or H level MicroLogic trip units with ERMS blue label.			



Figure 10 - ERMS IFE I-Line Enable Module

Figure 11 - ERMS IFM (ERM2) I-Line Enable Module

**NOTE:** Ethernet Version shown. Modbus version contains multiple IFMs rather than an IFE. ERMS Switch position is subject to change for clearance purposes without effect.

	Table 1	1 - ERMS	I-LEM S	ystem Ch	naracteristics
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A1	Accessory Panel	Location of accessory operation connections.	
A2	Local Ethernet - RJ45 Connector (Bulkhead)	Front Ethernet access to IFE module for initial set-up or monitoring. Temporary use only. (Not available for IFM I-LEM versions).	
A3	Ethernet - RJ45 Connector Commscope 2111122-1	Ether 1 - Ethernet connection for remote set-up and monitoring of the ERMS function. Ether 2 - For daisy chaining other I-Line Enable Module units or Ethernet communicating equipment.	
A4	ULP - RJ45 Connector Commscope 2111122-1	NSX cord connection(s) for ULP communications with circuit breaker(s). (Note: 600 V I-Line Enable Module maximum capacity is quantity 1 ULP port.)	
A5	RS-485 (2-wire Modbus) - RJ45 Connector. <i>Commscope</i> 2111122-1	RS-485 port for daisy chaining other I-Line Enable Module units or Modbus communicating equipment for Modbus-SL network connection. (IFM Version Only).	
A6	2-Pole Fused Disconnect Switch	Provides the ability to remove power from the inside of the unit while installed on the I-Line bus stack or connected to the LINE side power source. It doesn't remove power from I-Line bus stack.	
A7	I/O Module Schneider LV434063	Provides ability to switch trip unit to ERMS setting function. The ERMS system is programmed to default to an Instantaneous (li setting) of 2 x In.	
A8	IFE Ethernet Switchboard Server Schneider LV434002	Enables the I-Line Enable Module (therefore the circuit breaker) to be connected to an Ethernet network. (IFE Version Only).	
A9	IFM Modbus-SL Interface Schneider LV434000	Enables the I-Line Enable Module (therefore the circuit breaker) to be connected to an RS-485 Serial Line Modbus network and ULP to Modbus-SL converter. (IFM Version Only).	
A10	ERMS Switch Assembly (Padlockable Cover)	Manual switch to turn the ERMS setting ON/OFF. When the ERMS switch is "ON" the trip unit (circuit breaker) is in maintenance mode. The trip unit is in ERMS mode when the ERMS switch is lit.	
A11	24 VDC Output - PCB Connector. Phoenix Contact 1757019	Provides 24 VDC from the power supply to the trip unit.	
NOTE: Refer to Connector Usage Information, page 22 for connector details.			



#### Figure 12 - ERMS IFE I-LEM Accessory Panel

# Figure 13 - ERMS IFM (ERM2 I-LEM) Accessory Panel



#### Table 12 - ERMS I-LEM Accessory Panel Connection Identification

Р	24 VDC Power Outputs Connections	24 AWG–14 AWG (0.2–2.5 mm <sup>2</sup> ) twisted pair cable
E	Ethernet Connections. (IFE Version Only)	Cat 5e Shielded
1	ULP 1 – IFE. (IFE Version Only)	Cat 5e Shielded
R	RS-485 Connection, 2-wire Modbus. (IFM Version Only)	Cat 5e Shielded
1	ULP 1 – IFM 01. (IFM Version Only)	Cat 5e Shielded
2	ULP 2 – IFM 02. (IFM Version Only)	Cat 5e Shielded
3	ULP 3 – IFM 03. (IFM Version Only)	Cat 5e Shielded
4	ULP 4 – IFM 04. (IFM Version Only)	Cat 5e Shielded

### **ERMS I-LEM and ERM2 I-LEM Connections**

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

- 1. Install the ERMS I-Line Enable Module according to the I-Line Enable Module installation instructions.
- Connect 24 VDC power wires from the MicroLogic trip unit in the circuit breaker to the 24 VDC power supply connector on the accessory panel of the ERMS I-Line Enable Module. See Connector Usage Information, page 22.

**NOTE:** Refer to the instructions provided with the circuit breaker and/or trip unit for details.

- Connect the RJ45 end of the NSX cord from the circuit breaker BCM (Breaker Communication Module) or BSCM (Breaker Status Control Module) to the RJ45 connector labeled "ULP" on the accessory panel of the I-Line Enable Module. See ERMS I-LEM System Characteristics, page 28 for additional details.
- 4. For ERMS Unit (Ethernet TCP version): Connect the Ethernet cable to the RJ45 connector labeled "ETHER 1" on the accessory panel for remote set-up or monitoring of the ERMS I-Line Enable Module.

**Optional**: A second RJ45 connector, labeled "ETHER 2," is available for daisy chaining a U-PaS I-Line Enable Module (in conjunction with an IFM unit to provide communication to other communicating circuit breakers), or for daisy chaining Ethernet communicating equipment.

Refer to ERMS I-LEM Communication Schematic Diagram, page 53 and NVE4858900—ERMS I-Line Enable Module (240 and 480 VAC), page 67.

 For ERM2 Unit (ERMS Modbus Serial version): Connect the Modbus Serial cable to the RJ45 connector labeled "RS-485" on the accessory panel for remote set-up or monitoring of the ERM2 I-Line Enable Module. Additional ULP connectors are available to provide communication to other communicating circuit breakers as needed.

Refer to ERM2 I-LEM Communication Schematic Diagram, page 56 and PHA6993000—ERM2 I-Line Enable Module (240 and 480 VAC), page 68.

## **Communications Packages**

## IFM I-LEM Modbus-SL Communication Interface Accessory and Control Wiring

### **A**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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.

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

#### Table 13 - IFM I-LEM Catalog Numbers

Catalog Number	Voltage VAC	Features
ICWL2222M01	120–240	Wide Side, Bottom Feed, IFM, Interface for Modbus-SL communication
ICWR2222M01	120–240	Wide Side, Top Feed, IFM, Interface for Modbus-SL communication
ICWL2422M01	277–480	Wide Side, Bottom Feed, IFM, Interface for Modbus-SL communication
ICWR2422M01	277–480	Wide Side, Top Feed, IFM, Interface for Modbus-SL communication
ICWL2622M01	480–600	Wide Side, Bottom Feed, IFM, Interface for Modbus-SL communication
ICWR2622M01	480–600	Wide Side, Top Feed, IFM, Interface for Modbus-SL communication
ICNL2222M01	120–240	Narrow Side, Bottom Feed, IFM, Interface for Modbus-SL communication
ICNR2222M01	120–240	Narrow Side, Top Feed, IFM, Interface for Modbus-SL communication
ICNL2422M01	277–480	Narrow Side, Bottom Feed, IFM, Interface for Modbus-SL communication
ICNR2422M01	277–480	Narrow Side, Top Feed, IFM, Interface for Modbus-SL communication

NOTE: Narrow Side units are not available for units with ratings greater than 480 VAC.

#### Figure 14 - Communications IFM I-Line Enable Module



NOTE: IFM I-LEM Wide side version shown. Also available in Narrow Side.

Table 14 - IFINI I-LEINI Systemi Characteristics	Table 14	4 - IFM I-	LEM Sys	stem Char	acteristics
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B1	Accessory Panel	Location of accessory operation connections			
B2	RS-485 (2-wire Modbus) - RJ45 Connector. <i>Commscope</i> 2111122-1	RS-485 port for daisy chaining other I-Line Enable Module units or Modbus communicating equipment for Modbus-SL network connection.			
B3	ULP - RJ45 Connector Commscope 2111122-1	NSX cord connection(s) for ULP communications with circuit breaker(s).			
B4	24 VDC Output - PCB Connector. Phoenix Contact 1757019	Provides 24 VDC from the power supply to the trip unit.			
B5	IFM Modbus-SL Interface Schneider LV434000	Enables the I-Line Enable Module / circuit breaker to be connected to an RS-485 Serial Line Modbus network and ULP to Modbus-SL converter.			
B6	B6       2-Pole Fused Disconnect Switch       Provides the ability to remove power from the inside of the unit while installed on the I-Line bus stack or connected to the LINE side power source. It doesn't remove power from I-Line bus stack.				
	NOTE: Refer to Connector Usage Information, page 22 for connector details.				

#### Figure 15 - Adjustment of IFM Modbus Address



Figure 16 - IFM I-LEM Accessory Panel



#### Table 15 - IFM I-LEM Accessory Panel Connection Identification

Р	24 VDC Power Outputs Connections	24 AWG–14 AWG (0.2–2.5 mm²) twisted pair cable
R	RS-485 Connection, 2-wire Modbus	Cat 5e Shielded
1	ULP 1 – IFM 1 or IFM ID 01	Cat 5e Shielded
2	ULP 2 – IFM 02	Cat 5e Shielded
3	ULP 3 – IFM 03	Cat 5e Shielded
4	ULP 4 – IFM 04	Cat 5e Shielded
5	ULP 5 – IFM 05	Cat 5e Shielded
6	ULP 6 – IFM 06	Cat 5e Shielded
7	ULP 7 – IFM 07	Cat 5e Shielded
8	ULP 8 – IFM 08	Cat 5e Shielded
9	ULP 8 – IFM 09	Cat 5e Shielded

### **IFM I-LEM Communications Connections**

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

- 1. Install the IFM I-Line Enable Module according to the I-Line Enable Module installation instructions.
- Connect the 24 VDC power wires from the MicroLogic trip unit in the circuit breaker to the 24 VDC power supply connector on the accessory panel of the IFM I-Line Enable Module. See Connector Usage Information, page 22.

**NOTE:** Refer to the instructions provided with the circuit breaker and/or trip unit for details.

- 3. Repeat for multiple trip units by using a multi-conductor terminal strip such as Phoenix Contact 3007110 or equivalent.
- 4. Connect the ULP cord(s) from the circuit breaker communication module ULP (BCM or BSCM) to the RJ45 connectors labeled "ULP" on the accessory panel of the IFE I-Line Enable Module. Additional ULP connections are available to provide communication to other communicating circuit breakers.
- 5. The identification number of the ULP connectors mounted on the accessory panel will match the Modbus address that is set on the face of the IFM.
- Connect a Modbus Serial cable to the RJ45 connector labeled "RS-485" on the accessory panel of the IFM I-Line Enable Module for remote set-up or monitoring via Modbus Serial.

Refer to IFM I-LEM Communication Schematic Diagram, page 58, NVE4859200 —IFM I-Line Enable Module (240 and 480 VAC), page 70, and PHA6993500— IFM I-Line Enable Module (600 VAC), page 71.

### U-PaS I-LEM Ethernet Communication Interface Accessory and Control Wiring

## 

#### 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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.

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

### **A**DANGER

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

- Verify that all non-Schneider Electric (third-party) protective devices meet at least 10 V/m at 2.4 GHz Radio Frequency (RF) immunity levels before installing or using in this equipment.
- Contact your local Schneider Electric representative if you are uncertain if the device being installed meets this level.

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

**NOTE:** Panelboards can use either Bottom Feed or Top Feed. Switchboards use only Bottom Feed versions.

#### Table 16 - U-PaS I-LEM Catalog Numbers

Catalog Number	Voltage VAC	Features
ICNL222XUPAS	120–240	Narrow Side, Bottom Feed, Universal Panel Server
ICNR222XUPAS	120–240	Narrow Side, Top Feed, Universal Panel Server
ICNL242XUPAS	240–480	Narrow Side, Bottom Feed, Universal Panel Server
ICNR242XUPAS	240–480	Narrow Side, Top Feed, Universal Panel Server
ICWL222XUPAS	120–240	Wide Side, Bottom Feed, Universal Panel Server
ICWR222XUPAS	120–240	Wide Side, Top Feed, Universal Panel Server
ICWL242XUPAS	240–480	Wide Side, Bottom Feed, Universal Panel Server
ICWR242XUPAS	240–480	Wide Side, Top Feed, Universal Panel Server
ICWL262XUPAS	480–600	Wide Side, Bottom Feed, Universal Panel Server
ICWR262XUPAS	480–600	Wide Side, Top Feed, Universal Panel Server

#### Figure 17 - U-PaS I-Line Enable Module



**NOTE:** Wide side U-PaS I-Line Enable Module version shown.

Table	17 -	U-PaS	I-LEM	System	Characteri	stics
TUDIC		0140		<b>Oy</b> Stollin	onunuoton	5005

H1	Accessory Panel	Location of accessory operation connections.	
H2	Local Ethernet - RJ45 Connector (Bulkhead)	Front Ethernet access to U-PaS gateway for initial set-up or monitoring. Temporary use only.	
НЗ	Ethernet - RJ45 Connector Commscope 2111122-1	Ether 1 - Ethernet connection for remote set-up and network connection. Ether 2 - For daisy chaining other I-Line Enable Module units or Ethernet communicating equipment.	
H4	RS-485 (2-wire Modbus) - RJ45 Connector. <i>Commscope</i> 2111122-1	RS-485 port for daisy chaining other I-Line Enable Module units or Modbus communicating equipment for Modbus-SL network connection.	
H5	Digital Outputs - PCB Connector. Phoenix Contact 1757019	2 software-configurable Digital Inputs (DI): Dry contact or pulse contacts. For DI through dry contact, a 24V external power supply is required. For DI through pulse contact, 24V external power supply is not required. Digital Inputs are programmed to default to Dry Contacts. If needed, DI configuration can be customized through EPC.	
H6	Universal Panel Server (U-PaS) Schneider PAS600L	Wireless Concentrator, Modbus Gateway, and Energy Server provide Ethernet, Modbus and IEEE 802.15.4 communication. Enables the I-Line Enable Module to be connected to an Ethernet Network and features as Web Server to Modbus-SL and ULP.	
H7	Wireless Communication	Provides downstream IEEE 802.15.4 connectivity for Schneider devices with wireless sensor.	
H8	2-Pole Fused Disconnect Switch	Provides the ability to remove power from the inside of the unit while installed on the I-Line bus stack or connected to the LINE side power source. It doesn't remove power from the I-Line bus stack.	
NOTE: Refer to Connector Usage Information, page 22 for connector details.			
#### Figure 18 - U-PaS I-LEM Accessory Panel



#### Table 18 - U-PaS I-LEM Accessory Panel Connection Identification

Е	Ethernet Connections	Cat 5e Shielded
D	Digital Outputs Connections	24 AWG-14 AWG (0.2-2.5 mm²)
R	RS-485 Connection, 2-wire Modbus	Cat 5e Shielded

### **U-PaS I-LEM Connections**

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

- 1. Install the U-PaS I-Line Enable Module according to the I-Line Enable Module installation instructions.
- Connect the Ethernet cable to the RJ45 connector labeled "ETHER 1" on the accessory panel for remote set-up or monitoring of the U-PaS I-Line Enable Module.

Optional: A second Ethernet RJ45 connection, labeled "ETHER 2," is available for daisy chaining an ERMS I-LEM or PM I-LEM, or for daisy chaining Ethernet communicating equipment.

**Refer to** U-PaS I-LEM Communication Schematic Diagram, page 60 and JYT1888601—U-PaS I-Line Enable Module (240, 480, and 600 VAC), page 72.

 Connect the Modbus Serial cable to the RJ45 connector labeled "RS-485" on the accessory panel of the I-Line Enable Module for daisy chaining an IFM I-Line Enable Module, or for daisy chaining Modbus Serial communicating equipment. This type of configuration allows ULP connections to provide communication to other communicating circuit breakers.

**Refer to** U-PaS I-LEM Communication Schematic Diagram, page 60 **and** JYT1888601—U-PaS I-Line Enable Module (240, 480, and 600 VAC), page 72.

### **Connecting Multiple Communication I-Line Enable Modules**

### **A**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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.

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

### **Modbus Serial Connections**

- 1. When connecting two communication I-Line Enable Modules or alternative Modbus communication equipment, you may use an RS-485 2-wire Modbus connection.
- When connecting Modbus-SL communicating devices such as IFM and U-PaS I-Line Enable Modules, perform the connection using a 2 x RJ45 Modbus cable (for example, VW3A8306R03, VW3A8306R10, or VW3A8306R30).
- 3. If the connection is between an I-Line Enable Module and any other gateway or Modbus equipment, the receiving components should be capable of accepting an RS-485 2-wire Modbus connection.

**NOTE:** When adding an additional IFM I-Line Enable Module to a system that uses an IFE gateway, observe the following general guidelines for sizing the application.

- Maximum of 11 IFM interfaces can be physically connected to one IFE server. This can be used for applications that have the lowest performance requirement and are recommended for simple applications.
- Maximum of eight IFM interfaces should be used for applications that require regular access via the IFE web pages or that have other primaries communicating, such as FDM128 display. This normally provides a reasonable response time for up to three primaries.
- Refer to Enerlin'X IFE Ethernet Switchboard Server User Guide, DOCA0084EN, for more information.

4. Each IFM I-Line Enable Module comes with one IFM installed. Each IFM I-Line Enable Module can have additional IFMs installed per the following rules:

IFM I-Line Enable Commercial Reference	Description	IFMs Installed in I-Line Enable Factory	Additional IFMs	Maximum IFMs Total Capacity
ICNL2222M01	IFM I-Line Enable Module, 240V, Narrow, Left	1	4	5
ICNL2422M01	IFM I-Line Enable Module, 480V, Narrow, Left	1	4	5
ICNR2222M01	IFM I-Line Enable Module, 240V, Narrow, Right	1	4	5
ICNR2422M01	IFM I-Line Enable Module, 480V, Narrow, Right	1	4	5
ICWL2222M01	IFM I-Line Enable Module, 240V, Wide, Left	1	8	9
ICWL2422M01	IFM I-Line Enable Module, 480V, Wide, Left	1	8	9
ICWR2222M01	IFM I-Line Enable Module, 240V, Wide, Right	1	8	9
ICWR2422M01	IFM I-Line Enable Module, 480V, Wide, Right	1	8	9
ICWL2622M01	IFM I-Line Enable Module, 600V, Wide, Left	1	2	3
ICWR2622M01	IFM I-Line Enable Module, 600V, Wide, Right	1	2	3

Table 19 - Additional IFMs Installation Rules

5. U-PaS Only I-Line Enable Modules do not come with any IFMs installed. IFMs that are connecting to a U-PaS will be located in an IFM I-Line Enable Module.

**NOTE:** When adding an additional IFM I-Line Enable Module to a system that uses a U-PaS gateway, consider that a maximum of 11 IFM interfaces can be physically connected to one U-PaS.

### **Ethernet Daisy Chain Connections**

illustrative only.

represent an Ethernet device or I-Line Enable Module.

They can

#### NOTICE HAZARD OF IMPROPER FUNCTIONALITY Read ULP system bulletin (catalog number 0602IB1503) before activating any ULP components. Failure to follow these instructions can result in equipment damage. 1. When connecting two communication I-Line Enable Modules or other Ethernet communicating devices, you may use an Ethernet daisy-chain connection method. 2. Use shielded Ethernet patch cables (Cat5e) or equivalent. Figure 19 - Ethernet Daisy Chain **NOTE:** Accessory Customer Network Panels in Ethernet Shielded ethernet patch cable Shielded ethernet patch cable Connection Daisy Chain are $\bigcirc$ 0 $\bigcirc$ 00000 00000 000000 E1 E2 E1 E2 E1 E2

0

0

0

**ETHERNET UNIT 2** 

0

**ETHERNET UNIT 3** 

## Expanding the Communication Package

0

**ETHERNET UNIT 1** 



### NOTICE

#### HAZARD OF IMPROPER FUNCTIONALITY

 Read ULP system bulletin (catalog number 0602IB1503) before activating any ULP components.

#### Failure to follow these instructions can result in equipment damage.

The design of the I-Line Enable Modules IFM and ERM2 allows for the expansion of the available communication capacity. Both versions allow the addition of IFMs for communicating to MicroLogic trip units. The MicroLogic trip units must be capable of communication and these can be in the PowerPacT H-, J-, L-, P-, and/or R-frame circuit breakers.

The expansion kits listed in Kits for Additional IFM Installation provide all components and instructions necessary for expanding the units listed in I-Line Enable Modules Available for Expanding Communication.

#### Table 20 - Kits for Additional IFM Installation

Kit Part Number	Description
ICIFM1	IFM Kit for adding 1 IFM
ICIFM5	IFM Kit for adding up to 5 IFMs

I-Line Enable Commercial Reference	Description	IFMs Installed in I- Line Enable Factory	Additional IFMs	Maximum IFMs Total Capacity
ICNL2222M01	IFM I-Line Enable Module, 240V, Narrow, Left	1	4	5
ICNL2422M01	IFM I-Line Enable Module, 480V, Narrow, Left	1	4	5
ICNR2222M01	IFM I-Line Enable Module, 240V, Narrow, Right	1	4	5
ICNR2422M01	IFM I-Line Enable Module, 480V, Narrow, Right	1	4	5
ICWL2222M01	IFM I-Line Enable Module, 240V, Wide, Left	1	8	9
ICWL2422M01	IFM I-Line Enable Module, 480V, Wide, Left	1	8	9
ICWR2222M01	IFM I-Line Enable Module, 240V, Wide, Right	1	8	9
ICWR2422M01	IFM I-Line Enable Module, 480V, Wide, Right	1	8	9
ICWL2622M01	IFM I-Line Enable Module, 600V, Wide, Left	1	2	3
ICWR2622M01	IFM I-Line Enable Module, 600V, Wide, Right	1	2	3
ICWL2222ERM2	ERM2 I-Line Enable Module, 240V, Wide, Left	2	2	4
ICWL2422ERM2	ERM2 I-Line Enable Module, 480V, Wide, Left	2	2	4
ICWR2222ERM2	ERM2 I-Line Enable Module, 240V, Wide, Right	2	2	4
ICWR2422ERM2	ERM2 I-Line Enable Module, 480V, Wide, Right	2	2	4

#### Table 21 - I-Line Enable Modules Available for Expanding Communication

I-Line Enable Commercial Reference	Description	IFMs Installed in I- Line Enable Factory	Additional IFMs	Maximum IFMs Total Capacity
ICWL2622ERM2	ERM2 I-Line Enable Module, 600V, Wide, Left	1	0	1
ICWR2622ERM2	ERM2 I-Line Enable Module, 600V, Wide, Right	1	0	1

#### Table 21 - I-Line Enable Modules Available for Expanding Communication (Continued)

# Expanding Communication by Adding IFMs - Installation Instructions

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

- 1. Follow all Lockout/Tagout procedures prior to removing the I-Line Enable Module from the equipment. Turn off all power supplying this equipment before working on or inside the equipment. Remove the I-Line Enable Module from the equipment prior to removing the I-Line Enable Module covers.
- Refer to Kits for Additional IFM Installation, page 41 and I-Line Enable Modules Available for Expanding Communication, page 41 for necessary kits to install additional IFMs to I-Line Enable Module and applicable units.
- 3. Remove the top and side covers by removing the screws, identified in Cover Removal, page 44, using a #2 Phillips-head screwdriver.
- 4. Remove the DIN rail mounted spacers (MG27062)—two spacers equal the same width of one IFM.
- 5. Install the stacking accessory (TRV00217) on the DIN rail as shown in steps 5a and 5b of IFM Installation, page 45.
- 6. Remove the cover from the bottom of the IFM unit, as shown in steps 6a and 6b of IFM Installation, page 45.
- 7. Place the IFM onto the installed stacking accessory on the DIN rail, as shown in steps 7a, 7b, and 7c of IFM Installation, page 45.
- Connect the RJ45 connector of the patch cord to the RJ45 port located at the bottom of the IFM and identified with the ULP pictogram, as shown in steps 8 and 9 of IFM ULP Ports, page 45.
- Install the ULP line terminator (TRV00880) in the second RJ45 port located at the bottom of the IFM and identified with the ULP pictogram, as shown in steps 8 and 9 of IFM ULP Ports, page 45.
- 10. Remove the appropriate "ULP" knockout from the accessory panel of the I-Line Enable Module to create one or more openings. To remove the knockout, rotate the weakened area along the knockout outline until it breaks loose and pop it out. Discard the removed tab.
- 11. Install the RJ45/RJ45 inline coupler into the openings of the accessory panel by sliding the connector in the opening so that the stationary jaws of the coupler fit on each side of the accessory panel first, then rotate the RJ45/RJ45 inline coupler into the opening so that the flexible jaws snap into place.
- 12. Connect the other end of the RJ45 connector of the patch cord (see step 8 above) to the RJ45/RJ45 inline coupler (see step 11 above).
- 13. Repeat steps 4 through 12 above when installing multiple IFMs.

- 14. After multiple IFMs have been added to the I-Line Enable Module, the final IFM in the chain should have a Modbus terminator (VW3A8306RC) installed (refer to IFM Installation, page 45 for location). One terminator is supplied with every communicating I-Line Enable Module in the information packet.
- 15. Install the necessary DIN rail mounted spacers (MG27062), that were removed in step 4, to make sure there are no gaps when the top cover is installed. Refer to Appendix B Installation Schematics, page 66 (in the I-Line Enable Instruction Bulletin) for the layout of the IFMs and spacers.
- 16. Replace the top and side covers using the screws removed in step 3 above. Refer to Cover Removal, page 44 and Cover Screws, page 44.
- 17. The I-Line Enable Module should now be prepared with the correct number of IFMs (refer to I-Line Enable Modules Available for Expanding Communication, page 41) and ready to install into an I-Line panelboard or switchboard.
- 18. Adjust the Modbus address of the IFMs. Refer to Adjustment of IFM Modbus Address, page 33.
- The I-Line Enable Module is now ready to be interconnected for multiple communicating circuit breakers. Refer to Appendix A - System Communication Schematics, page 51 and Appendix B - Installation Schematics, page 66 for interconnection with circuit breakers.

**NOTE:** The circuit breaker must have a Breaker Communication Module (BCM) or Breaker Status Control Module (BSCM). The circuit breaker ULP Cord is not included in the expansion kits. Refer to Appendix A - System Communication Schematics, page 51 and Appendix B - Installation Schematics, page 66 for interconnection with circuit breakers.

### Figure 20 - Cover Removal



#### Table 22 - Cover Screws

Covers	Screw	Wide (Quantity per cover)	Narrow (Quantity per cover)
Тор	8-32 x 0.375 in	6	6
Side	8-32 x 0.5 in	9	8

### Figure 21 - IFM Installation



Figure 22 - IFM ULP Ports



# **Metering Packages**

# Power Meter I-LEM Series Package Accessory and Control Wiring

### **A**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 only be installed and serviced 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 that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E—Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards—29 CFR Part 1910 Subpart S—Electrical.

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

#### Table 23 - Power Meter I-LEM Series Catalog Numbers

Catalog Number	Voltage VAC	Features
ICWL243X5563	120-480	Wide Side, Bottom Feed, PM5563 meter
ICWR243X5563	120-480	Wide Side, Top Feed, PM5563 meter
ICWL243X8244	120-415	Wide Side, Bottom Feed, PM8244 meter
ICWR243X8244	120-415	Wide Side, Top Feed, PM8244 meter
ICWL263X5563	480-600	Wide Side, Bottom Feed, PM5563 meter
ICWR263X5563	480-600	Wide Side, Top Feed, PM5563 meter
ICWL263X8244	480-600	Wide Side, Bottom Feed, PM8244 meter
ICWR263X8244	480-600	Wide Side, Top Feed, PM8244 meter



Table 24 - Power Meter I-LEM Series System Characteristics

D1	Accessory Panel	Location of accessory operation connections.
D2	Local Ethernet - RJ45 Connector (Bulkhead)	Front Ethernet access to Power Meter for initial set-up or monitoring. Temporary use only.
D3	Ethernet - RJ45 Connector Commscope 2111122-1	Ether 1 - Ethernet connection for remote set-up and network connection. Ether 2 - For daisy chaining other I-Line Enable Module units or Ethernet communicating equipment.
D4	RS-485 (2-wire Modbus) - RJ45 Connector. Commscope 2111122-1	RS-485 port for daisy chaining to other I-Line Enable Module units or Modbus communicating equipment for Modbus-SL network connection.
D5	Current Transformer (CT) signals - PCB Connector. <i>Phoenix Contact</i> 1825527	CT connections for meter (A, B, C phases and current flow (In) in the neutral conductor).
D6	Digital Input / Digital Output signals - PCB Connector. <i>Phoenix Contact</i> 1825569	Provides connection to 2 Digital Inputs and 2 Digital Outputs
D7	Power Meter (PM Series) and Power Meter Remote Display	Power Meter (refer to meter documentation for detailed capabilities.) PM5563: Basic Power Meter + Remote Meter Display PM8244: Intermediate Power Meter + Remote Meter Display
D8	3-Pole Fused Disconnect Switch	Provides the ability to remove power from the inside of the unit while installed on the I-Line bus stack or connected to the LINE side power source. It doesn't remove power from I-Line bus stack.
D9	Voltage Neutral (VN) Input - PCB Connector <i>Phoenix Contact</i> 1825501	Voltage neutral connector: VN input for voltage measurement (when neutral is present)





### Table 25 - Power Meter I-LEM Accessory Panel Connection Identification

CI	Current Inputs (CT Connections)	4-pin plug-in connector (From shorting block connector 14 AWG)
E1	Ethernet 1 Connection (Output typical)	Cat 5e Shielded—RJ45
E2	Ethernet 2 Connection (Input typical)	Cat 5e Shielded—RJ45
R	RS-485 Modbus-SL or BACnet Connection	Cat 5e Shielded—RJ45
VN	Voltage Neutral Connection (as required)	14 AWG (2.5 mm²) wire
х	D1/D2 Output Connections	24 AWG (0.2 mm²) twisted pair
Y	S1/S2 Input Connections	24 AWG (0.2 mm²) twisted pair

### **Power Meter I-LEM Package Connections**

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

- 1. Install the power meter shorting block (included in package), according to the instructions provided, prior to installing the Power Meter I-Line Enable Module.
- 2. Install Power Meter I-Line Enable Module according to the I-Line Enable Module installation instructions.
- 3. When connecting the CTs to the shorting block of the Power Meter I-Line Enable Module, note that typically "X1"="White"="+" and "X2"="Black"="-". However, refer to the CT manufacturer's specifications for the exact nomenclature equivalent to primary "X1" and secondary "X2."
- If the system uses an alarm output or additional inputs, connect to the appropriate Input/Output terminals on the accessory panel of the Power Meter I-Line Enable Module identified as X = D1/D2 (Outputs) and Y =S1/S2 (Inputs).
- 5. If the voltage system requires a neutral, a connection must be made from the panelboard neutral to the terminal identified as "VN" on the accessory panel in the Power Meter I-Line Enable Module.
- 6. Connect the Ethernet cable to the RJ45 socket connector labeled "ETHER 1" on the accessory panel for remote set-up or monitoring of the Power Meter I-Line Enable Module.

Optional: A second Ethernet RJ45 connection, labeled "ETHER 2," is available for daisy chaining additional Power Meter I-Line Enable Modules, or for daisy chaining Ethernet communicating equipment.

**Refer to** Power Meter I-LEM Communication Schematic Diagram, page 62 and Metering Packages - Installation Schematics, page 73.

 If communicating circuit breakers are present in the same system with the Power Meter, they are interconnected to the communication system via an IFM I-Line Enable Module in conjunction with a U-PaS I-Line Enable Module.

Connect the Ethernet cable to the RJ45 connector (labeled "ETHER 1") on the accessory panel of the Power Meter I-Line Enable Module and to the RJ45 connector (labeled "ETHER 2") on the U-PaS I-Line Enable Module to daisy chain the two devices.

Connect the Ethernet cable to the RJ45 connector labeled "ETHER 1" on the U-PaS accessory panel for remote set-up or monitoring of the network.

Connect the Modbus Serial cable to the RJ45 connector labeled "RS-485" on the U-PaS accessory panel for daisy chaining an IFM I-Line Enable Module. This connection allows the system to feature ULP connections to provide communication to communicating circuit breakers.

**Refer to** Power Meter I-LEM Communication Schematic Diagram, page 62, Power Meter I-LEM with Communicating Circuit Breakers Communication Schematic Diagram, page 64, and Metering Packages - Installation Schematics, page 73.

# **Appendix A - System Communication Schematics**

NOTE: The notice below pertains to all 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. Do not create loops with surplus cabling.

Failure to follow these instructions can result in equipment damage.

### **MMS I-LEM Communication Schematic Diagram**

### Figure 25 - MMS I-LEM Communication Schematic Diagram



Table	26 -	MMS	I-LEM	Comms	Legend
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А	Circuit Breaker Communication Module ULP (BCM)	E	MicroLogic Trip Unit (P or H)
В	OF, SD, SDE, PF, and CH switches	F	Zone Selective Interlocking Connections, Twisted Pair Cable
С	COM Terminal Block (E1 to E6) for communications via ULP Cord	G	24 VDC Power Output, Twisted Pair Cable
D	Shunt Trip (MX1) and Shunt Close (XF) communicating voltage releases (on electrically operated devices only)	н	MMS I-Line Enable Module

### **ERMS I-LEM Communication Schematic Diagram**

#### Figure 26 - ERMS I-LEM Communication Schematic Diagram



Table 27	- ERMS	I-LEM	Comms	Legend
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А	Circuit Breaker Communication Module ULP (BCM)	F	Breaker ULP Cord, LV434197
В	OF, SD, SDE, PF, and CH switches	G	24 VDC Power Output, Twisted Pair Cable
С	COM Terminal Block (E1 to E6) for communications via ULP Cord	Н	Ethernet Cable
D	Shunt Trip (MX1) and Shunt Close (XF) communicating voltage releases (on electrically operated devices only)	J	ERMS I-Line Enable Module
Е	MicroLogic Trip Unit (P or H)		

### ERMS I-LEM with Communicating Circuit Breakers Communication Schematic Diagram

Figure 27 - ERMS I-LEM with Communicating Circuit Breakers Communication Schematic Diagram



А	Circuit Breaker Communication Module ULP (BCM or BSCM)	G	24 VDC Power Output, Twisted Pair Cable
В	OF, SD, SDE, PF, and CH switches	н	Modbus Serial Cable
С	COM Terminal Block (E1 to E6) for communications via ULP Cord	J	Ethernet Cable
D	Shunt Trip (MX1) and Shunt Close (XF) communicating voltage releases (on electrically operated devices only)	к	ERMS I-Line Enable Module
E	MicroLogic Trip Unit (P or H only for Circuit Breaker with ERMS)	L	U–PaS I-Line Enable Module
F	Circuit Breaker ULP Cord, LV434197	М	IFM I-Line Enable Module

### Table 28 - ERMS I-LEM with Communicating Circuit Breakers Comms Legend

## **ERM2 I-LEM Communication Schematic Diagram**

### Figure 28 - ERM2 I-LEM Communication Schematic Diagram



Table 29 - ERM2 I-LEM Comms Leg	jend
---------------------------------	------

А	Circuit Breaker Communication Module ULP (BCM or BSCM)	F	Circuit Breaker ULP Cord, LV434197
В	OF, SD, SDE, PF, and CH switches	G	24 VDC Power Output, Twisted Pair Cable
с	COM Terminal Block (E1 to E6) for communications via ULP Cord	н	Modbus Serial Cable
D	Shunt Trip (MX1) and Shunt Close (XF) communicating voltage releases (on electrically operated devices only)	J	ERMS I-Line Enable Module
E	MicroLogic Trip Unit (P or H only for Circuit Breaker with ERMS)		

## **IFM I-LEM Communication Schematic Diagram**





### Table 30 - IFM I-LEM Comms Legend

А	Circuit Breaker Communication Module ULP (BCM or BSCM)	F	Circuit Breaker ULP Cord, LV434197
В	OF, SD, SDE, PF, and CH switches	G	24 VDC Power Output, Twisted Pair Cable
с	COM Terminal Block (E1 to E6) for communications via ULP Cord	н	Modbus Serial Cable
D	Shunt Trip (MX1) and Shunt Close (XF) communicating voltage releases (on electrically operated devices only)	J	IFM I-Line Enable Module
E	MicroLogic Trip Unit		

# **U-PaS I-LEM Communication Schematic Diagram**

### Figure 30 - U-PaS I-LEM Communication Schematic Diagram



Table 31	- U-PaS	I-LEM	Comms	Legend
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А	Circuit Breaker Communication Module ULP (BCM or BSCM)	G	24 VDC Power Output, Twisted Pair Cable
В	OF, SD, SDE, PF, and CH switches	Н	Modbus Serial Cable
с	COM Terminal Block (E1 to E6) for communications via ULP Cord	J	Ethernet Cable
D	Shunt Trip (MX1) and Shunt Close (XF) communicating voltage releases (on electrically operated devices only)	к	U-PaS I-Line Enable Module
E	MicroLogic Trip Unit	L	IFM I-Line Enable Module
F	Circuit Breaker ULP Cord, LV434197		

## **Power Meter I-LEM Communication Schematic Diagram**

#### Figure 31 - Power Meter I-LEM Communication Schematic Diagram



### Table 32 - Power Meter I-LEM Comms Legend

н	Modbus Serial Cable
J	Ethernet Cable
К	5 A Current Transducers
L	Power Meter I-Line Enable Module

### Power Meter I-LEM with Communicating Circuit Breakers Communication Schematic Diagram

Figure 32 - Power Meter I-LEM with Communicating Circuit Breakers Communication Schematic Diagram



Table 33 - Power Meter I-LEM with Communicating Circuit B	Breakers Comms Legend
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A	Circuit Breaker Communication Module ULP (BCM or BSCM)	Н	Modbus Serial Cable
В	OF, SD, SDE, PF, and CH switches	J	Ethernet Cable
С	COM Terminal Block (E1 to E6) for communications via ULP Cord	к	5 A Current Transducers
D	Shunt Trip (MX1) and Shunt Close (XF) communicating voltage releases (on electrically operated devices only)	L	Power Meter I-Line Enable Module
E	MicroLogic Trip Unit	М	U–PaS I-Line Enable Module
F	Circuit Breaker ULP Cord, LV434197	N	IFM I-Line Enable Module
G	24 VDC Power Output, Twisted Pair Cable		

Installed in I-Line Enable factory

HUA33748 + TME07544 to MMS chapter

25410-13033 +

**7**4 Panel full

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NOTES

Circuit Breaker comes with Jump Z3–Z5 from factory. 18 Ft (5.48 m) maximum lenght of Z3 & Z4 twisted pair cable.

# **Appendix B - Installation Schematics**

### **Safety Packages - Installation Schematics**

Z ⊘ I-LINE BUS 600V WYE or Delta 480V WYE or Delta 240V WYE or Delta  $\odot$ 0 3 6 ഹ  $\triangleleft$ ∢ ⊲ LOAD SIDE BREAKER BREAKER Ð Ð ۵ (◄) 6 -LINE ENABLE MODULE: MMS П  $\bigotimes$ 6 P/R CIRCUIT BREAKER(S)  $\overline{0}$ MMS ŧ BCM μ 8 ⊗⊏ TWISTED PAIR 18-2C-16TC č 0 0 Installed in I-Line Enable factory NOTES PANEL CONNECTIONS  $\otimes$ TWISTED PAIR 18-2C-16TC ACCESSORY PANEL UA33748 + TME0754 25410-13033 + PART NUMBER POWER MMS outpu ACCESSORY DESIGNATION 24 VDC power 0 0 -OCATION Ł This Installation Schematic applies for I-Line Enable Modules Left and t meets Trip Unit requirements ERMS function Circuit Breakers requir Unit be powered en the breaker is in between the bus bars nart Cell is through conection (jaws). rgy reduction maintenance AYOUT FOR I-LINE ENABLE MODULE MMS NARROW RIGHT SIDE ith the PowerPo circuit breakers communication and e the Accessory Panel may Enable Module does to a Branch or a Main position. This may be 1 nit ed when using the MMS Enable Module. power source would power source utilizing the Enable Module eaker P/R frame, Trip function is with or H R-frame

Figure 33 - GDE8239900—MMS I-Line Enable Module (240, 480, and 600 VAC)



vithin the

chapter

refer to ERMS

Panel full details

For Accessory



<u>.</u>- \$

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#### Figure 35 - PHA6993000—ERM2 I-Line Enable Module (240 and 480 VAC)

Do not create length of cable surplus at minimum loops from s

factory d in I-Line factory 1 in I-Line

HUA41441

RS-485

8 F **4**4 A5 A6 For

needed, based on number of IFMs.

Trim length to keep ULP Cord(s)

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length.

minimum

communicating Circuit Breakers as

Repeat ULP connection for

1

IFMs.

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HUA41441 HUA41441 tactory or Custome To be installed by factory or Custome

Sized for HUA41441 Future use. Sized for HUA41441

uture use. Sized for HUA41441

ULP3 ULP1 ULP2 ULP4 refer to ERMS chapter within the IB.

Panel full details

Accessory

Non usable

Non usable

ULP3

**A**5 A6

Trim length to keep ULP Cord at minimum length. Do not create loops from surplus length of cable.

ULP4

Non usable

usable

Non

refer to ERMS chapter within the IB.

For Accessory Panel full details

Figure 36 - PHA6993200—ERM2 I-Line Enable Module (600 VAC)



installed by

HUA41441

ULP7 ULP8

A10 A11 A12

HUA41441 for HUA41441

within the

chapter

refer to IFM Only

details

Panel full

Accessory

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ULP9

minimum length. Do not create loops from surplus length of cable

length to keep ULP Cord(s)

Trim

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### **Communication Packages - Installation Schematics**

Z (Z I-LINE BUS 480V WYE or Delta 240V WYE or Delta 6 6 (m  $\triangleleft$ (4  $\langle \mathbf{A} \rangle$ LOAD SIDE JOIS JNI MAIN CIRCUIT BREAKER BRANCH CIRCUIT BREAKER Ð Ð . Jais avot (₹) 6 6 I-LINE ENABLE MODULE: IFM ONLY ž Ē  $\odot$ ΕM FM  $\leqslant$ THW ΡM FM CIRCUIT BREAKER(S) Ο IFM FM BUIF 법법법법 P/R RED-0 WHITE-0 BKR ULP CORD(S) LV434197 BCM 99 뜨혀 ⊗ ⊏  $\otimes$ 1 TWISTED PAIR 18-2C-16TC Pubd ble Factory. be installed by Pnbd 800 Installed in I-Line Enable Factory. or Costume installed by <u>ory or Costume</u> be installed by actory. in I-Line ible Factory. NOTES ory or Costi be installed be installed 0 0 3 H/J/L CIRCUIT BREAKER(S) ACCESSORY PANEL CONNECTIONS BSCM TPUT 0 3 (F) POWER 24V+ 25410-13033 + HUA33748 + TME07544 **(%** Future use. Sized for HUA41441 Future use. ACCESSORY PANEL ruture use. Sized for HUA41441 Future use Future use. Sized for HUA41441 HUA41441 ਿਛ ਪਰ +×ਬ/,ਬ HUA41441 PART NUMBER BSCV 8 6 JU -01 10 +×1/8 -01 00 -×1/4 -01 00 -×1/4 -01 00 -×1/4 HUA41441 HUA41441 HUA41441 4  $\geq$ HITE-Future use. Sized for H Future use. Sized for H 3 (P) 5¢ ∧ 8 J.L Å 3 2 ULP 1 ULP 2 outpu 9 RS-485 RS-DESIGNATION power RS-485 BKR ULP CORD(S) LV434197 RS-485 ULP3 3 4 ULP1 ULP2 ULP4 ULP5 0LP6 R) ٩IJ٧ 24 VDC p  $\bigcirc$ 0  $\triangleleft$ 4  $\triangleleft$ LOCATION ٩ı Ş A3 A4 **A**5 A6 Ā A8 A9 Ĵ This Installation Schematic applies for location of I-Line Enable that meets Trip Unit requirements for comms function. Modbus-SL connections may be P/R Frame Circuit Breakers requir required when using the IFM I-Line communicating Circuit Breakers as needed, based on number of IFMs Modules Left and Right side. Connection between the bus bars and the Smart Cell is through per conection (jaws). I-Line Enable Module may be applied to a Branch or to a Main Circuit Breaker PowerPact class, used for either remote monitoring or daisy-chaining. and 480V standard version comes Panelboards Plant or on field, maximum 5 IFMs for Narrow Side .9 featured with communication and other power source would be external 24VDC power source provided in the Accessory Panel. FOR I-LINE ENABLE MODULE ONLY NARROW RIGHT SIDE externally when the breaker is i the "OFF" position. This may be installed). If required, additional IFMs may be installed at I-Line Enable Module 240V that the Trip Unit be powered accomplished by utilizing the 1 IFM module (factory Side. connection for for Wide Module. and 9 IFMs f LAYOUT F Repeat ULP copper c IFM I-Lir Enable and 9 NOTES with ١٢ 9 <u>.</u>-' ~ 3 4 \$ \$  $\triangleleft$ 

### Figure 37 - NVE4859200—IFM I-Line Enable Module (240 and 480 VAC)

Figure 38 - PHA6993500—IFM I-Line Enable Module (600 VAC)



For Accessory Panel full details refer to IFM Only chapter within the IB.

Non usable

Non usable

Non usable

ULP8 ULP9

A11

1

A12

on usable


# **Metering Packages - Installation Schematics**

Z Z  $\odot$ 0 I-LINE BUS 3PH-4W Ľ, X 6 **(m**) 2 X ŧ ⊲ ∕₹ LOAD SIDE 5∨ SIDE MONITORED BREAKER CT's INSTALLED BY CUSTOMER NH NH  $\otimes$  $\triangleleft$ Œ Ð I-LINE ENABLE MODULE: POWER METER PM5563 & PM8244 GRN#14 ğ ğ Õ 00  $\triangleleft$  $\bigcirc$ ₽ŝ  $\mathbb{A}$ 0000 SHORTING BLOCK KIT wHт#147 WHT#14 RED#14 RED#14 ₹ED#14 ⊗ □ 0 14-O 13+Ø Ø+E l2+⊘ -0 .... S-485 MHT#14 (CUSTOMER SUPPLIED) **e** 8 3 THER ETHER ACCESORY PANEL access (i.e. set-up). Do not connection due to loss in be used for either remote monitoring **booochaa** I-Line Enable Module may be applied to a Branch or to a more information on use/application of Digital Inputs Installation Schematic applies for location of I-Line Enable Modules on metering options desired. Refer to Power and the Smart Cell is through copper Shorting Block Kit towards be used for either remote monitoring or (₹) 3°0 **(**2) 0 access O Neutral Voltage customer connection Ethernet comms within the IB. remote or dasiy-chain temporary CT's signal located in the NOTES Customer use odbus-SL Ethernet ACCESSORY PANEL CONNECTIONS . ה may (ETHER For Accessory Panel full details refer to PM chapter Circuit Breaker PowerPact class Customer local Ethernet access for bars HUA33748 + TME07544 + 25410-13033 HUA29234 + HUA29281 + 25410-13003 nections PART NUMBER 4-pins connector HUA41441 HUA41441 -chaining may HUA41441 between the bus Customer connection based conn 3006 conjunction with Modbus-SL connections ability Ethernet and Right side. daisv Meter literature for (jaws). munications Voltage Neutral Input daisy-chaining. P DESIGNATION CT's Connection Digital Inputs Digital Outputs This Installat Left and Rig Connection b Power Meter and Outputs Plug-in the RS-485 connection required. 7 ETHER ETHER (ETHER .⊆ Main NOTES nse 5 OCATION ÷ ~ Ś € \$ \$  $\ll$ 1 Ł 4 93 F2 A7 A5

## Figure 40 - QGH1510300—PM Meter I-Line Enable Module (3P4W)

Voltage Neutral (VN) connection to be done by customer when Neutral is present in the system.

onnector "A5" located in the Accessory Panel. to Shorting Block Kit Instruction Bulletin JYT59305 for operation

connector

the

\$

details. Refer

 $\triangleleft$ 



## Figure 41 - QGH3063400—PM Meter I-Line Enable Module (3P3W)

in the system





Neutral (VN) connection to be done by customer when Neutral is

in the system.

Voltage present

 $\triangleleft$ 

details.

Refer to Shorting Block Kit Instruction Bulletin JYT59305 for operation

the connector "A5" located in the Accessory Panel.

Inputs

Digital

use/application of

b

Meter literature for more information

Outputs.

and

Plug-in the

**I** 

4-pins connector located in the Shorting Block Kit towards



## Figure 43 - QGH3063800—PM Meter I-Line Enable Module (1P3W)

Neutral (VN) connection to be done by customer when Neutral is

system

in the

details. Voltage present

§

the connector "A5" located in the Accessory Panel. Refer to Shorting Block Kit Instruction Bulletin JYT59305 for operation

# **Appendix C - Documentation References**

# **Safety Packages - Documentation**

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

#### Table 34 - Maintenance Mode Switch (MMS) Package

Title	Document Number
PowerPacT™ M-frame Circuit Breaker — Installation and User Guide	48049-251-01
PowerPacT P-Frame and NS Circuit Breakers — Installation and User Guide	48049-148-05
PowerPacT R-Frame and NS1600b–NS3200 Circuit Breaker — Installation Instructions	48049-243-04
MicroLogic 2.0A, 3.0A, 5.0A, and 6.0A Electronic Trip Units	48049-136-05
Maintenance Mode Switch (MMS) Instruction Bulletin	MFR70008

For additional information, also consult any user guides or installation materials that were shipped with the equipment for components that are to be connected to the I-Line Enable Module.

#### Table 35 - Energy Reduction Maintenance Setting (ERMS)

Title	Document Number
Energy Reduction Maintenance Setting (ERMS) System Installation and User Guide	NHA67346
PowerPacT M-frame Circuit Breaker — Installation and User Guide	48049-251-01
PowerPacT P-Frame and NS Circuit Breakers — Installation and User Guide	48049-148-05
PowerPacT R-Frame and NS1600b–NS3200 Circuit Breaker — Installation Instructions	48049-243-04
MicroLogic 5.0H and 6.0H Electronic Trip Units	48049-330-03
IFE Ethernet Interface for LV Circuit Breakers User Guide (UL)	1040IB1401
IO Module – Input/Output Interface for LV Circuit Breakers – User Guide	0613IB1317

## **Communications Documentation**

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

 Table 36 - Communications Packages

Title	Document Number
EcoStruxure Panel Server Universal — Instruction Sheet	GDE74119
EcoStruxure Panel Server Universal — User Guide	DOCA0172EN
EcoStruxure Panel Server Universal — Cybersecurity Guide	DOCA0211EN
EcoStruxure Panel Server Universal — Firmware Release Notes	DOCA0178EN
ULP System for MasterPacT and PowerPacT - User Guide	0602IB1503
PowerPacT H-, J- and L-frame Circuit Breakers — Catalog	0611CT1001
PowerPacT M-frame Circuit Breaker — Installation and User Guide	48049-251-01
PowerPacT P-Frame and NS Circuit Breakers — Installation and User Guide	48049-148-05
PowerPacT R-Frame and NS1600b–NS3200 Circuit Breaker — Installation Instructions	48049-243-04

## Table 36 - Communications Packages (Continued)

Title	Document Number
MicroLogic 5.0H and 6.0H Electronic Trip Units	48049-330-03
MicroLogic 5.0P and 6.0P Electronic Trip Units	48049-137-05
IFE Ethernet Interface for LV Circuit Breakers User Guide (UL)	1040IB1401
Modbus Interface Module (IFM) for PowerPacT H-, J-, and L-frame Circuit Breakers	48940-326-01
Enerlin'X IFE Ethernet Switchboard Server — User Guide	DOCA0084EN

## **Metering Documentation**

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

## Table 37 - Metering Packages (PM Series)

Title	Document Number
PowerLogic PM5500 Series User Manual	HRB1684301
PowerLogic PM8000 Series User Manual	7EN02-0336
ULP (Universal Logic Plug) System - User Guide	DOCA0093EN
Shorting Block Installation Bulletin	JYT59305

## **Special Function Package Documentation**

For additional information, consult any user guides or installation materials that were shipped with the equipment for components that are to be connected to the I-Line Enable Module.

## Glossary

## С

## Circuit Breaker Communication Module (BSM or BSCM):

A module which, when installed in a circuit breaker, receives and transmits information on the communication network.

## Ε

### EcoStruxure Panel Server Universal (U-PaS):

A Wireless Concentrator, Modbus Gateway, and Energy Server.

### **Energy Reduction Maintenance Setting (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 providing data logging and web pages through Ethernet connection directly to the circuit breaker, as well as a Modbus serial connection to TCP gateway for downstream IFM's.

## L

## Low Voltage Current Transducer (LVCT):

The PowerLogic LVCTxxx series of 1 or 0.333 volt split-core current transducers provide secondary voltage AC proportional to the primary (sensed) current.

## Μ

#### Maintenance Mode Switch (MMS):

A switch that is used to reduce the typical short-time delay (STD) from 0.30 seconds to 0.08 seconds or less. Used only in conjunction with trip units that have the Short-time Zone Selective Interlocking (ST-ZSI) capability.

## MicroLogic:

The family of electronic trip systems available on molded case circuit breakers, insulated case circuit breakers, and low-voltage power circuit breakers.

## 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.

## Ν

## **NSX Cord:**

A shielded communication cable consisting of two twisted pairs of stranded wire that is typically black/red and blue/white color. The NSX Cord has an RJ45 jack at one end, and four wires terminated into a small terminal block on the other end. This is used with PowerPacT H, J, or L breakers. If the terminal block is not needed, it can be removed.

## U

Universal Logic Plug (ULP) Cable:

The Circuit Breaker ULP Cord has an RJ45 jack at one end, and at the other end, the four wires are ready to be connected into screw terminals of an accessory such as a communication module. This is used with PowerPacT P, R, and MasterpacT NT and NW breakers to connect the BCM to the communication network.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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