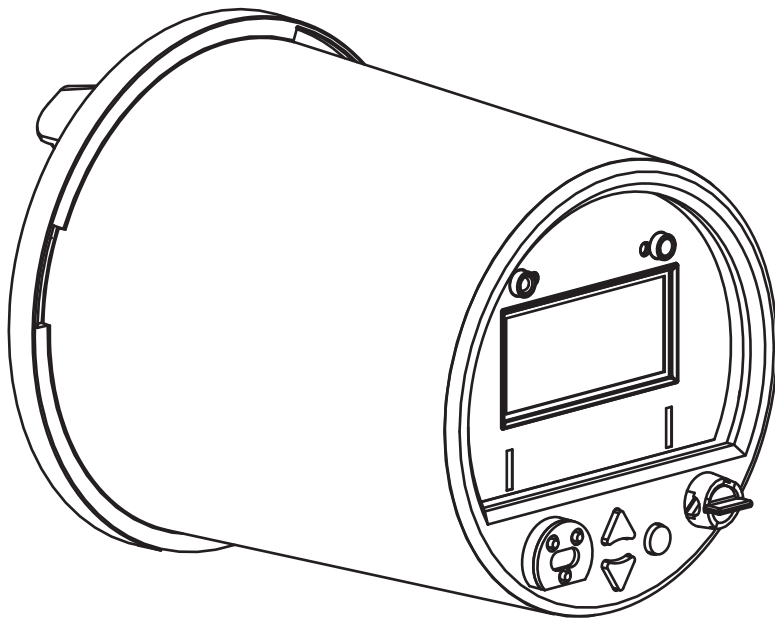


PowerLogic™ ION8650

Energy and power quality socket meter

Field retrofit instructions

7EN52-0370-00
08/2015



Safety information

Important information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential 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 potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

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

WARNING

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

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.

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.

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Chapter 1 Safety precautions

Installation, wiring, testing and service must be performed in accordance with all local and national electrical codes.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this device and the equipment in which it is installed before working on the device or equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- Ensure the meter has been unpowered for at least 15 minutes prior to disassembly.
- Always wear an anti-static wrist strap and use an anti-static workbench or mat when working with the meter's internal components.
- Do not damage any wires or wire connections within this meter.
- Do not damage the meter's printed circuit boards or their components.
- Connect protective (earth) ground before turning on any power supplying this device.

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

Chapter 2 Overview

PowerLogic™ ION8650 meters provide revenue-accurate, true RMS measurements of voltage, current power and energy, and are complemented by extensive I/O capabilities, comprehensive logging, and advanced power quality measurement and compliance verification functions.

This document outlines the steps for removing and replacing the following components on the socket version of the ION8650 meter:

- the display board
- the I/O board
- the communications board
- the power supply boards

NOTE: The illustrations within this document are representative and are intended for reference only. Your meter may appear different than shown.

For the field retrofit instructions for ION8650 switchboard meter, refer to the *PowerLogic ION8650 switchboard meter field retrofit instructions*, available from www.schneider-electric.com.

NOTE: You can only replace the meter's I/O and communications boards with boards that have the same or lesser functionality. If your meter did not originally have an optional I/O board then you cannot add one.

If your meter has the fiber optic communications option, you cannot add an I/O board to your meter.

It is recommended that you accuracy test your meter before it is returned to service. Refer to the *PowerLogic ION8600 and ION8650 accuracy verification* technical note for instructions on how to test your meter.

Additional information

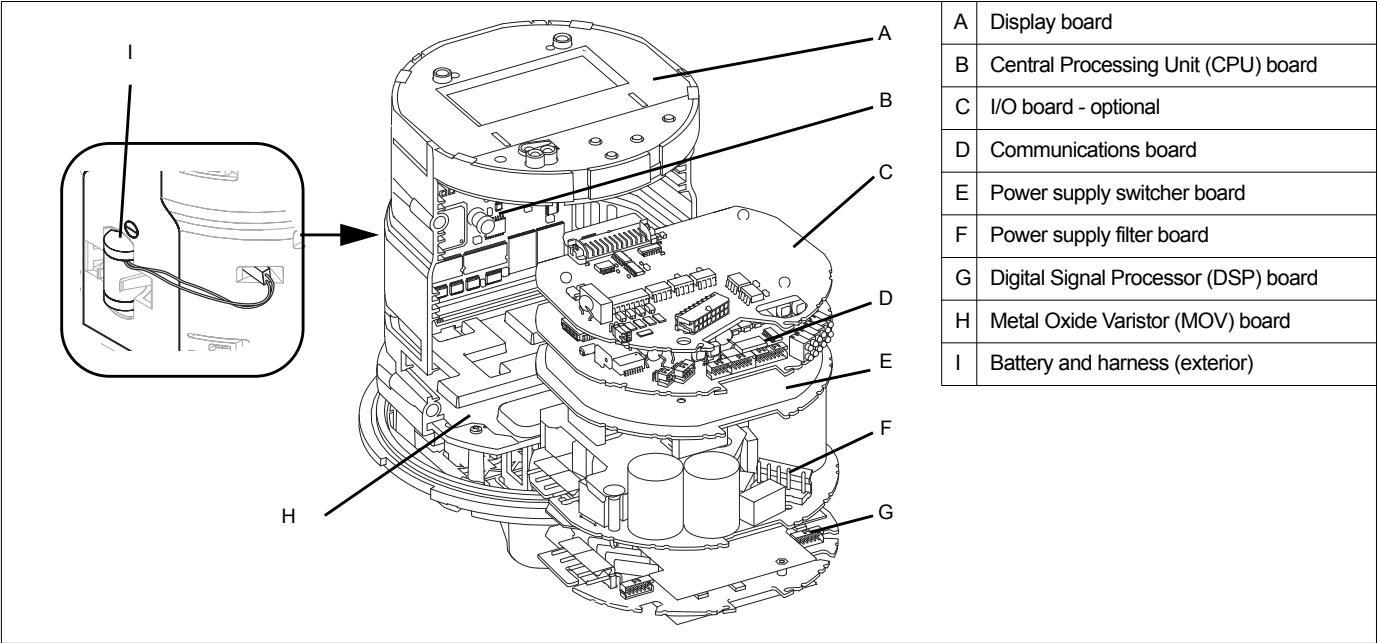
All of the most up-to-date documentation about your meter is available for download from www.schneider-electric.com, or contact your local Schneider Electric representative for more information.

Available technical documentation includes:

- *ION8650 installation guide* - contains wiring and installation instructions for the ION8650 meter.
- *PowerLogic ION8600 and ION8650 accuracy verification* - contains testing instructions and test configurations for verifying meter accuracy.
- *ION8650 User guide* - contains detailed information on meter operation, software support, communications, inputs/outputs, logging, time-of-use, alarm notification, and other advanced features.

Internal components of the meter

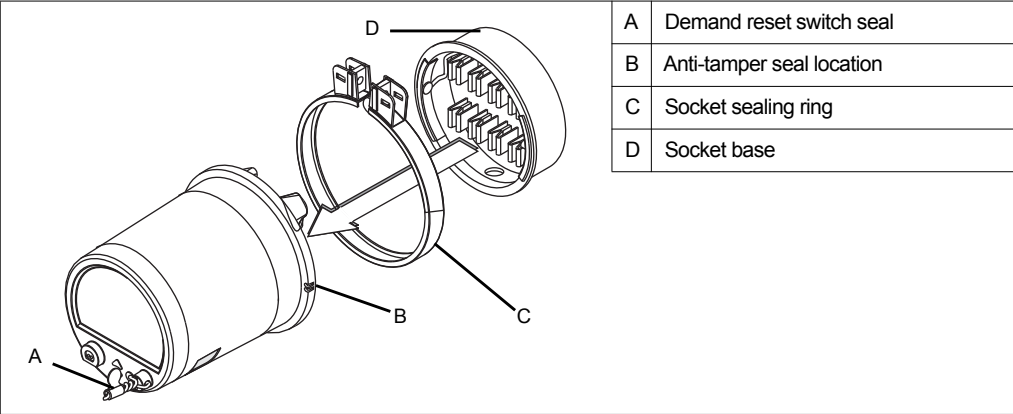
This graphic provides an overview of the meter’s internal components:



NOTE: The illustrations within this document are representative and are intended for reference only. Your meter may appear different than shown.

External components of the meter

This graphic provides an overview of the meter’s external components:



NOTE: The illustrations within this document are representative and are intended for reference only. Your meter may appear different than shown.

Before you begin

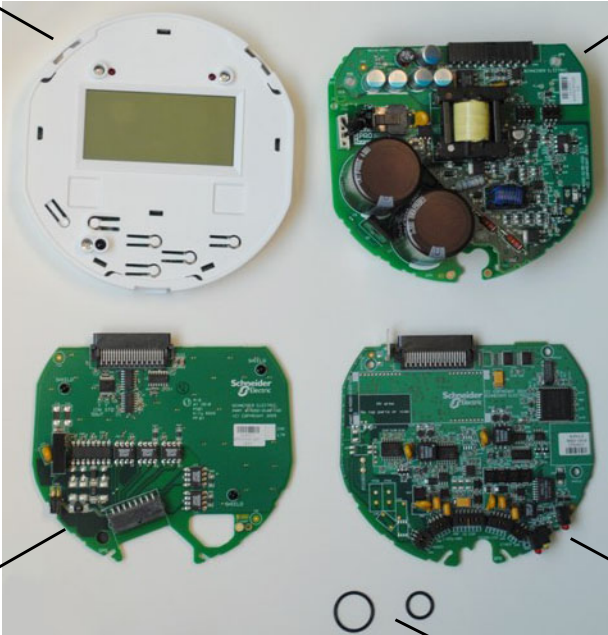
1. Familiarize yourself with the contents of this guide, in particular the section “Safety precautions” on page 7.
2. Make sure you have all tools and parts required for your retrofit, including an anti-static wrist strap and an anti-static workbench or mat.
3. Ensure the meter has been unpowered for at least 15 minutes prior to disassembly. Use a properly rated voltage sensing device to confirm the power is off.

Recommended tools

- Insulated screwdriver with #2 Phillips bit
- Needlenose pliers
- Medium protective gloves
- Anti-static wrist strap and an anti-static workbench or mat

Field retrofit kit contents

Your meter's field retrofit kit contains some or all of the following parts, depending on the field retrofit kit you have ordered:



A	Display board
B	I/O board
C	Power supply boards
D	Communication board
E	O-rings (2)
Anti-tamper seal not shown.	

NOTE: Field retrofit kit contents are subject to change and may not be exactly as shown.

Chapter 3 Retrofitting the meter

When disassembling the meter, keep track of what parts have been removed from which area. This will make it easier to reassemble your meter correctly.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

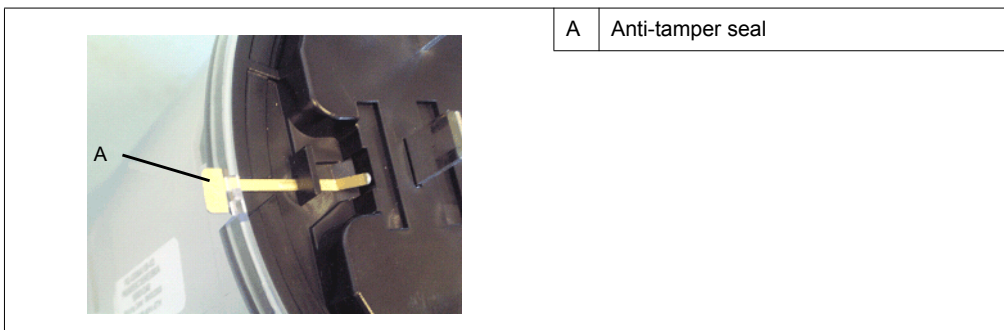
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this device and the equipment in which it is installed before working on the device or equipment.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Ensure the meter has been unpowered for at least 15 minutes prior to starting work on the meter.
- Do not damage any wires or wire connections within this meter.
- Do not damage the meter's printed circuit boards or their components.
- Always wear an anti-static wrist strap and use an anti-static workbench or mat when working with the meter's internal components.

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

Step 1: Remove outer cover

These steps outline how to remove the meter's clear plastic cover:

1. Remove the anti-tamper seal from the base of the meter (if present).



2. Remove the demand reset switch seal (if present).

3. Place the meter base on a non-skid surface. Using both hands, press the clear plastic cover down and twist counterclockwise to release.



4. Lift off the clear plastic cover.

Step 2: Removing and replacing the display

Follow these steps to remove and replace the meter's display:

1. Remove the plastic cover as outlined in "Step 1: Remove outer cover" on page 13.
2. Remove faceplate label from the display and set aside. This label can be applied to the new display.



⚠ CAUTION

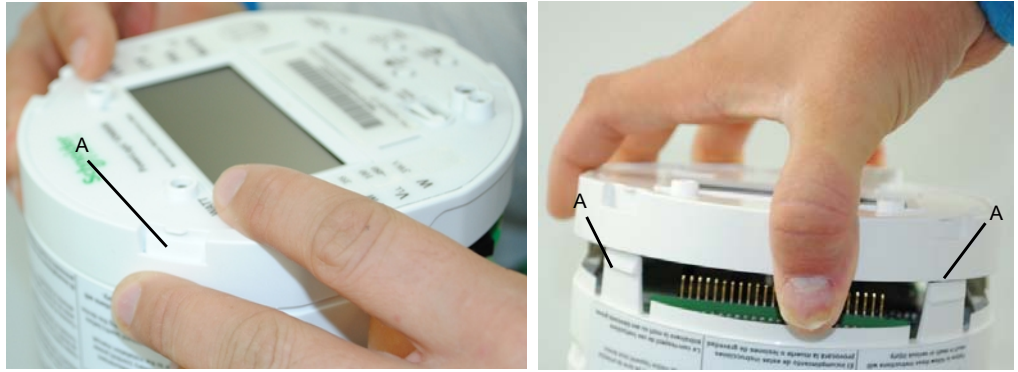
EQUIPMENT DAMAGE

Always wear an anti-static wrist strap and use an anti-static workbench or mat when working with the meter's internal components.

Failure to follow this instruction can result in equipment damage.

3. Remove the display board by carefully pushing the tabs (A) in and pulling the display board straight up.

NOTE: Angling the display board will damage the connector on the CPU.



4. Insert the new display board, ensuring proper orientation with the connector on the CPU. Push down on the display board until the tabs click into place.



5. Install the faceplate label on new display.

NOTE: If you are removing additional boards from the meter, they may be easier to access with the display board removed.

Step 3: Opening the meter and removing the optional I/O board

Follow these steps to open the meter's plastic housing and access the meter's I/O, communication and power supply boards:

NOTE: You must remove the I/O board in order to remove the communications board.

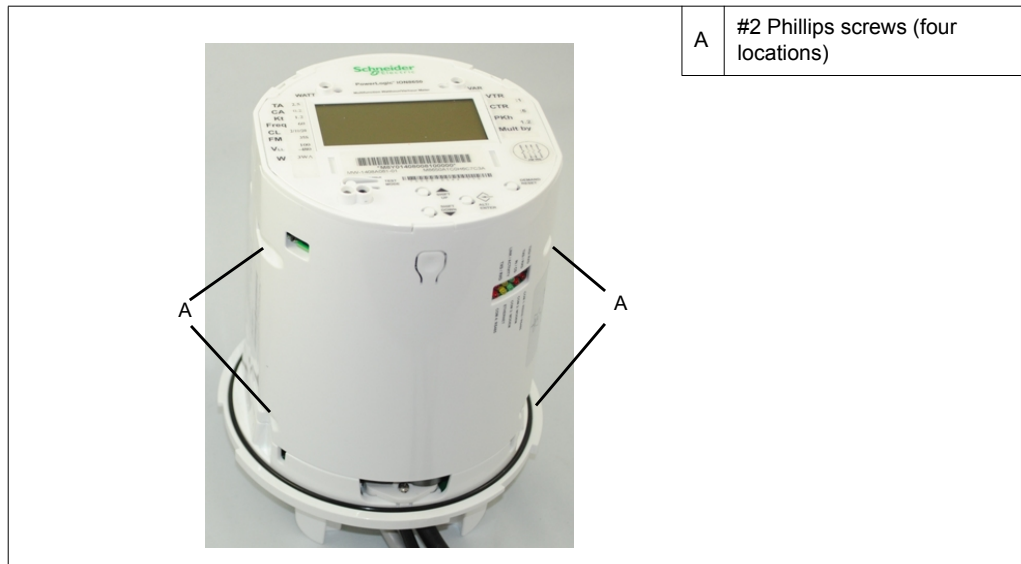
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

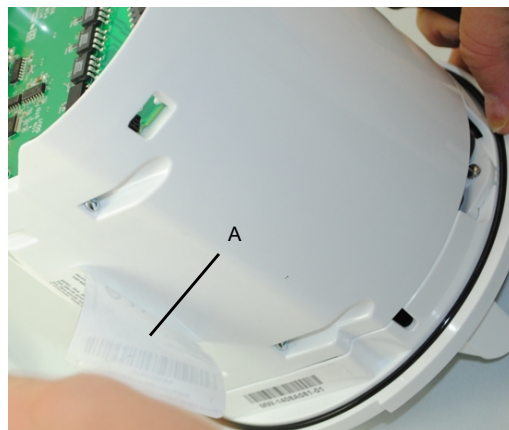
- Ensure your work area is clear of metal fragments and debris that could create a short circuit inside the meter.
- Ensure that your hands are free of any oils and contaminants that could damage the meter's boards or components.
- Ensure the meter has been unpowered for at least 15 minutes prior to starting work on the meter.

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

1. Remove the four #2 Phillips screws from the meter side case cover.



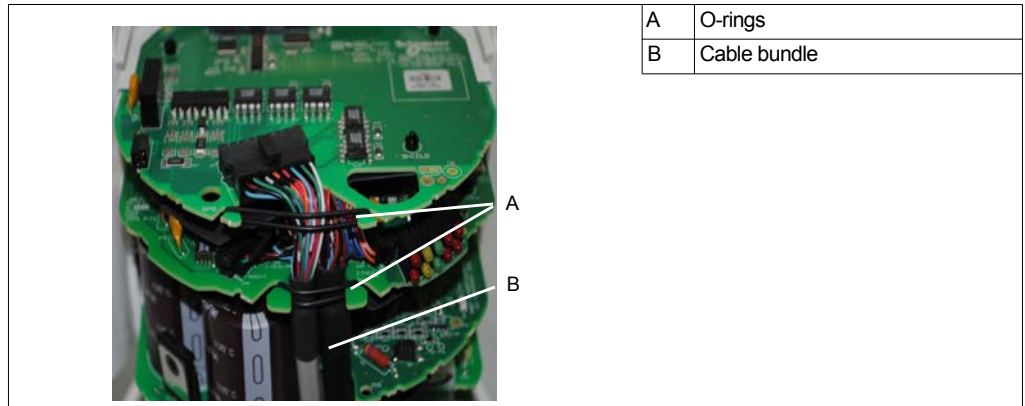
2. Carefully peel back the label (A) over the seam between the meter case and the meter side case cover.



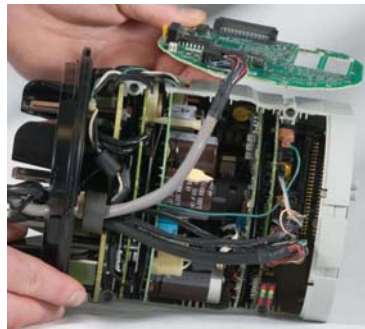
3. Remove the meter side case cover to expose the meter boards.



4. Remove all retaining O-rings from the cable bundle. Ensure your work area is clean and free of debris before proceeding.



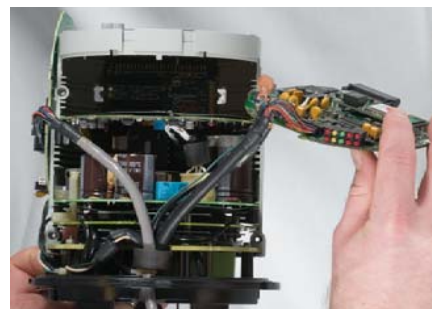
5. Slide the I/O board out of the meter, keeping the cables attached. Position the I/O board to one side to allow access to the inside of the meter.



Step 4: Removing the communications board

Follow these steps to remove your meter's communications board:

1. Slide the communications board out of the meter, keeping the communications cable attached. Position the communications board to one side to allow access to the inside of the meter.



Step 5: Removing and replacing the power supply boards

Follow these instructions to replace your meter's power supply boards:

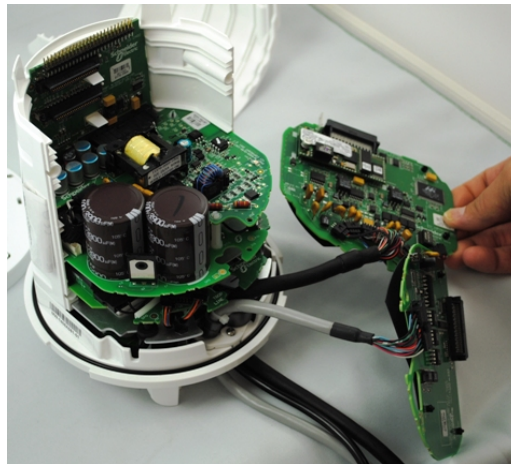
NOTE: You must remove the I/O board and the communications board in order to remove the power supply assembly.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Ensure your work area is clear of metal fragments and debris that could create a short circuit inside the meter.
- Ensure that your hands are free of any oils and contaminants that could damage the meter's boards or components.
- Ensure that the meter has been unpowered for at least 15 minutes prior to disassembly.

Failure to follow this instruction will result in death or serious injury.



1. Slide the power supply assembly (top and bottom power supply boards) out of the meter.



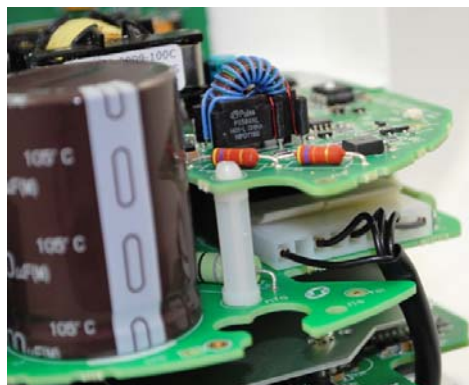
2. Disconnect the connector from the lower power supply board. Do not pull on the wires.



3. Slide the new power supply assembly back into the meter housing and press to insert the board edge connector into the meter connector.



4. Connect the power supply connector to the lower board of the power supply assembly.



Step 6: Replacing the communications board

Your meter's communications board can be replaced with a board that has different communications features than the original board. If you are not replacing your meter's communications board, go to "Step 7: Replacing the I/O board" on page 20.

Follow these instructions to replace your meter's communications board:

1. Disconnect the communications cable from the existing communications board.
2. Connect the communication cable to the connectors on the new communications board ensuring that the connectors are fully inserted.

NOTE: Each connector on the communication board has a unique number of pins. Make sure the connectors on the cable and the board match up correctly.



3. Gently slide the communications board back into the meter housing and press to insert the board edge connector into the meter connector.



Step 7: Replacing the I/O board

Your meter's optional I/O board can be replaced with a board that has different I/O features than the original. If you are not replacing your I/O board or reinstalling your existing I/O board, go to "Step 9: Reassembling the meter" on page 21.

WARNING

HAZARD OF UNINTENDED OPERATION

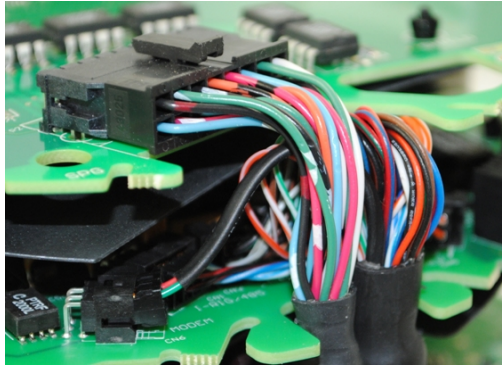
Do not use the meter for critical control or protections applications where human or equipment safety relies on the operation of the control circuit.

Failure to follow this instruction can result in death or serious injury.

NOTE: You cannot add optional I/O to some meters. Refer to "Overview" on page 9 for more information.

Follow these instructions to reinstall your meter's optional I/O board or to install a new I/O board:

1. Disconnect the I/O cable from the I/O board.
2. Connect the I/O cable to the connector on the new I/O board, ensuring that the connector is fully inserted.



3. Gently slide the new I/O board back into the meter housing and press to insert the board edge connector into the meter connector.



Step 8: Visual inspection

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Visually inspect cables and connectors to ensure they are undamaged.

Failure to follow this instruction will result in death or serious injury.

Follow these instructions to visually inspect your meter:

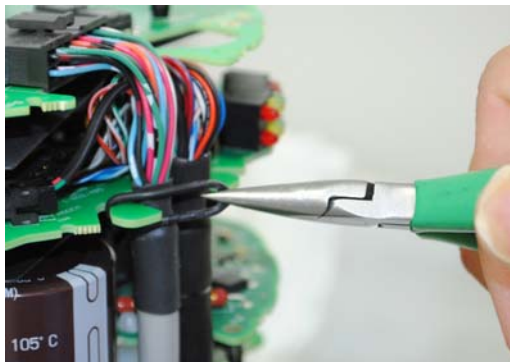
- Visually inspect all cables and connectors to ensure they are undamaged before proceeding.
- Check that no cable connections have become disconnected during the previous steps.
- Ensure the meter is free of any debris before reassembling.

If your meter fails visual inspection, contact Technical Support.

Step 9: Reassembling the meter

Follow these steps to reassemble your meter:

1. Ensure the I/O and communications cables are slotted inside the cable channel formed by the board cutouts.
2. Secure the cables to the retaining clips on the optional I/O board and communications board using the supplied O-rings.



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Ensure no cables are pinched during reassembly of the meter.

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

3. Replace the meter side case cover. Ensure that no cables are pinched.



4. Replace the four #2 Phillips screws in the meter side case cover and tighten to 1.7 Nm (15 in-lb).



5. Reapply the label across the seam between the meter case and the meter side case cover.



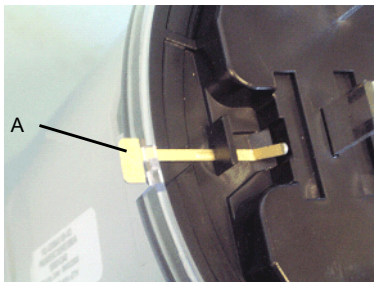
Step 10: Replace outer cover

Follow these steps to replace the outside plastic cover:

1. Inspect the meter's sealing ring. If the meter's sealing ring is damaged, replace it with the sealing ring provided.
2. Place the meter base on a non-skid surface. Replace the cover by aligning the cover tabs with the rim slots on the meter's base and pressing down. Secure the cover by twisting it clockwise.



3. Replace the anti-tamper seal at the base of the meter with the new seal provided.



A	Anti-tamper seal
---	------------------

4. Replace the demand reset seal if required.

Step 11: Final inspection

Visually inspect the meter before returning it to service:

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Visually inspect cables and connectors to ensure they are undamaged.

Failure to follow this instruction will result in death or serious injury.

- Visually inspect all cables and connectors to ensure they are undamaged before proceeding.
- Ensure the socket blades are straight and free of paint, rust or other contamination that might prevent proper electrical connection of the socket meter to the socket base.
- Ensure that the socket base and the meter’s ground contacts are clean. Remove any paint, rust or other contamination that might prevent a proper electrical connection.

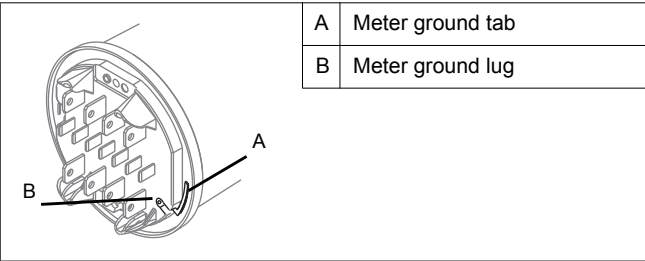
Step 12: Continuity testing

Complete these tests to help confirm that the meter wiring is correct. See the *PowerLogic ION8650 Installation Guide* for more information regarding meter connections.

1. Use a properly rated electrical continuity tester to check the following connections:

Connection 1	Connection 2	Continuity
Meter ground	Each voltage input (V1, V2 and V3)	No continuity (> 3 MΩ)
Meter ground	Vref (Reference voltage input)	No continuity (> 3 MΩ)
Meter ground	Auxiliary power ground (if present) ¹	Continuity (< 5 Ω)
Meter ground	Auxiliary power L/+ (if present) ¹	No continuity (> 3 MΩ)
Meter ground	Auxiliary power N/- (if present) ¹	No continuity (> 3 MΩ)

¹ If your meter does not have an auxiliary power supply, you do not need to test those connections.



Step 13: Testing and returning your meter to service

To test your meter before putting it into service, go to “Insulation resistance testing your meter” on page 25. Follow the instructions in the *ION8650 installation guide* to return your meter to service.

Chapter 4 Insulation resistance testing your meter

Insulation resistance testing checks for wiring damage on the communications, voltage input and auxiliary power circuits that could create a short to other circuits within the meter. Insulation resistance testing should only be done when necessary and at the prescribed levels to help prevent equipment damage.

It is recommended that you insulation resistance test your meter if you have replaced any of the meter's boards.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

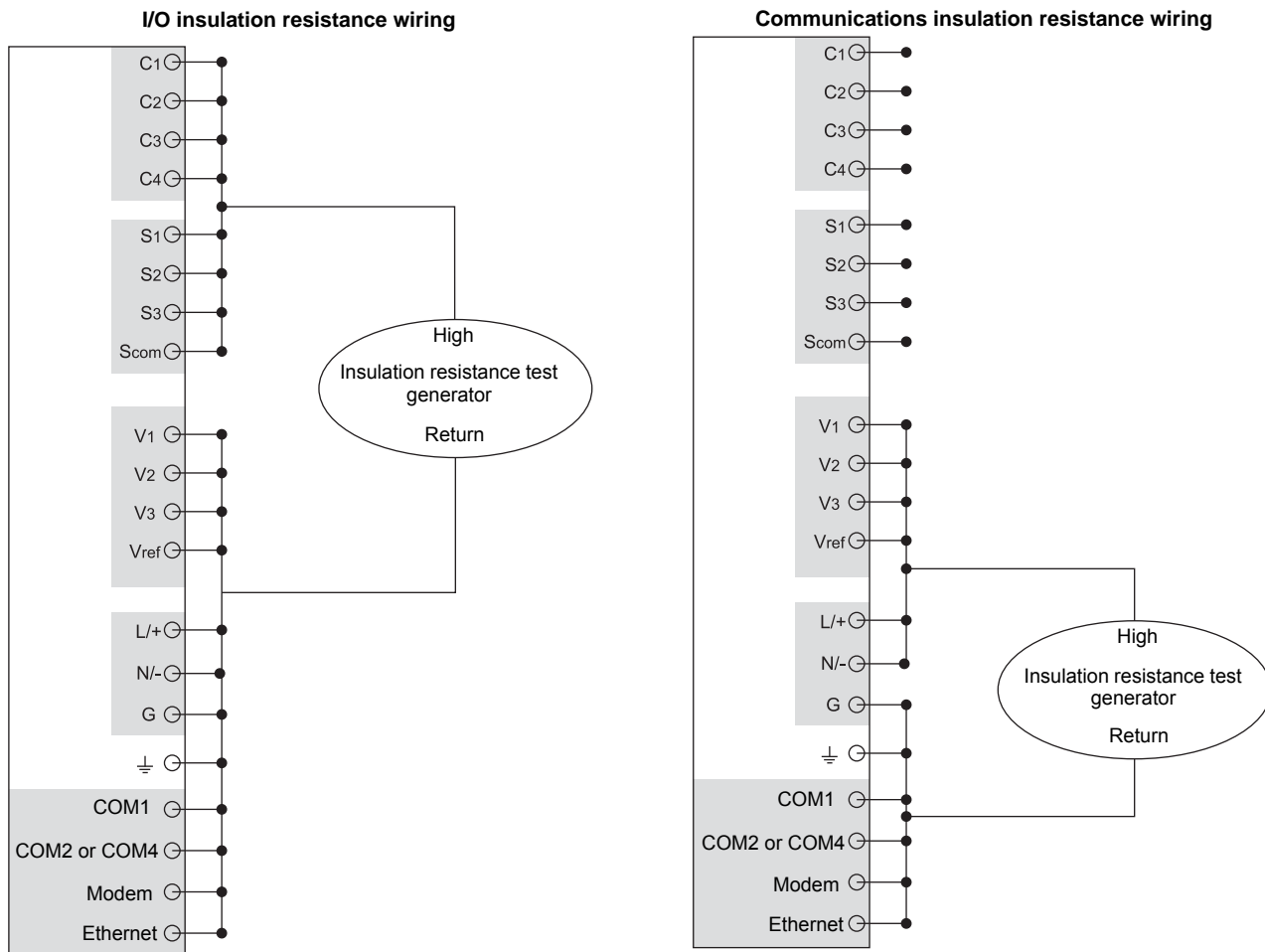
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this device and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Continuity test the meter before insulation resistance testing.
- Do not exceed insulation resistance levels.
- Do not repeatedly insulation resistance test the meter.

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

NOTE: Refer to “Step 12: Continuity testing” on page 24 for instructions on how to continuity test your meter.

Insulation resistance test wiring

Refer to the following diagrams and tables to wire your meter for I/O or communications insulation resistance testing:



NOTE: Test wiring should be minimum 0.33 mm² (22 AWG) or thicker.

I/O insulation resistance test connections:

Meter connections	Insulation resistance generator connections
<ul style="list-style-type: none"> – Meter ground lug – Auxiliary power supply ground (if present) – Voltage inputs V1, V2, V3 – Vref – Auxiliary power L/+ (if present) – Auxiliary power N/- (if present) – COM1 – COM2 or COM4 – Ethernet 	Return
<ul style="list-style-type: none"> – Digital outputs C1, C2, C3, C4 – Digital inputs S1, S2, S3, SC 	High

Communications insulation resistance test connections:

Meter connections	Insulation resistance generator connections
<ul style="list-style-type: none"> – Meter ground lug – Auxiliary power supply ground (if present) – COM1 – COM2 or COM4 – Ethernet 	Return
<ul style="list-style-type: none"> – Voltage inputs V1, V2, V3 – Vref – Auxiliary power L/+ (if present) – Auxiliary power N/- (if present) 	High
<ul style="list-style-type: none"> – Digital outputs C1, C2, C3, C4 – Digital inputs S1, S2, S3, SC 	Do not connect

Step 1: Insulation resistance testing the I/O board

Follow these steps to insulation resistance test your meter's I/O board:

1. Ensure the meter has passed continuity testing. Refer to “Step 12: Continuity testing” on page 24.
2. Connect the meter to the insulation resistance test generator as described in “Insulation resistance test wiring” on page 26.
3. Configure the insulation resistance test generator as shown:

Insulation resistance test generator settings	Value
Ramp up time	2 seconds
Hold time	2 seconds
Ramp down time	1 second
Recommended test voltage	500 VDC
Maximum test voltage	750 VDC

- Run the insulation resistance test. If your meter does not pass insulation resistance testing, contact Technical Support.

Test criteria	Pass/Fail
Insulation resistance ¹	Pass if > 4 MΩ
Maximum leakage current	Pass if < 200 μA

¹ Insulation resistance (R) varies as a function of test voltage (V_T) and maximum leakage current (I_{maxL}) as follows: $(R > V_T / I_{maxL})$.

Step 2: Insulation resistance testing the communications board

Follow these steps to insulation resistance test your meter's communication board:

- Ensure the meter has passed continuity testing. Refer to "Step 12: Continuity testing" on page 24.
- Connect the meter to the insulation resistance test generator as described in "Insulation resistance test wiring" on page 26.
- Configure the insulation resistance test generator as shown:

Insulation resistance test generator settings	Value
Ramp up time	2 seconds
Hold time	2 seconds
Ramp down time	1 second
Recommended test voltage	500 VDC
Maximum test voltage	800 VDC

- Run the insulation resistance test. If your meter does not pass insulation resistance testing, contact Technical Support

Test criteria	Pass/Fail
Insulation resistance ¹	Pass if > 800 kΩ
Maximum leakage current	Pass if < 1000 μA

¹ Insulation resistance (R) varies as a function of test voltage (V_T) and maximum leakage current (I_{maxL}) as follows: $(R > V_T / I_{maxL})$.

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7EN52-0370-00 08/2015

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