

RELION® PROTECTION AND CONTROL

620 series ANSI

Installation Manual





Document ID: 1MAC457436-IB
Issued: 2019-05-29
Revision: D
Product version: 2.0

© Copyright 2019 ABB. All rights reserved

Copyright

This document and parts thereof must not be reproduced or copied without written permission from ABB, and the contents thereof must not be imparted to a third party, nor used for any unauthorized purpose.

The software or hardware described in this document is furnished under a license and may be used, copied, or disclosed only in accordance with the terms of such license.

Trademarks

ABB and Relion are registered trademarks of the ABB Group. All other brand or product names mentioned in this document may be trademarks or registered trademarks of their respective holders.

Warranty

Please inquire about the terms of warranty from your nearest ABB representative.

www.abb.com/substationautomation

Disclaimer

The data, examples and diagrams in this manual are included solely for the concept or product description and are not to be deemed as a statement of guaranteed properties. All persons responsible for applying the equipment addressed in this manual must satisfy themselves that each intended application is suitable and acceptable, including that any applicable safety or other operational requirements are complied with. In particular, any risks in applications where a system failure and/or product failure would create a risk for harm to property or persons (including but not limited to personal injuries or death) shall be the sole responsibility of the person or entity applying the equipment, and those so responsible are hereby requested to ensure that all measures are taken to exclude or mitigate such risks.

This product has been designed to be connected and communicate data and information via a network interface which should be connected to a secure network. It is the sole responsibility of the person or entity responsible for network administration to ensure a secure connection to the network and to take the necessary measures (such as, but not limited to, installation of firewalls, application of authentication measures, encryption of data, installation of anti virus programs, etc.) to protect the product and the network, its system and interface included, against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB is not liable for any such damages and/or losses.

This document has been carefully checked by ABB but deviations cannot be completely ruled out. In case any errors are detected, the reader is kindly requested to notify the manufacturer. Other than under explicit contractual commitments, in no event shall ABB be responsible or liable for any loss or damage resulting from the use of this manual or the application of the equipment.

Conformity

This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2014/30/EU) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2014/35/EU). This conformity is the result of tests conducted by ABB in accordance with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-1 and EN 60255-27 for the low voltage directive. The product is designed in accordance with the international standards of the IEC 60255 series and ANSI C37.90. This product complies with the UL 508 certification.

Safety information



Dangerous voltages can occur on the connectors, even though the auxiliary voltage has been disconnected.



Non-observance can result in death, personal injury or substantial property damage.



Only a competent electrician is allowed to carry out the electrical installation.



National and local electrical safety regulations must always be followed.



The frame of the protection relay has to be carefully grounded.



When the plug-in unit has been detached from the case, do not touch the inside of the case. The relay case internals may contain high voltage potential and touching these may cause personal injury.



The protection relay contains components which are sensitive to electrostatic discharge. Unnecessary touching of electronic components must therefore be avoided.



Whenever changes are made in the protection relay, measures should be taken to avoid inadvertent tripping.

Table of contents

Section 1	Introduction.....	3
	This manual.....	3
	Intended audience.....	3
	Product documentation.....	4
	Product documentation set.....	4
	Document revision history.....	4
	Related documentation.....	5
	Symbols and conventions.....	5
	Symbols.....	5
	Document conventions.....	6
Section 2	Environmental aspects.....	7
	Sustainable development.....	7
	Disposal of a protection relay.....	7
Section 3	Unpacking, inspecting and storing.....	9
	Removing transport packaging.....	9
	Inspecting product and delivery items.....	9
	Identifying product.....	9
	Checking delivery items.....	9
	Inspecting product.....	10
	Returning a product damaged in transit.....	10
	Storing.....	10
Section 4	Mounting.....	11
	Checking environmental conditions and mounting space.....	11
	Detaching and installing the plug-in unit.....	11
	Detaching the plug-in unit.....	11
	Installing plug-in unit.....	13
	Sealing the plug-in unit.....	16
	Securing the handle.....	17
	Mounting the IED.....	19
	Required tools.....	19
	Flush mounting the IED.....	19
	Semi-flush mounting the IED.....	23
	Rack mounting the IED.....	25
	Wall-mounting the IED.....	27

Table of contents

Flush mounting the IED with a protection cover.....	31
Mounting lens sensors for an arc flash detector system.....	35
Section 5 Connecting.....	37
Required tools.....	37
Connecting wires	37
Connecting protective grounding	37
Connecting analog signals.....	39
Connecting current and voltage inputs	39
Connecting RTD and mA inputs.....	44
Connecting protection relay with a test switch.....	46
Connecting binary signals.....	46
Connecting power supply.....	49
Connecting communication.....	50
Energizing the IED.....	50
Section 6 Removing, repairing and exchanging.....	53
Product lifecycle.....	53
Checking protection relay information.....	53
Removing the IED.....	54
Sending protection relay for repair.....	54
Exchanging protection relay.....	55
Section 7 Technical data.....	57
Case and HMI display variants.....	57
Front side of the IED.....	57
Rear side of the IED.....	58
Enclosure class.....	61
Section 8 Accessories and ordering data.....	63
Section 9 Glossary.....	65

Section 1 Introduction

1.1 This manual

The installation manual contains instructions on how to install the protection relay. The manual provides procedures for mechanical and electrical installation. The chapters are organized in the chronological order in which the relay should be installed.

1.2 Intended audience

This manual addresses the personnel responsible for installing the product hardware.

The installation personnel must have basic knowledge of handling electronic equipment.

1.3 Product documentation

1.3.1 Product documentation set

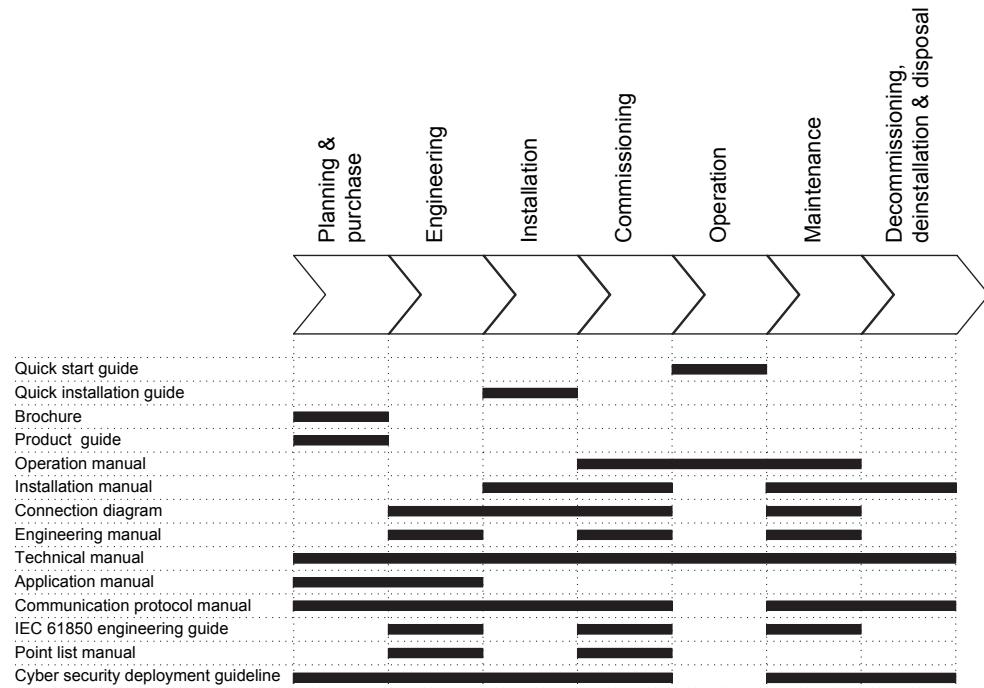


Figure 1: The intended use of documents during the product life cycle



Product series- and product-specific manuals can be downloaded from the ABB Web site <http://www.abb.com/relion>.

1.3.2 Document revision history

Document revision/date	Product series version	History
A/2012-10-31	2.0	First release
B/2018-08-31	2.0	Content updated
C/2019-05-17	2.0	Content updated
D/2019-05-29	2.0	Content updated



Download the latest documents from the ABB Web site
<http://www.abb.com/substationautomation>.

1.3.3

Related documentation

Product series- and product-specific manuals can be downloaded from the ABB Web site
<http://www.abb.com/substationautomation>.

1.4

Symbols and conventions

1.4.1

Symbols



The electrical warning icon indicates the presence of a hazard which could result in electrical shock.



The warning icon indicates the presence of a hazard which could result in personal injury.



The caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in corruption of software or damage to equipment or property.



The information icon alerts the reader of important facts and conditions.



The tip icon indicates advice on, for example, how to design your project or how to use a certain function.

Although warning hazards are related to personal injury, it is necessary to understand that under certain operational conditions, operation of damaged equipment may result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2

Document conventions

A particular convention may not be used in this manual.

- Abbreviations and acronyms are spelled out in the glossary. The glossary also contains definitions of important terms.
- Push button navigation in the LHMI menu structure is presented by using the push button icons.
 - To navigate between the options, use and .
- Menu paths are presented in bold.
Select **Main menu/Settings**.
- WHMI menu names are presented in bold.
Click **Information** in the WHMI menu structure.
- LHMI messages are shown in Courier font.
To save the changes in nonvolatile memory, select **Yes** and press .
- Parameter names are shown in italics.
The function can be enabled and disabled with the *Operation* setting.
- Parameter values are indicated with quotation marks.
The corresponding parameter values are "Enabled" and "Disabled".
- Input/output messages and monitored data names are shown in Courier font.
When the function picks up, the **PICKUP** output is set to TRUE.
- Dimensions are provided both in inches and mm. If it is not specifically mentioned, the dimension is in mm.

Section 2 Environmental aspects

2.1

Sustainable development

Sustainability has been taken into account from the beginning of the product design including the pro-environmental manufacturing process, long life time, operation reliability and disposing of the protection relay.

The choice of materials and the suppliers have been made according to the EU RoHS directive (2002/95/EC). This directive limits the use of hazardous substances which are the following:

Table 1: Maximum concentration values by weight per homogeneous material

Substance	Proposed maximum concentration
Lead - Pb	0.1%
Mercury - Hg	0.1%
Cadmium - Cd	0.01%
Hexavalent Chromium Cr (VI)	0.1%
Polybrominated biphenyls - PBB	0.1%
Polybrominated diphenyl ethers - PBDE	0.1%

Operational reliability and long life time have been assured with extensive testing during the design and manufacturing processes. Moreover, long life time is supported by maintenance and repair services as well as by the availability of spare parts.

Design and manufacturing have been done under a certified environmental system. The effectiveness of the environmental system is constantly evaluated by an external auditing body. We follow environmental rules and regulations systematically to evaluate their effect on our products and processes.

2.2

Disposal of a protection relay

Definitions and regulations of hazardous materials are country-specific and change when the knowledge of materials increases. The materials used in this product are typical for electric and electronic devices.

All parts used in this product are recyclable. When disposing of a protection relay or its parts contact a local waste handler who is authorized and specialized in disposing of electronic waste. These handlers can sort the material by using dedicated sorting processes and dispose of the product according to the local requirements.

Table 2: *Materials of the protection relay parts*

Protection relay	Parts	Material
Case	Metallic plates, parts and screws	Steel
	Plastic parts	PC ¹⁾ , LCP ²⁾
	Electronics plug in module	Various
Plug-in unit	Electronics plug in modules	Various
	Electronics LHMI module	Various
	Plastic parts	PC, PBT ³⁾ , LCP, PA ⁴⁾
	Metallic parts	Aluminium
Package	Box	Cardboard
Attached material	Manuals	Paper

1) Polycarbonate

2) Liquid crystal polymer

3) Polybutylene terephthalate

4) Polyamide

Section 3

Unpacking, inspecting and storing

3.1

Removing transport packaging

Protection relays require careful handling.

1. Examine the delivered products to ensure that they have not been damaged during the transport.
2. Remove the transport packaging carefully without force.
3. Attach the protective film (supplied with the protection relay) on the top side of the unit for the installation phase.



Before connecting the auxiliary power, remove the protective film from top of the protection relay.



The cardboard packaging material is 100% recyclable.

3.2

Inspecting product and delivery items

3.2.1

Identifying product

1. Locate the protection relay's order number from the label on top of the plug-in unit.
2. Compare the protection relay's order number with the ordering information to verify that the received product is correct.

3.2.2

Checking delivery items

Check that all items are included in the delivery in accordance with the delivery documents.

3.2.3

Inspecting product

Protection relays require careful handling before installation on site.

- Check the protection relay to see if any damage occurred during transportation.

If the protection relay has been damaged during transportation, make a claim against the transport contractor, and notify the local ABB representative.

3.2.4

Returning a product damaged in transit

If damage has occurred during transport, appropriate actions must be taken against the latest carrier. Please inform the nearest ABB office or representative. Notify ABB immediately if there are any discrepancies in relation to the delivery documents.

3.3

Storing

If the protection relay is stored before installation, it must be done in the original transport casing in a dry and dust free place in accordance with ANSI C37.90.0.

Observe the environmental requirements stated in the technical manual.

Section 4 Mounting

4.1

Checking environmental conditions and mounting space

The mechanical and electrical environmental conditions at the installation site must be within the limits described in the technical manual.

- Avoid installation in dusty, damp places.
Avoid places susceptible to rapid temperature variations, powerful vibrations and shocks, surge voltages of high amplitude and fast rise time, strong induced magnetic fields or similar extreme conditions.
- Check that sufficient space is available.
Sufficient space is needed at the front and rear of the protection relay to allow access to wires and optical fibers to provide sufficient ventilation to the protection relay and to enable maintenance and future modifications.
- Ensure that flush-mounted protection relays can be added and replaced without excessive dismantling.



Make sure that the ventilation holes are not blocked at any side of the installed protection relay case.

4.2

Detaching and installing the plug-in unit

4.2.1

Detaching the plug-in unit



Before detaching the plug-in unit from the case, the auxiliary voltage must be disconnected.

1. Turn off the power.
2. Open the seal on the front panel by removing the sealing wire and screw the sealing screw all the way in.
3. Lift the handle to 90 degrees to release the latching mechanism.
The unit is pushed about 0.28 inches (7 mm) out of the case and the connectors are separated.
4. Pull the unit out of the case.

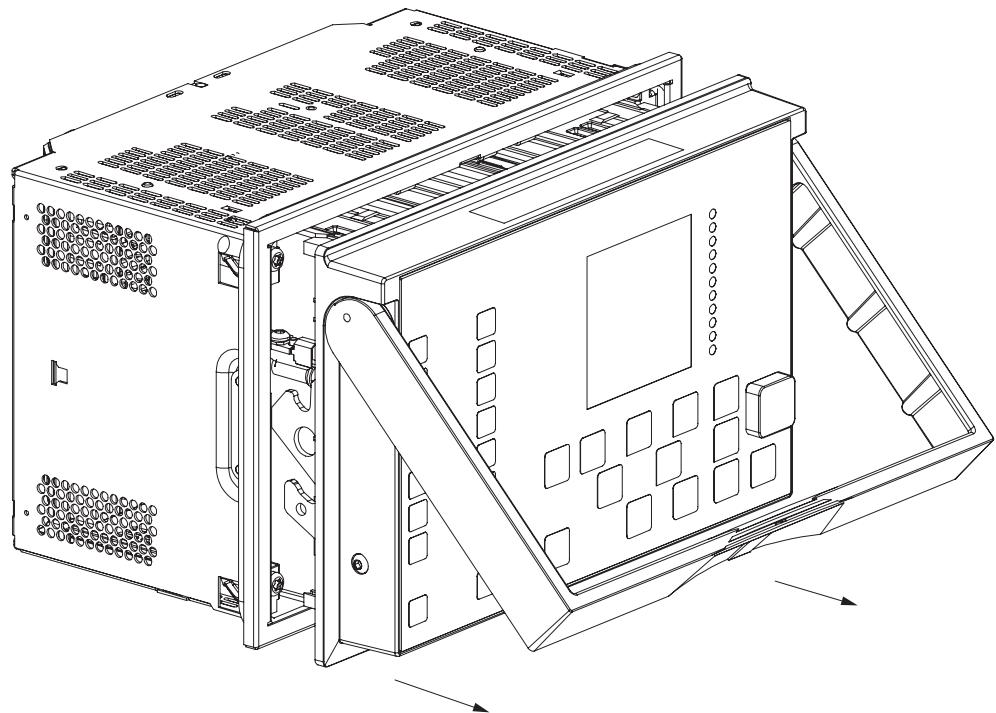


Figure 2: Detaching a plug-in unit from the case



The IED features an automatic short-circuit mechanism in the CT connector. Therefore, detaching the plug-in unit will not open the secondary circuit of the CT which could cause dangerously high voltages.



Do not touch terminals inside the case after removing the plug-in unit.
Live terminals can be inside the case.



The signal connectors are left open when the plug-in unit is detached.

4.2.2

Installing plug-in unit

The protection relay is constructed in a way that a plug-in unit with voltage- or current-measuring inputs can only be plugged into a corresponding case. This prevents fitting an unsuitable plug-in unit into a wrong case.



Before fitting the plug-in unit into the case, check that the unit and the case have the same serial number.

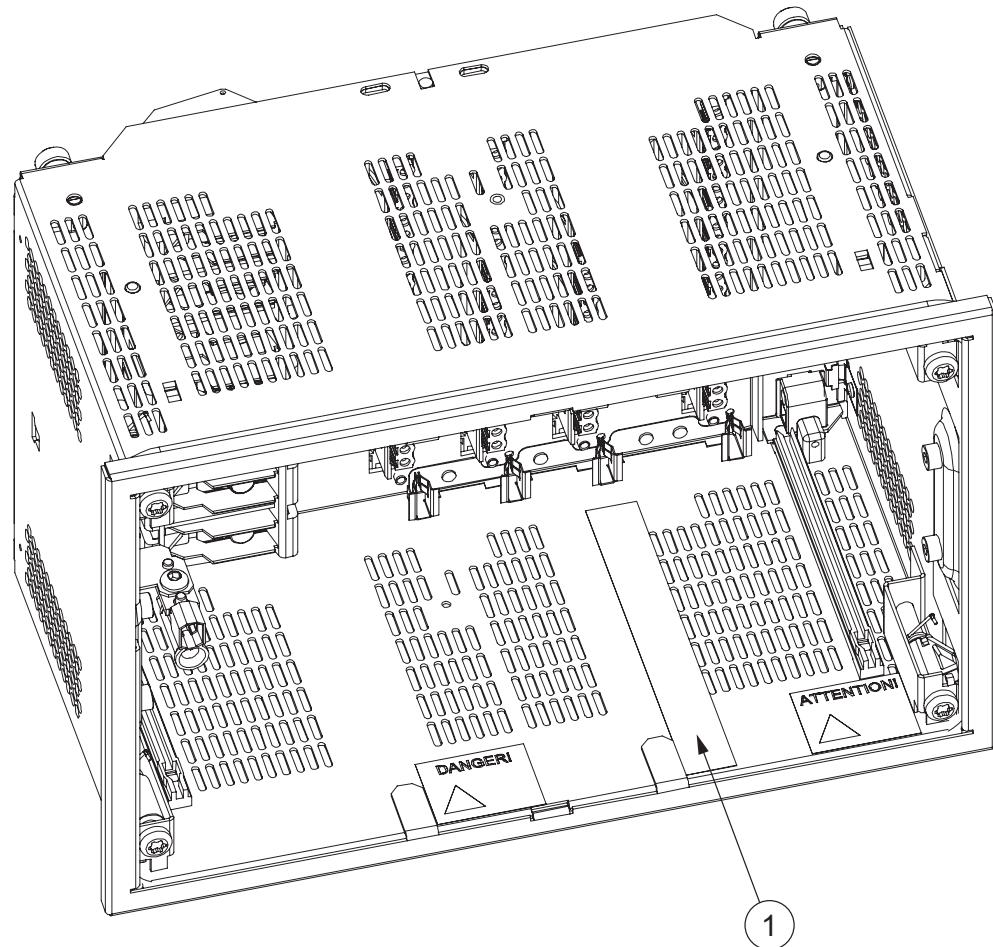


Figure 3: Serial number in the case

1 Rating label with serial number



Forcing an unsuitable plug-in unit into the case can break both the plug-in unit and the case and may cause danger.

1. Lift the handle 90 degrees and push the plug-in unit into the case.

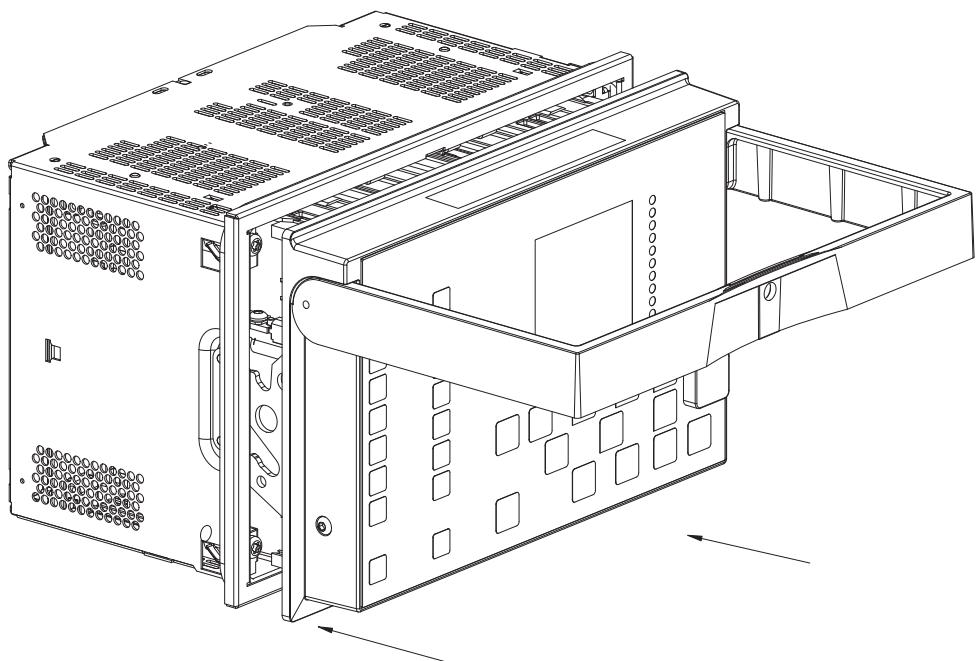


Figure 4: Installing a plug-in unit into the case

2. Let the handle swing down about 45 degrees. At the same time, push the plug-in unit into the case as far as it goes.
Plug-in unit stops at about 0.28 inches (7 mm) distance from the case.

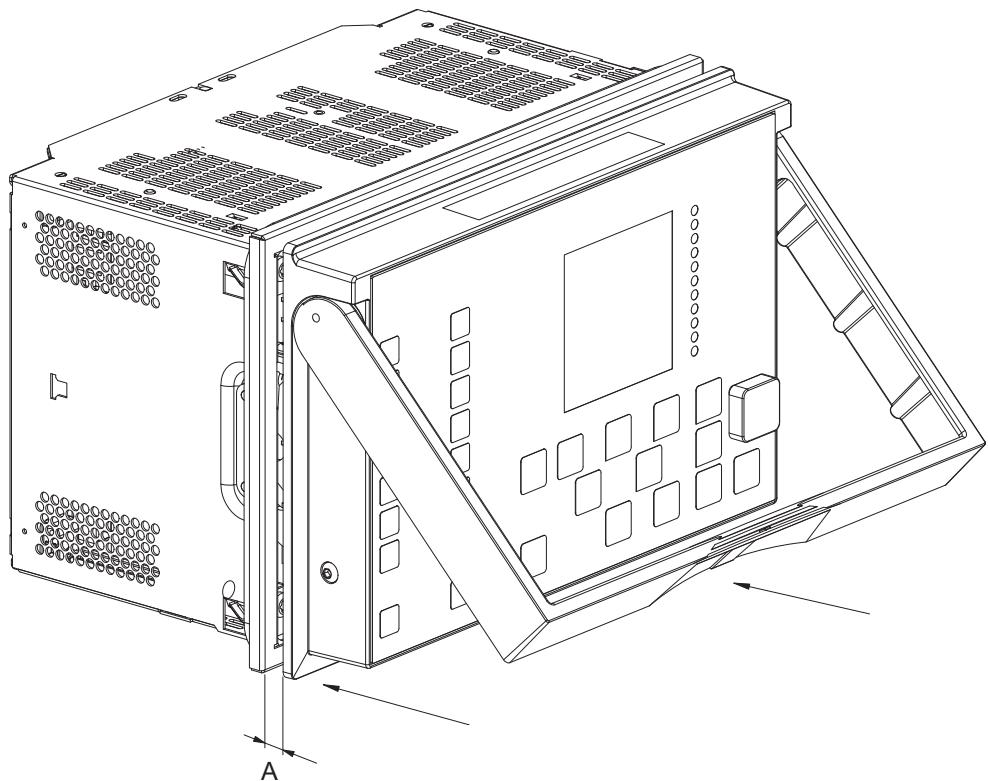


Figure 5: Pushing the plug-in unit into the case

A 0.28 inches (7 mm)

3. Turn down the handle to push the plug-in unit into its final position in the case.



The handle must be locked or sealed to secure the mechanical performance under any conditions caused by vibration, pressure, shock or bump, seismic activity or other equivalent circumstances.

4.2.3 Sealing the plug-in unit

The front panel of the IED has an integrated sealing screw. By default the screw is screwed all the way in and is not used when installing or detaching the plug-in unit.

1. Open the sealing screw about nine turns.
2. Thread a sealing wire through the holes in the sealing screw and the handle.

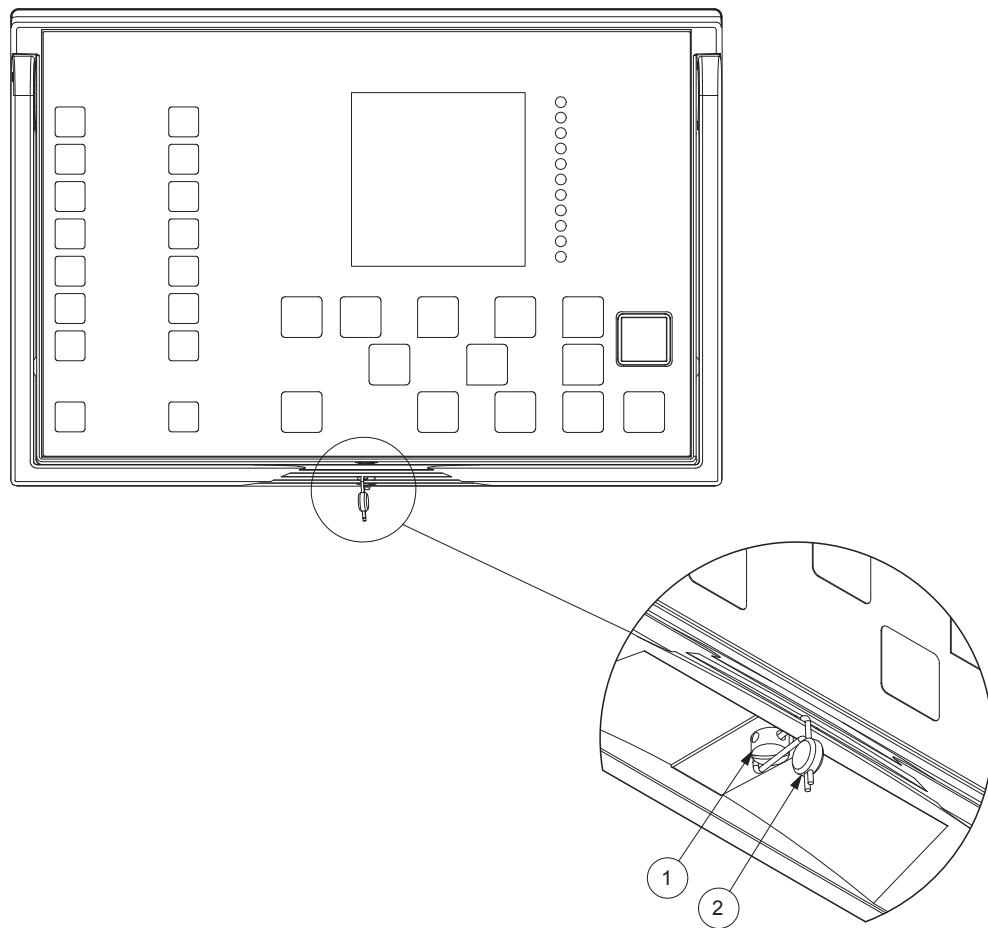


Figure 6: Sealing screw

- 1 Sealing screw
- 2 Sealing wire and seal

4.2.4

Securing the handle

The front panel of the IED has an integrated sealing screw. By default, the screw is screwed all the way in and not used when installing or detaching the plug-in unit. Instead of sealing the plug-in unit, the sealing screw and the spacer supplied with the IED can be used for securing the handle in place.

1. Fully open the sealing screw and remove it.
2. Re-insert the sealing screw with the spacer.

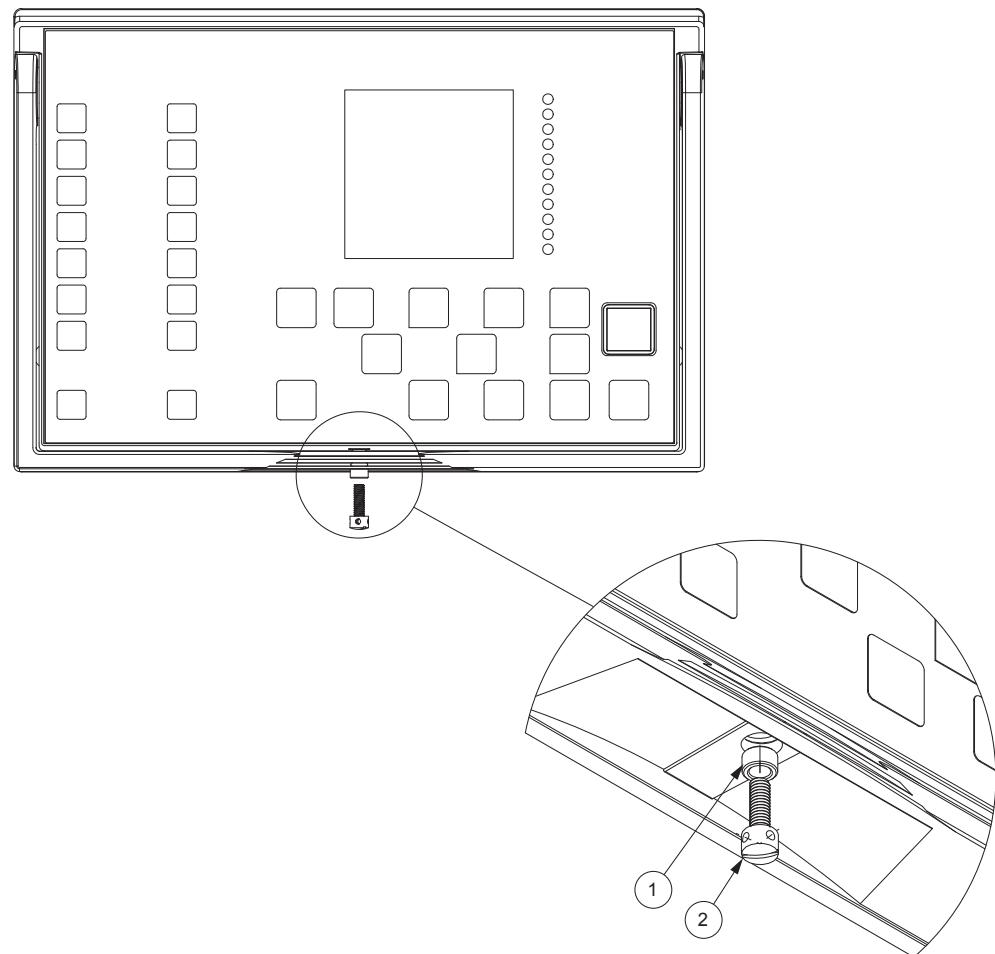


Figure 7: Sealing screw with spacer

- 1 Spacer
- 2 Sealing screw

4.3 Mounting the IED

4.3.1 Required tools

- T25 Torx screwdriver for mounting the case
- T20 Torx screwdriver for connecting the protective grounding



Only use adjustable torque screwdrivers.

4.3.2 Flush mounting the IED

All the mounting elements are integrated in the IED.

Requirements for installation:

- Panel cut-out of 9.76 x 6.38 inches (248 x 162 mm)
- Depth behind the panel 6.02 inches (153 mm)



An IED equipped with optic connections requires a minimum depth of 7.09 inches (180 mm). The allowed minimum bending radius has to be checked from the optical cable manufacturer.

1. Loosen the four M5 fixing screws in the case to fit the case into the panel cut-out.
2. Mount the case to the panel cut-out.

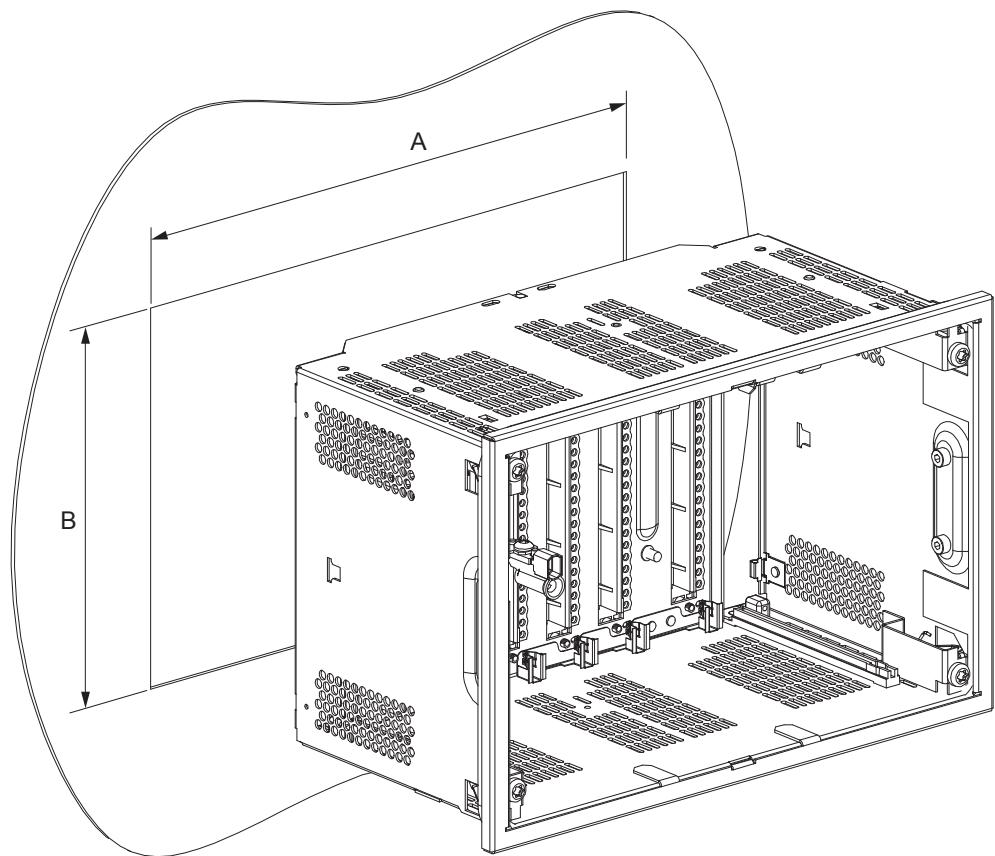


Figure 8: Flush mounting a case into a panel cut-out

A 9.76 inches (248 ± 1 mm)

B 6.38 inches (162 ± 1 mm)

3. Tighten the M5 (T25) screws.



The allowed range for the fixing screws' tightening torque is 0.52...0.74 foot-pounds (0.7...1 Nm).

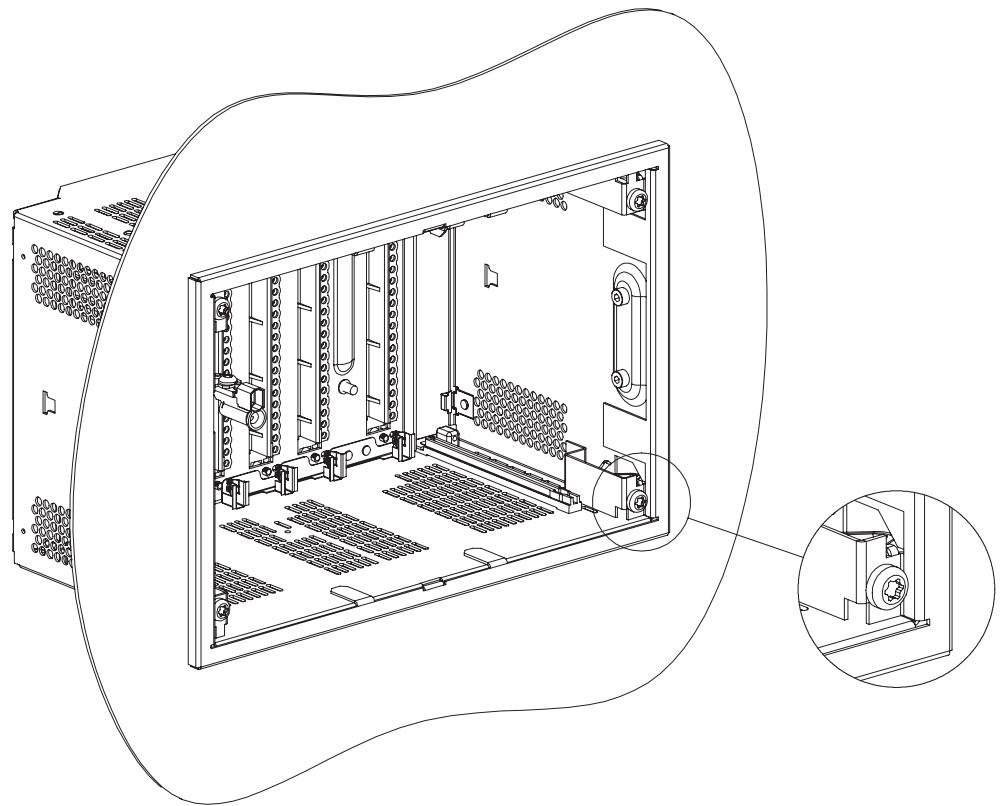


Figure 9: Flush mounted case, tightening the M5 fixing screws

4. Install the plug-in unit into the case.

There is a protective film on the top side of the IED. Its purpose is to prevent debris falling inside the unit while installing electrical wiring. Remove the protective film before energizing the IED.

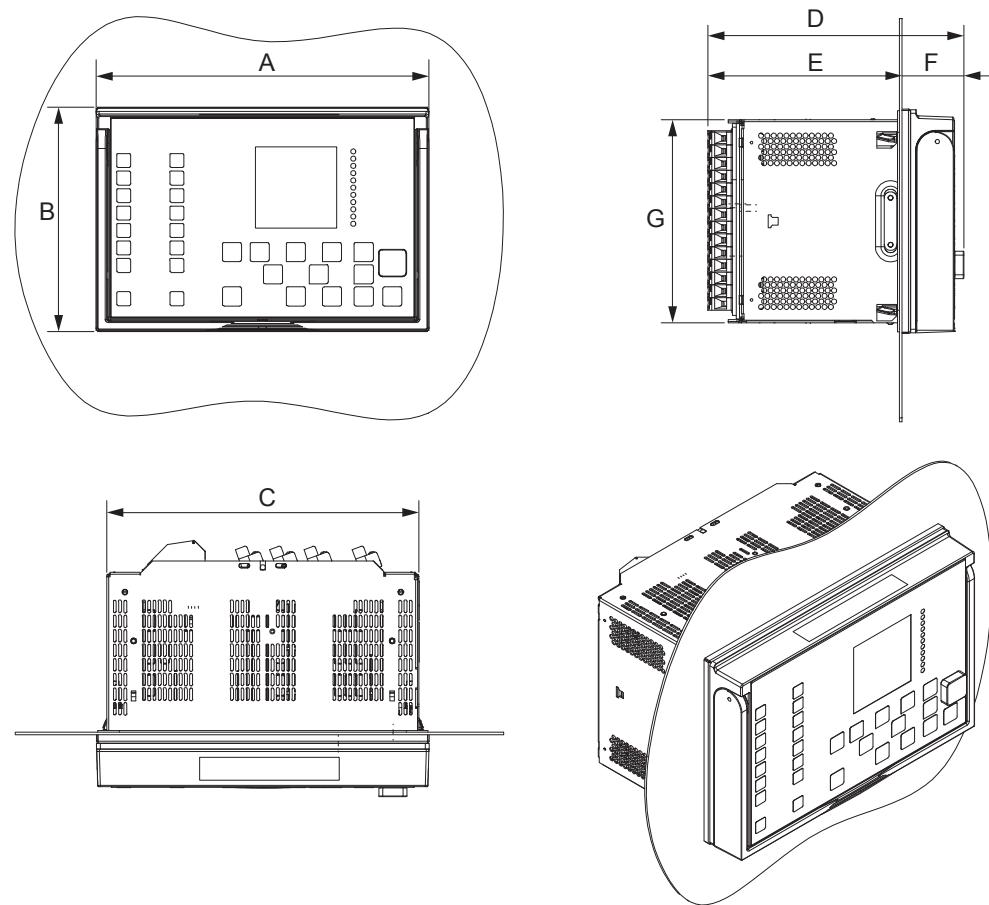


Figure 10: Flush mounted case and plug-in unit

- A 10.32 inches (262.2 mm)
- B 6.97 inches (177 mm)
- C 9.69 inches (246 mm)
- D 7.91 inches (201 mm)
- E 6.02 inches (153 mm)
- F 1.89 inches (48 mm)
- G 6.30 inches (160 mm)

4.3.3

Semi-flush mounting the IED

A mounting kit is needed for semi-flush mounting the IED. The mounting kit includes screws, a raising frame and gasket.

To install a semi-flush, a panel cut-out of 9.76 x 6.38 inches (248 x 162 mm) with mounting holes and 4.06 inches (103 mm) depth behind the panel is required.

1. Mount the raising frame into the panel cut-out with four M5 screws.

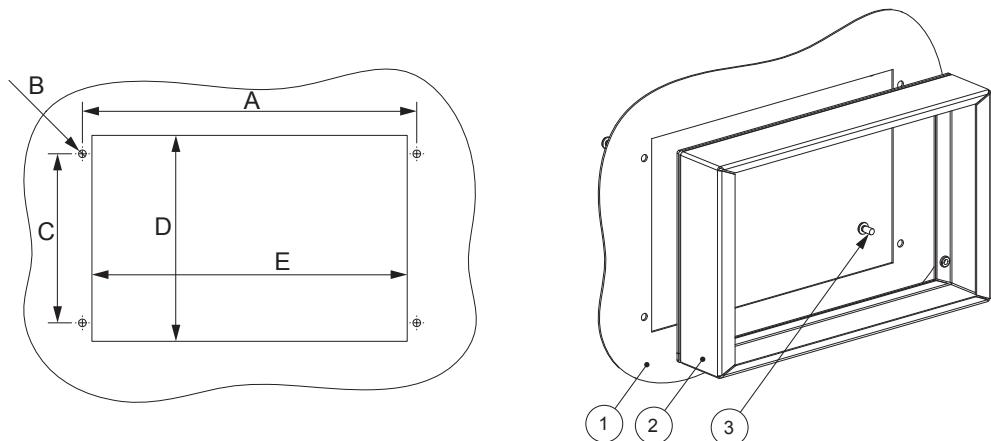


Figure 11: Mounting the raising frame

A	10.35 inches (263 ± 0.5 mm)	1	Panel
B	$\varnothing 0.24$ inches (6 mm)	2	Raising frame
C	5.24 inches (133 ± 0.5 mm)	3	M5 screw
D	6.38 inches (162 ± 1 mm)		
E	9.76 inches (248 ± 1 mm)		

2. Loosen the four M5 fixing screws in the case to fit the case to the raising frame.
3. Remove the protective film temporarily from the top side of the case.
4. Mount the case to the raising frame.

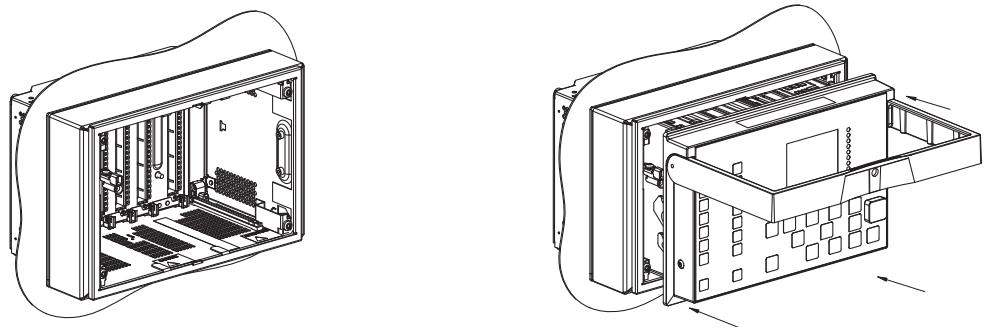


Figure 12: Mounting the case

5. Tighten the M5 screws.



The allowed range for the fixing screws' tightening torque is 0.52...0.74 foot-pounds (0.7...1 Nm).

6. Attach the protective film back on the top side of the case.
7. Install the plug-in unit into the case.

The purpose of the protective film is to prevent debris falling inside the unit while installing electrical wiring. Remove the protective film before energizing the IED.

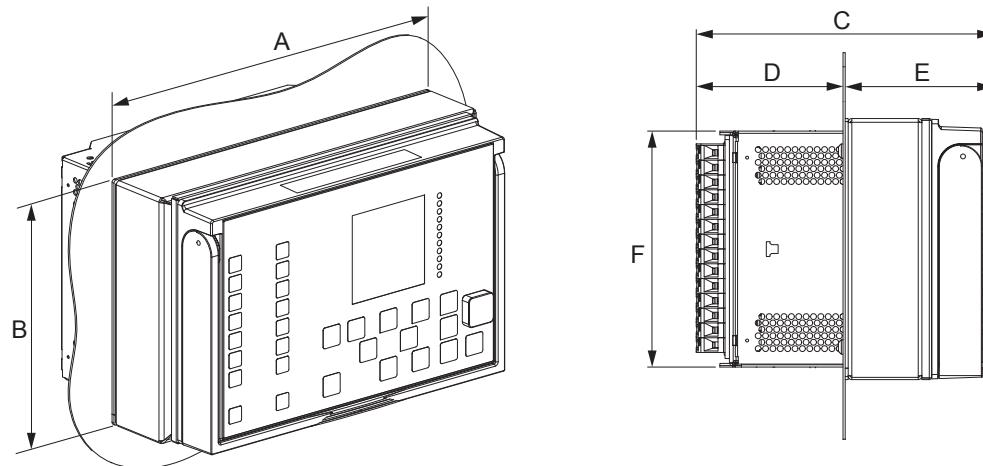


Figure 13: Semi-flush mounted IED

A 11.02 inches (280 mm)

B 6.97 inches (177 mm)

C 7.91 inches (201 mm)

D 4.06 inches (103 mm)

E 3.86 inches (98 mm)

F 6.30 inches (160 mm)



Check the allowed minimum bending radius from the optical cable manufacturer.

4.3.4

Rack mounting the IED

A mounting kit is needed for rack mounting the IED. The 19" rack mounting kit includes screws and a mounting panel.

1. Mount the mounting panel to a 19" rack.
2. Loosen the four M5 fixing screws in the case to fit the case into the panel cut-out.
3. Mount the case to the panel cut-out.

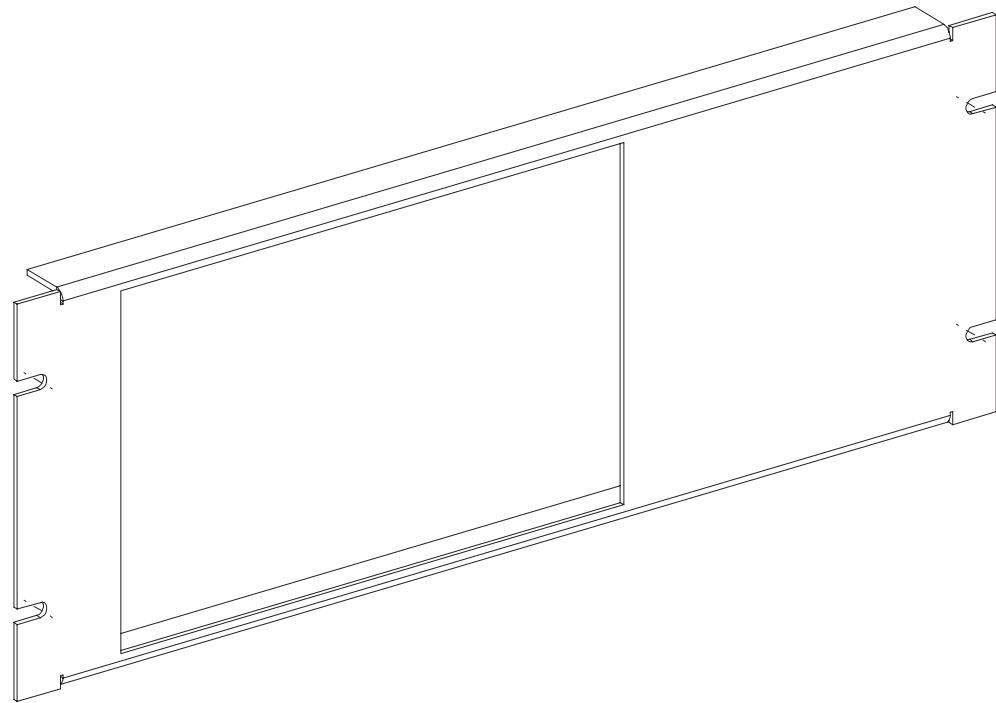


Figure 14: 19" rack mounting panel, height 4U

4. Tighten the screws.



The allowed range for the fixing screws' tightening torque is 0.52...0.74 foot-pounds (0.7...1 Nm).

5. Install the plug-in unit into the case.

There is a protective film on the top side of the IED. Its purpose is to prevent debris falling inside the unit while installing electrical wiring. Remove the protective film before energizing the IED.

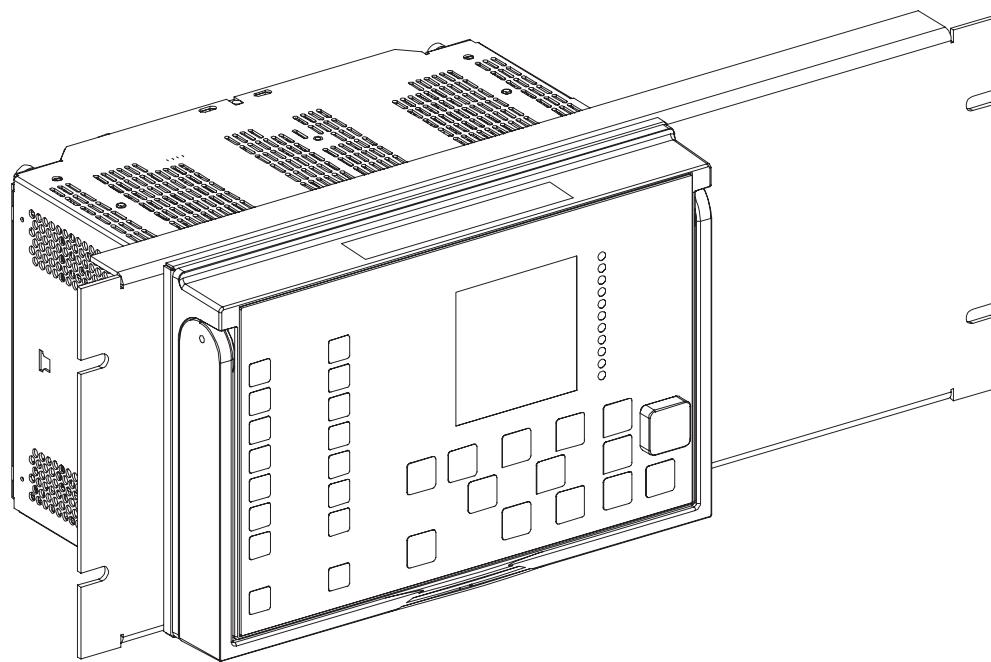


Figure 15: Rack mounted IED

4.3.5 Wall-mounting the IED

A mounting kit is needed for wall-mounting the IED.

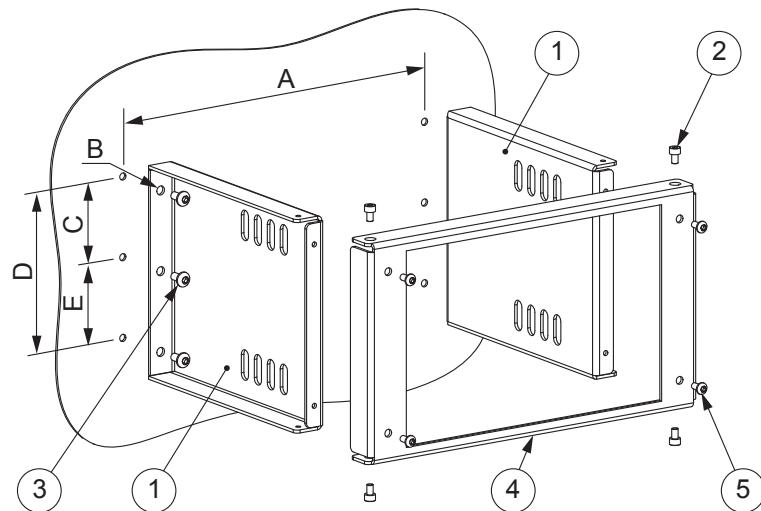


Figure 16: Wall-mounting kit

A	11.54 inches (293 mm)	1	Side part (2 pieces)
B	\varnothing 0.30 inches (7.5 mm)	2	Hexagon socket head cap screw M5x8 (4 pieces)
C	2.62 inches (66.5 mm)	3	Wall mounting screws (not included)
D	5.24 inches (133 mm)	4	Front part
E	2.61 inches (66.5 mm)	5	Torx screw M5x10 (4 pieces)

1. Drill mounting holes according to the dimensional drawing.
2. Mount the side parts with M6 screws (screws not included).
3. Mount the front part with the included M5 screws.
4. Detach the plug-in unit from the case and mount the case to the front part by tightening the integrated mounting screws 0.5...0.7 Ft-Lbs (0.7...1.0 Nm).

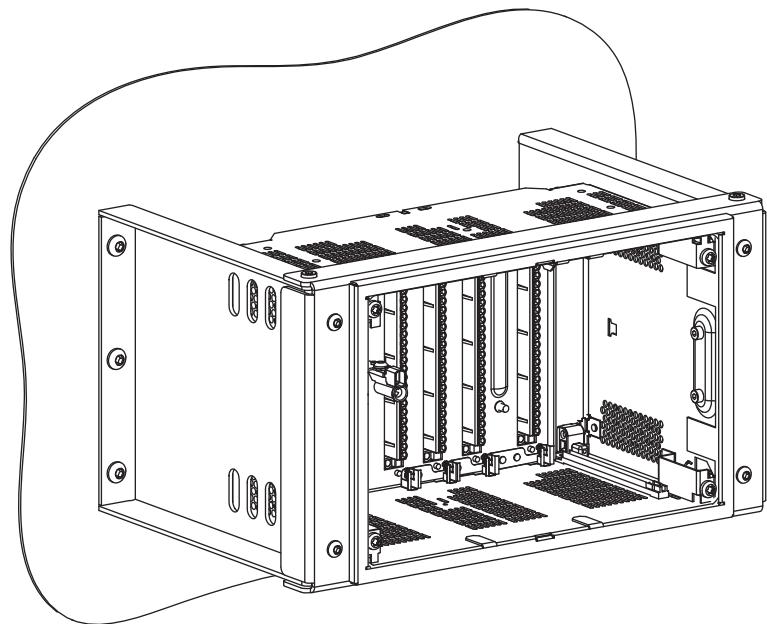


Figure 17: Mounting the case

5. The frame can be swung out to access terminals for wiring. Remove the screws as seen to swing out the frame.

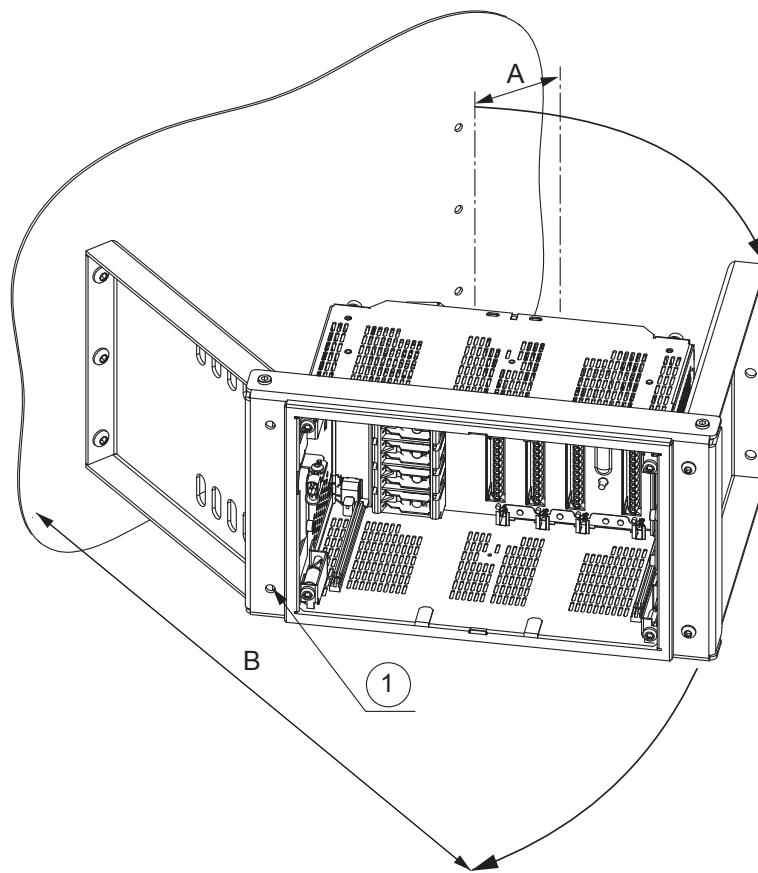


Figure 18: Swing mechanism

- | | |
|-------------------------|---|
| A 2.24 inches (57 mm) | 1 Remove the screws before swinging out the frame |
| B 19.80 inches (503 mm) | |

6. After finished wiring, turn the frame to the wall again and insert all removed screws.
7. Install the removed plug-in unit.

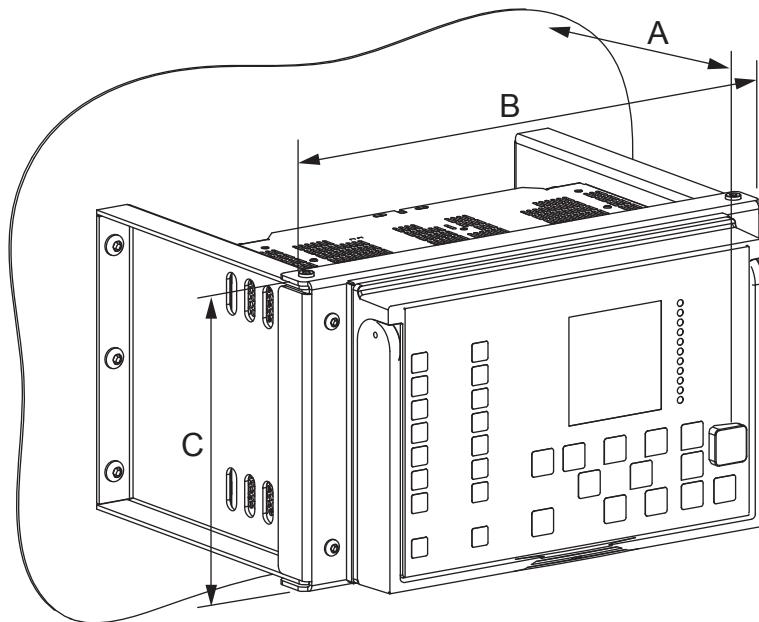


Figure 19: Wall-mounted IED

A 10.20 inches (259 mm)

B 12.52 inches (318 mm)

C 7.32 inches (186 mm)



Leave enough slack to wires and cables to allow installation movement.

4.3.6

Flush mounting the IED with a protection cover

A mounting kit is needed for flush mounting the IED with a protection cover. The mounting kit includes detailed mounting instructions and the protection cover.

Installation requirements:

- Panel cut-out of 9.76 x 6.38 inches (248 x 162 mm)
- Depth behind the panel 6.69 inches (170 mm)



An IED equipped with optic connections requires a minimum depth of 7.09 inches (180 mm). Check the allowed minimum bending radius from the optical cable manufacturer.

1. Loosen the four M5 fixing screws in the case to fit the case into the panel cut-out.
2. Mount the case to the panel cut-out from the front.
3. Mount the protection cover from the rear.

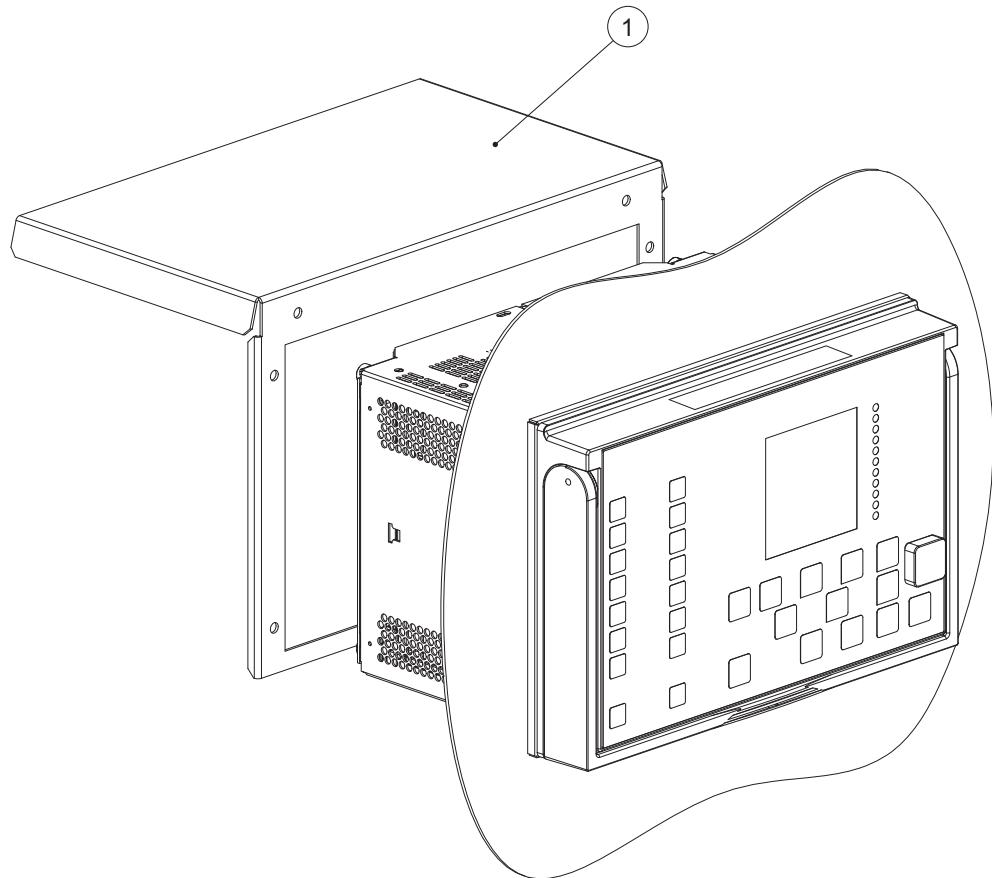


Figure 20: Mounting the protection cover

1 Protection cover

4. Tighten the M5 (T25) screws.



The allowed fixing screws' tightening torque is 0.52...0.74 foot-pounds (0.7...1 Nm).

5. Install the plug-in unit into the case.

There is a protective film on the top side of the IED. Its purpose is to prevent debris falling inside the unit while installing electrical wiring. Remove the protective film before energizing the IED.

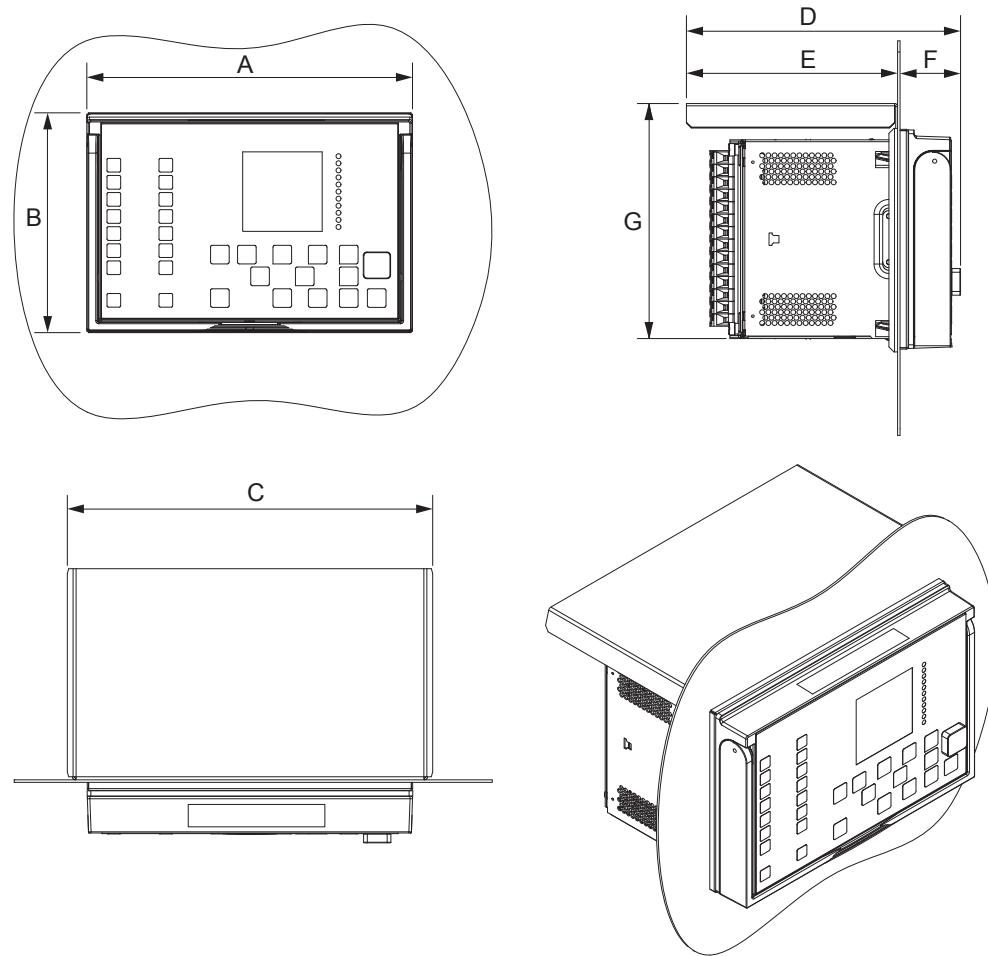


Figure 21: Flush mounted case and a plug-in unit with the protection cover

- A 10.32 inches (262.2 mm)
- B 6.97 inches (177 mm)
- C 11.58 inches (294.1 mm)
- D 8.70 inches (221 mm)
- E 6.69 inches (170 mm)
- F 1.89 inches (48 mm)
- G 7.48 inches (190 mm)

4.3.7

Mounting lens sensors for an arc flash detector system

Arc flash detector is used to detect arc situations in air insulated metal-clad switchgear.

The arc flash detector system determines where in the switchgear cubicle the optional lens sensors are installed. See the application examples in the application manual for further information on the alternatives.

1. Drill a hole \varnothing 0.38 inches (10 mm) in the wall of the supervised space.

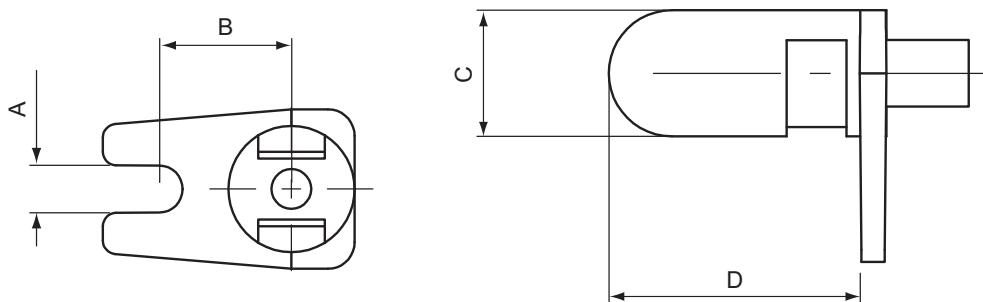


Figure 22: Dimensions of the lens sensor

- A 0.14 inches (3.5 mm)
- B 0.39 inches (9.9 mm)
- C \varnothing 0.37 inches (9.5 mm)
- D 0.75 inches (19.1 mm)

2. Fit the lens sensor into the hole and fasten it with a self-tapping M3 screw. Alternatively, the lens sensor can be fastened with a cable tie. To do this, secure the cable tie to a suitable point of attachment on the cubicle wall and wrap the cable tie tightly around the sensor.

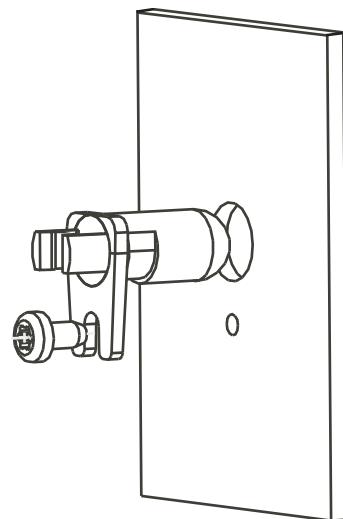


Figure 23: Mounting the lens sensor

3. Make sure that the cable tie lies in the groove of the sensor to prevent it from blocking the light.

Section 5 Connecting

5.1 Required tools

Only use a screwdriver and insert bits for Phillips (PH 2) cross-recessed head screws when handling CT/VT terminals of screw-compression type.

5.2 Connecting wires

All connections are made on the rear of the case. No soldering is needed.

- Connect each signal connector terminal with one 14 or 16 Gauge wire. Use 12 or 14 Gauge wire for CB trip circuit.
- Connect each ring-lug terminal for signal connector X120 with one of maximum 14 or 16 Gauge wire.
- Connect each ring-lug terminal for CTs/VTs with one 12 Gauge wire.



See the application manual for product-specific connection diagrams.

5.3 Connecting protective grounding



The ground lead must be at least a 10 Gauge wire. If the length of the ground lead is long, the cross section of the wire must be increased.



Use fine copper wire as the ground lead.

To connect a separate ground protection lead:

1. Loosen the protective ground screw (T20) to connect a separate ground protection lead.

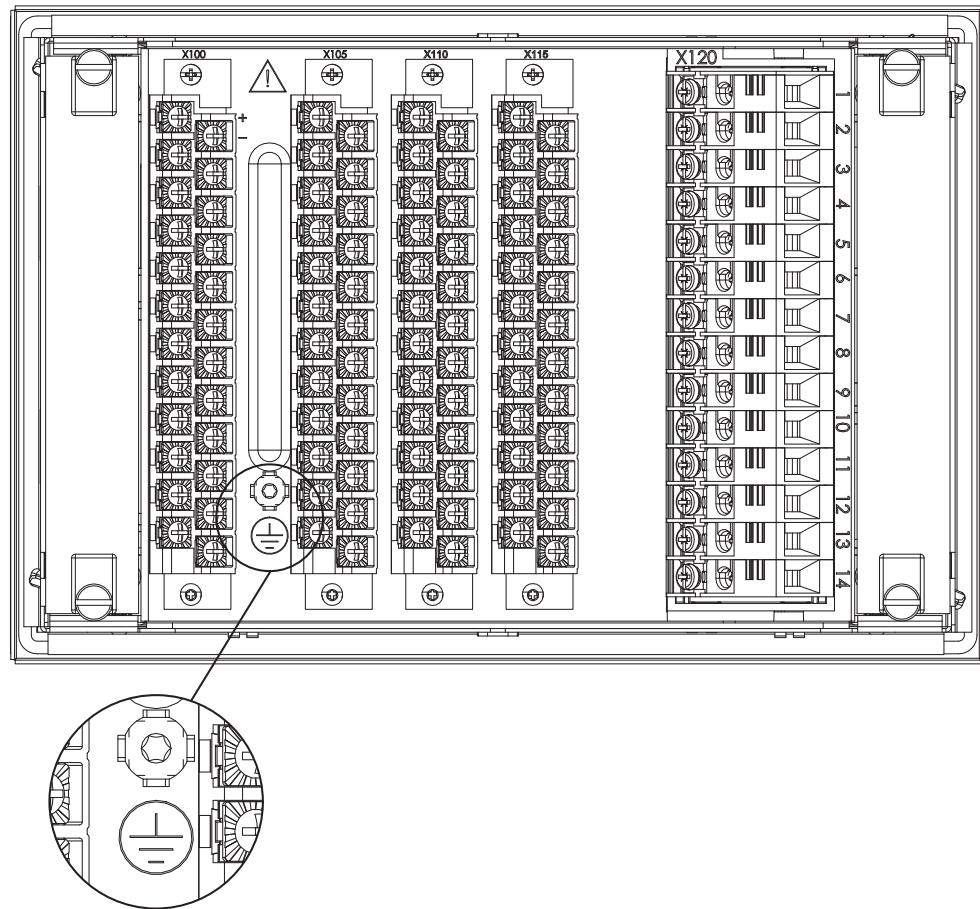


Figure 24: The protective ground screw is located between connectors X100 and X105



The ground lead should be as short as possible but notice that extra length is required for door mounting.



Each IED must have its own ground lead connected to the ground circuit connector.

2. Connect the ground lead to the ground bar.

Use either stripped wire screwed between a washer cup and the protective ground screw or a ring-lug.



Select a suitable ring-lug to fit under the M4 screw.

3. Tighten the protective ground screw.
4. Support the ground lead so that it cannot break or weaken.
Be aware of the mechanical, chemical and electrochemical environment.

5.4

Connecting analog signals

A connection diagram is needed to connect the analog signals.

When using the ring-lug type for CT/VT terminals, follow these steps.

1. Remove the fixing screw.
2. Slide the screw through the terminal lug and screw it back on.

5.4.1

Connecting current and voltage inputs

Connect the wires from the CTs/VTs to the correct device according to the phase order and the connection diagram. Each terminal for CTs/VTs is dimensioned for one 10 Gauge wire or for two wires of maximum 12 Gauge.



See the specific card variants from the application manual.

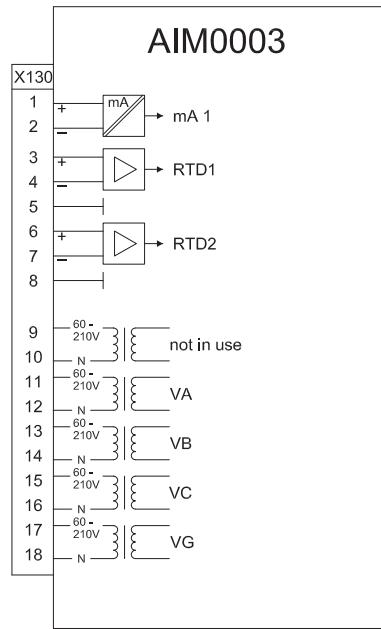


Figure 25: Example of AIM0003 card variant, 5 V + 2 RTD + 1 mA

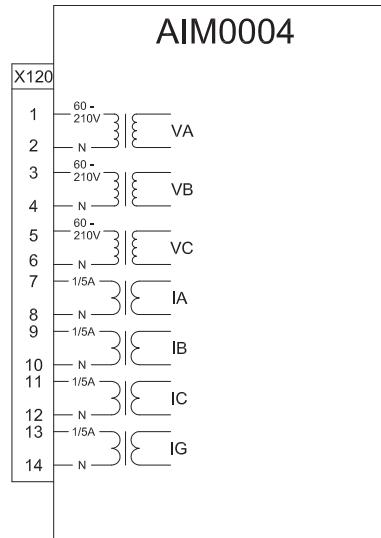


Figure 26: Example of AIM0004 card variant, 4 I + 3 V with 1/5 A IG channel

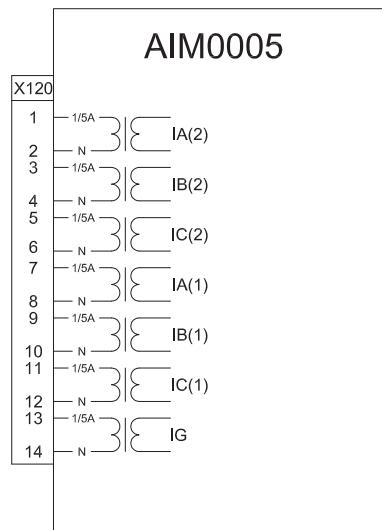


Figure 27: Example of AIM0005 card variant, 7 I with 1/5 A IG channel

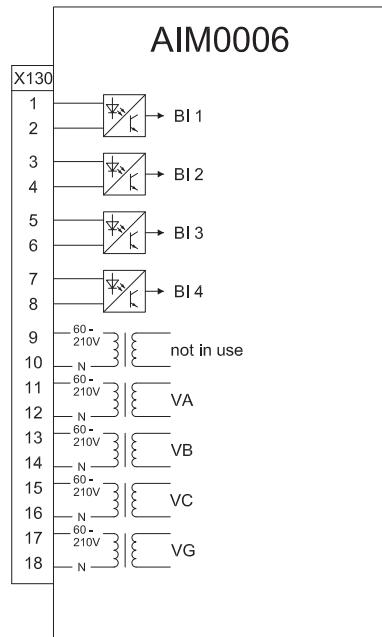


Figure 28: Example of AIM0006 card variant, 5 V + 4 BI

Section 5 Connecting

1MAC457436-IB D

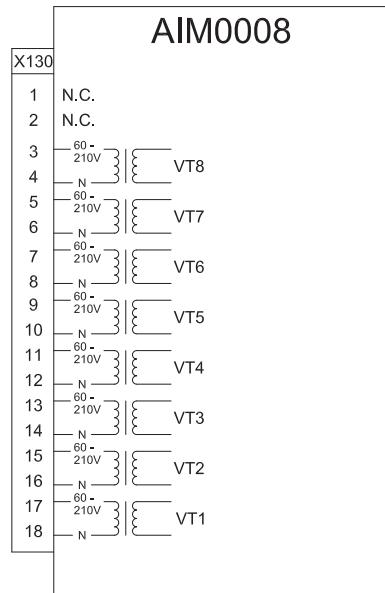


Figure 29: Example of AIM0008 card variant, 8 V

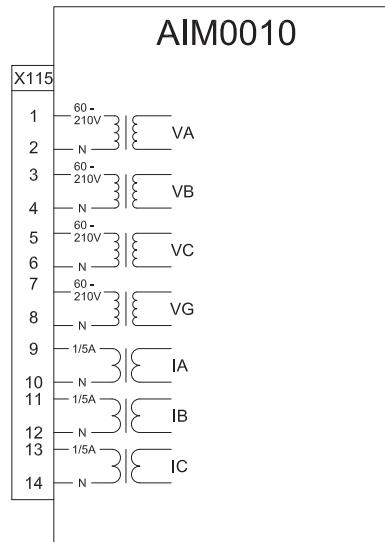


Figure 30: Example of AIM0010 card variant, 3 I + 4 V

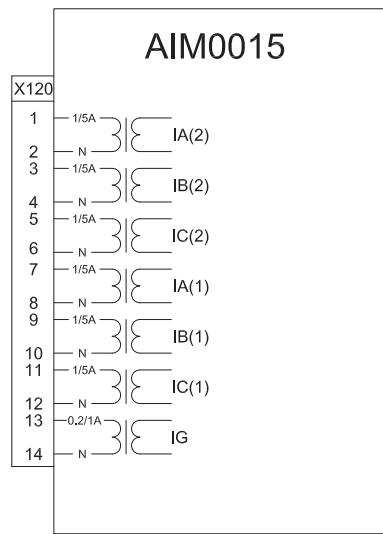


Figure 31: Example of AIM0015 card variant, 7 I with 0.2/1 A IG channel

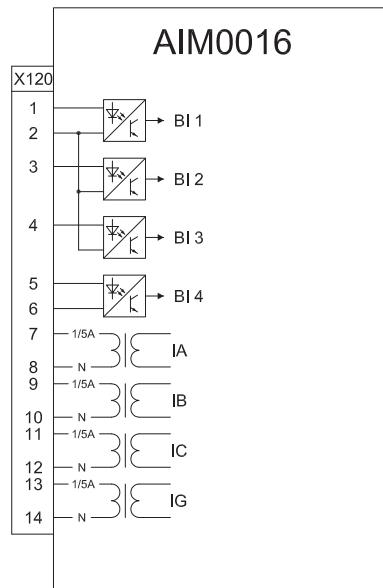


Figure 32: Example of AIM0016 card variant, 4 I with 1/5 A IG channel

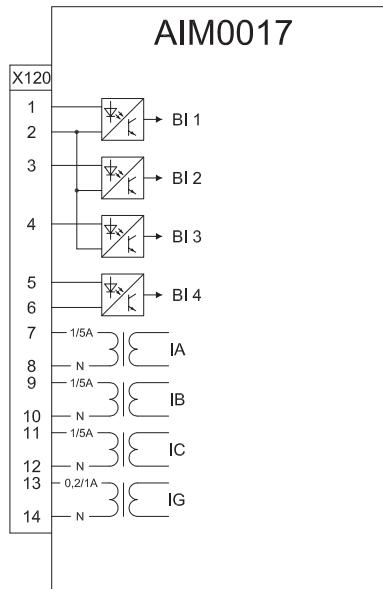


Figure 33: Example of AIM0017 card variant, 4 I with 0.2/1 A IG channel

5.4.2 Connecting RTD and mA inputs

Connect the wires from the transducers to the correct device according to the connection diagram. Each terminal for RTDs and mA inputs is dimensioned for one 14 or 16 Gauge wire.



See the specific card variant from the application manual.



Connect the RTD cable shield to the protective ground. To suppress RF interference, connect the RTD cable shield straight to the lead that connects to the protective ground screw and not to the protective screw itself. The connection should not be longer than 5 inches from the protective ground screw.

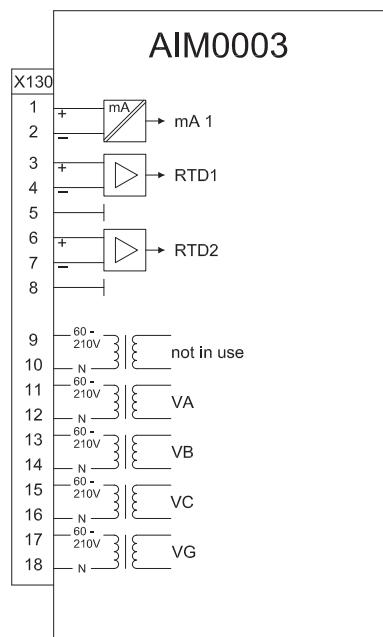


Figure 34: Example of AIM0003 card variant, 5 U + 2 RTD + 1 mA channel

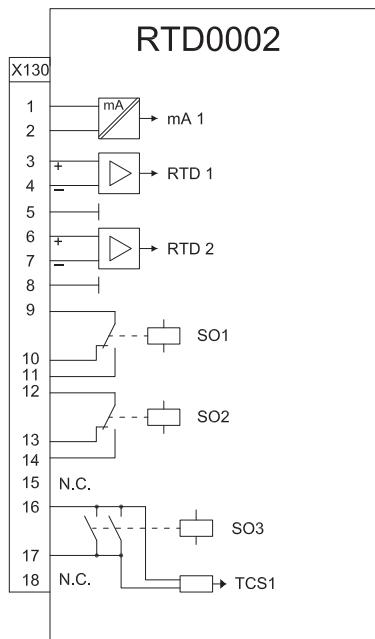


Figure 35: Example of RTD0002 card variant, 2 RTD + 1 mA + 3 SO + TCS

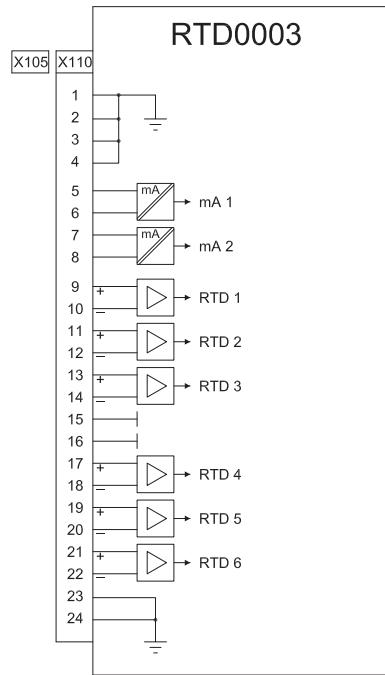


Figure 36: Example of RTD0003 card variant, 6 RTD + 2 mA

5.4.3

Connecting protection relay with a test switch

- When the protection relay is used with a test switch, connect the current and voltage transformers directly to the switch.

5.5

Connecting binary signals

- Connect the wires for the binary signals to the correct device according to the connection diagram. Each terminal for binary input and output signal is dimensioned for one 14 or 16 Gauge wire.



See the specific card variant from the application manual.

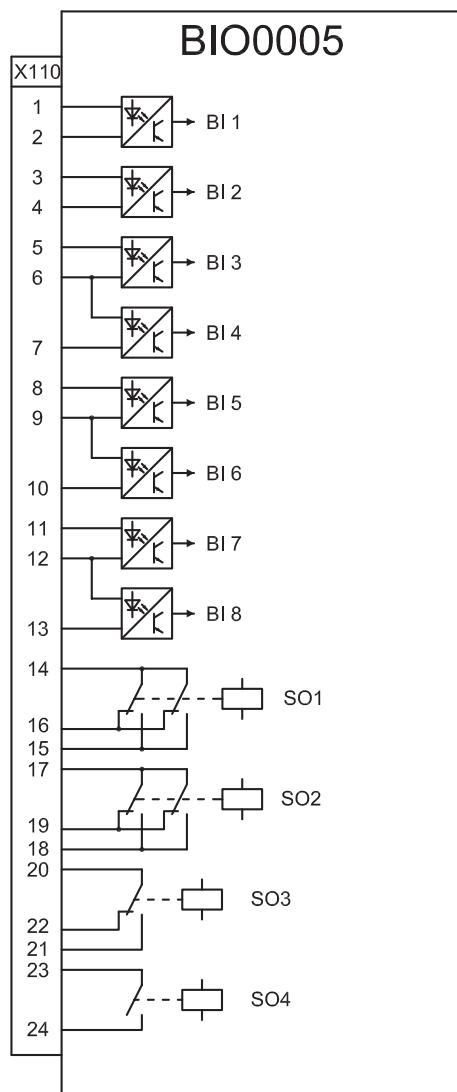


Figure 37: Example of BIO0005 card variant (8 BI + 4 BO)

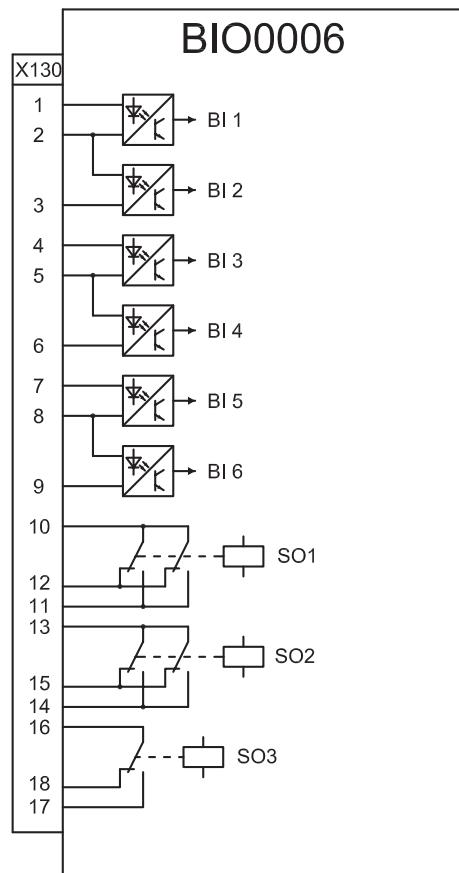


Figure 38: Example of BIO0006 card variant (6 BI + 3 BO)

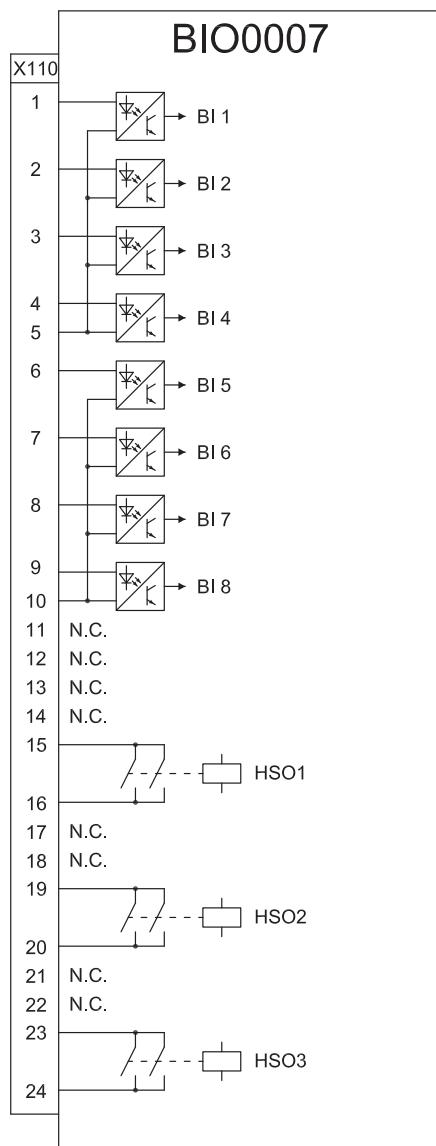


Figure 39: Example of BIO0007 card variant (8 BI + 3 BO)

5.6 Connecting power supply

- Connect the IED's auxiliary voltage to terminals X100-1 and X100-2.
- Connect the positive lead to terminal X100-1.

The permitted auxiliary voltage range of the IED is marked on top of the IED's LHMI.

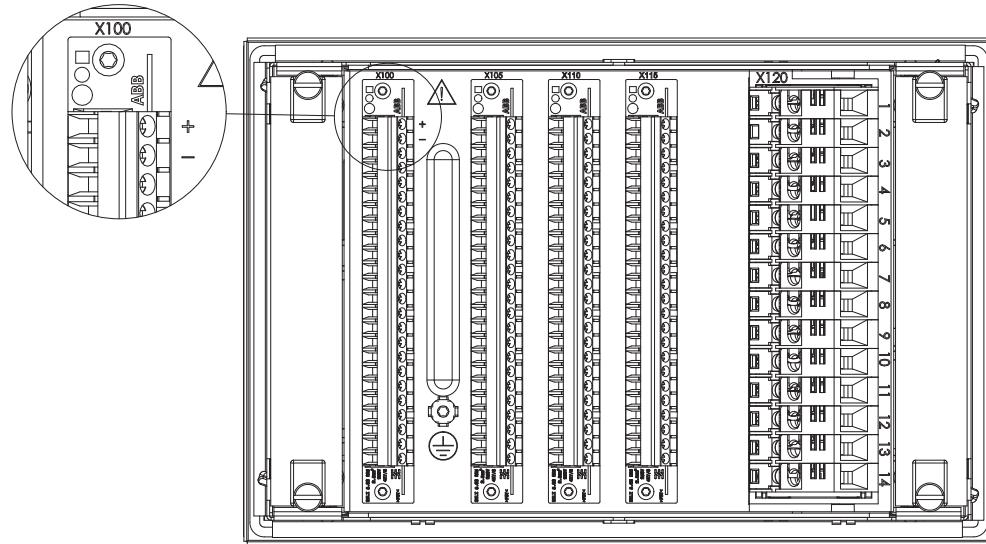


Figure 40: Connecting auxiliary voltage

5.7

Connecting communication

Before connecting communication, check that the HW module has the correct communication interfaces. The communication module is located on the left side of the IED when viewing the case from the rear.



See the technical manual for product-specific communication interfaces.

5.8

Energizing the IED



Before connecting the auxiliary power, check that the protective film is removed from top of the IED.

- Before connecting the auxiliary power, check that the terminal strip is wired and placed correctly.
- Remove the protective film from the top side of the unit. Check that there is no debris visible in the ventilation holes.

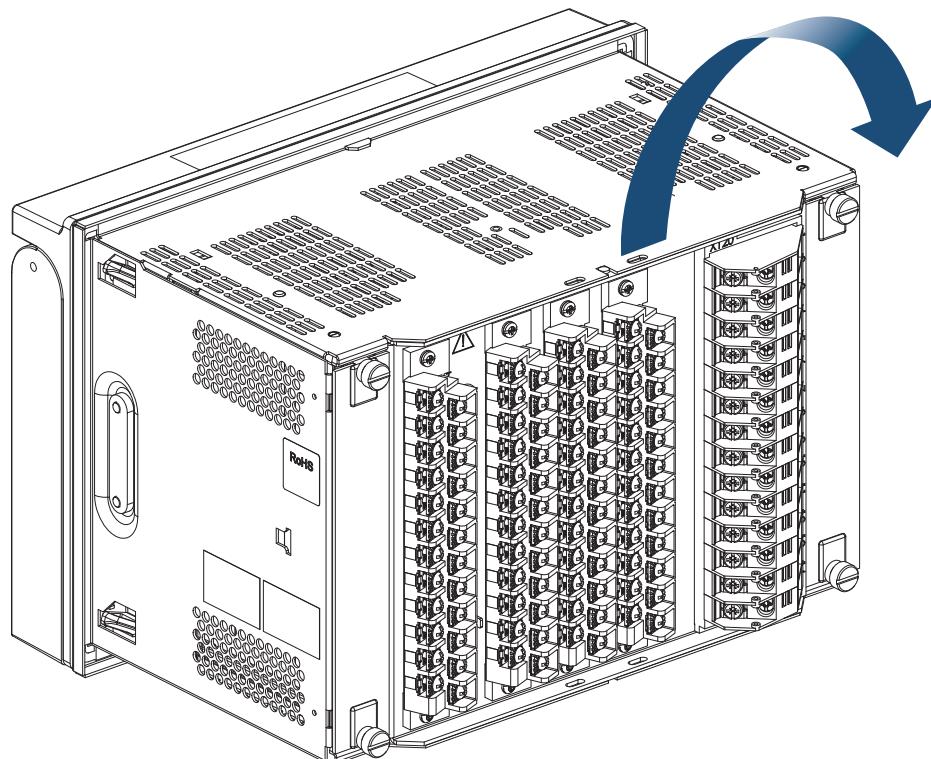


Figure 41: Removing the protective film

During the start-up all LEDs are lit for a short period.

- Green Normal LED starts to flash
- LCD lights up and IED start-up is displayed
- The main menu is displayed. A steady green Normal LED indicates a successful start-up.

If the IED detects a diagnostic error during start up, the green Normal LED flashes and the internal fault code is displayed on the LCD.

Section 6 Removing, repairing and exchanging

6.1 Product lifecycle

At some point of the product lifecycle, the protection relay is upgraded to a next generation unit. When selecting the original product, already consider the upgrading and extension possibilities that the specific product offers for its whole lifecycle.

Protection relay specific options can be found from Retrofit Solutions Database on the Internet www.abb.com by following the links within ABB Service Guide or via ABB Product Guide from the product specific Service & Support sheet.

6.2 Checking protection relay information

The protection relay information includes detailed information about the device, such as version and serial number. The protection relay information is shown on the display for a few seconds when the device starts up. The same information is found also in the protection relay menu.

1. Select **Main Menu/Information**.
2. Select a submenu with and .
3. Enter the selected submenu with .
4. Browse the information with and .

The **Product identifiers** submenu contains product related information like product type, serial number, order number, production date, configuration name, SW version, SW date and HW revision.

The **Site identifiers** submenu contains information about the site where the protection relay has been installed.

The **System identifiers** submenu contains the Technical key and IEC 61850 version. The Technical key is unique and cannot be changed.

The **HW modules** submenu contains information about the HW modules.

6.3

Removing the IED

1. Turn off the power.
2. Detach the plug-in unit from the case.
3. Disconnect the wiring.
4. Loosen the four M5 fixing screws.

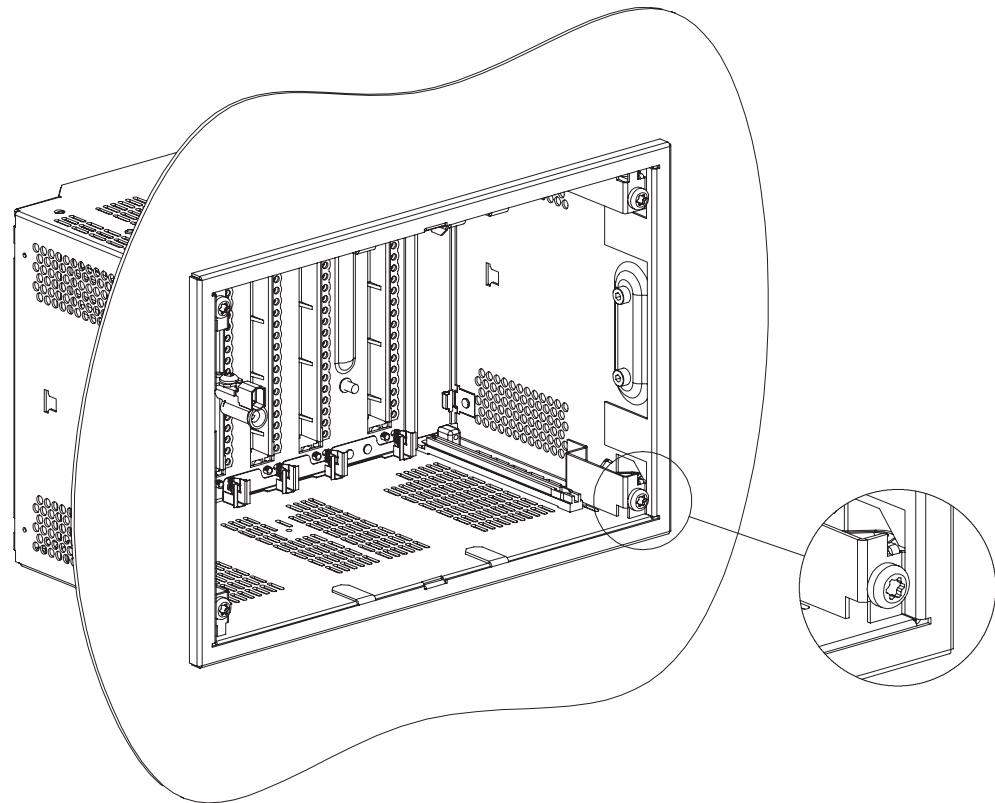


Figure 42: Loosening the M5 screws

5. Detach the case from the panel cut-out.

6.4

Sending protection relay for repair

- In case of product problems, contact the nearest ABB office or representative for consultation and instructions.

6.5

Exchanging protection relay

- To exchange the protection relay with another identical unit, remove the protection relay and install the new one.
The exchangeable units can be found from the PartsOnLine system, see www.abb.com/partsonline. Use of PartsOnLine requires user registration.
- To exchange a protection relay to a different unit, change the case and connect the wires.

Section 7 Technical data

7.1 Case and HMI display variants

7.1.1 Front side of the IED

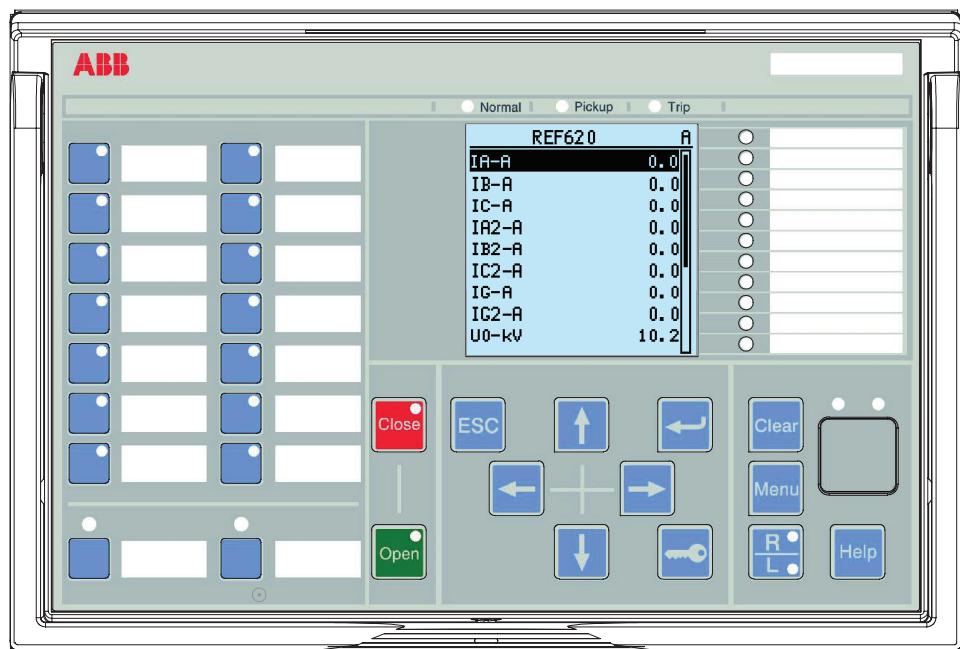


Figure 43: Large display

Table 3: Large display

Character size ¹⁾	Rows in the view	Characters per row
Small, mono-spaced (6 × 12 pixels)	10	20

1) Depending on the selected language

7.1.2

Rear side of the IED

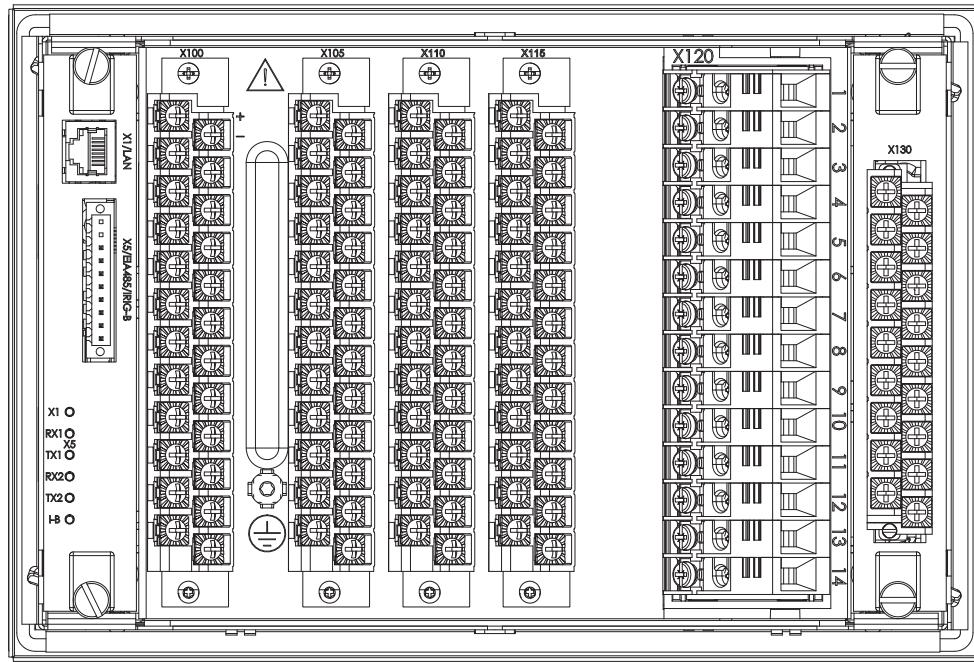


Figure 44: Rear view of REF620 with COM0011 and RTD002 modules

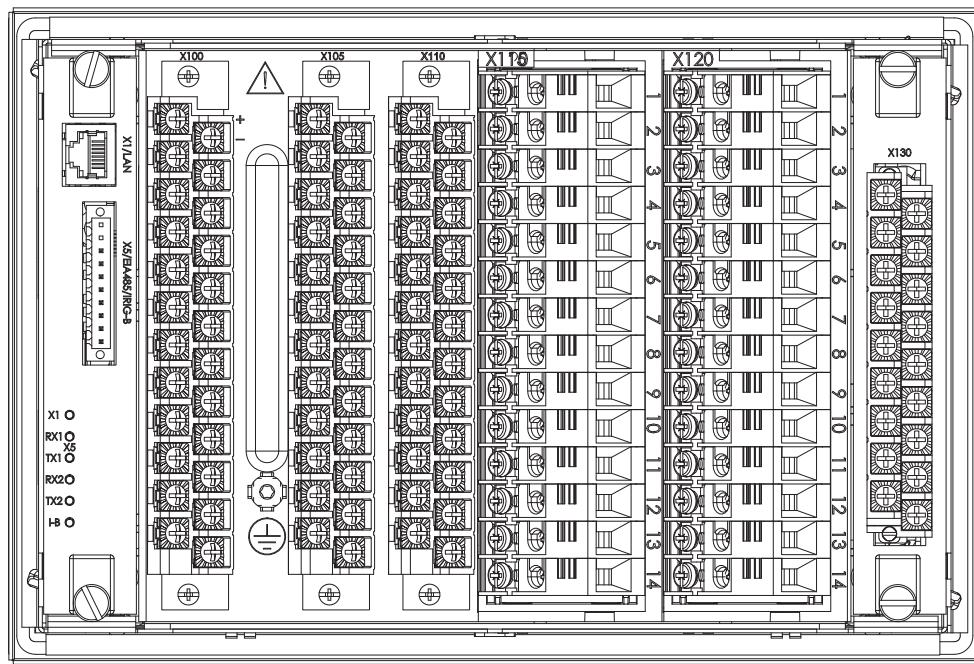


Figure 45: Rear view of RET620 with COM0011 and RTD002 modules

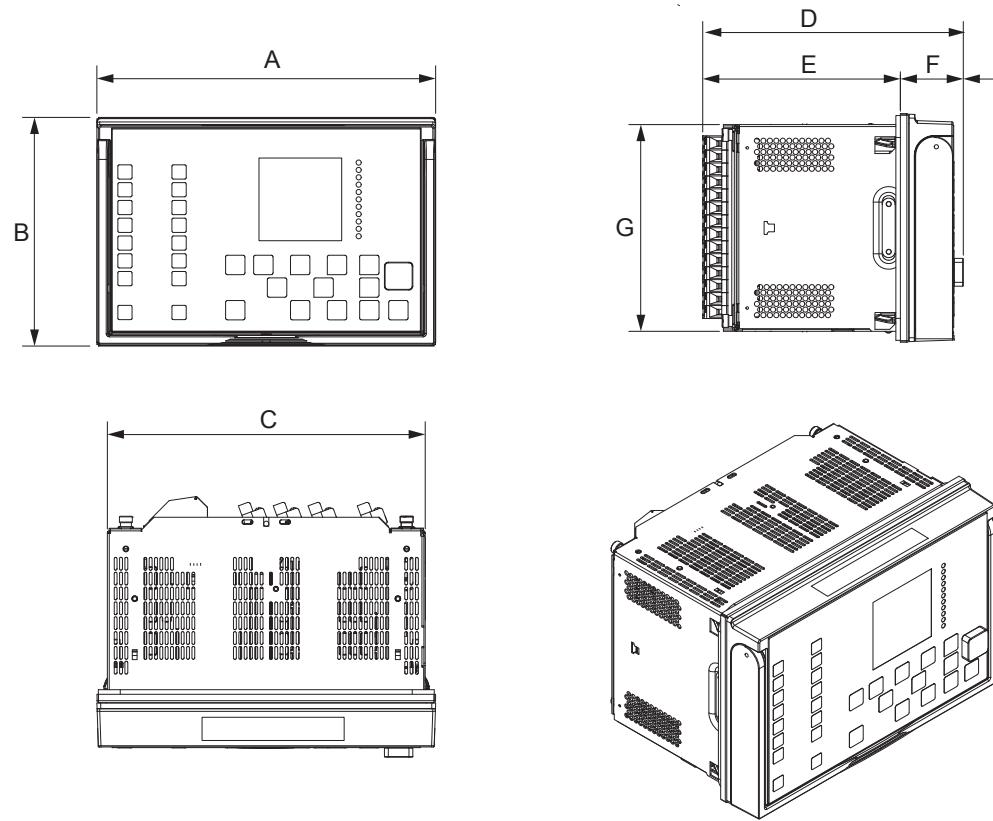


Figure 46: Protection relay's main dimensions

- A 10.32 inches (262.2 mm)
- B 6.97 inches (177 mm), 4U
- C 9.69 inches (246 mm)
- D 7.91 inches (201 mm)
- E 6.02 inches (153 mm)
- F 1.89 inches (48 mm)
- G 6.30 inches (160 mm)

Table 4: Dimensions

Description	Value	
Width	Frame	10.32 inches (262.2 mm)
	Case	9.69 inches (246 mm)
Height	Frame	6.97 inches (177 mm), 4U
	Case	6.30 inches (160 mm)
Depth		7.91 inches (201 mm)
Weight	Complete protection relay	max. 12.3 lbs (5.6 kg)
	Plug-in unit only	7.5 lbs (3.4 kg)

7.2 Enclosure class

Table 5: Degree of protection of flush-mounted protection relay

Description	Value
Front side	IP 54

Section 8 Accessories and ordering data

Table 6: Mounting accessories

Item	Order number
Semi-flush mounting kit	2RCA030573A0001
Wall mounting kit	2RCA030894A0001
19" Mounting panel kit	2RCA031135A0001
Protection cover kit	2RCA030963A0001

Section 9 Glossary

ANSI	American National Standards Institute
CT	Current transformer
EMC	Electromagnetic compatibility
HW	Hardware
IED	Intelligent electronic device
LCD	Liquid crystal display
LCP	Liquid crystal polymer
LED	Light-emitting diode
LHMI	Local human-machine interface
PA	Polyamide
PBT	Polybutylene terephthalate
PC	1. Personal computer 2. Polycarbonate
RoHS	Restriction of hazardous substances
SW	Software
UL	Underwriters Laboratories
VT	Voltage transformer
WHMI	Web human-machine interface



ABB Distribution Solutions

Distribution Automation

P.O. Box 699
FI-65101 VAASA, Finland
Phone +358 10 22 11

ABB Inc.

655 Century Point
Lake Mary, FL 32746, USA
Phone +1-800-222 1946

www.abb.com/mediumvoltage

www.abb.com/relion

www.abb.com/substationautomation