



Relion® Protection and Control

620 series Installation Manual



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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 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2006/95/EC). 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 60255-6 and EN 60255-27 for the low voltage directive. The IED is designed in accordance with the international standards of the IEC 60255 series and ANSI C37.90.

Safety Information



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



Non-conformance to instructions may result in substantial property damage, personal injury, and/or death.



Electrical installation is to be performed only by authorized personnel.



National and local electrical safety regulations must always be followed.



The frame of the IED 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 IED case internals may contain high voltage potential and touching these may cause personal injury.



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



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

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Section 1 Introduction

1.1 This manual

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

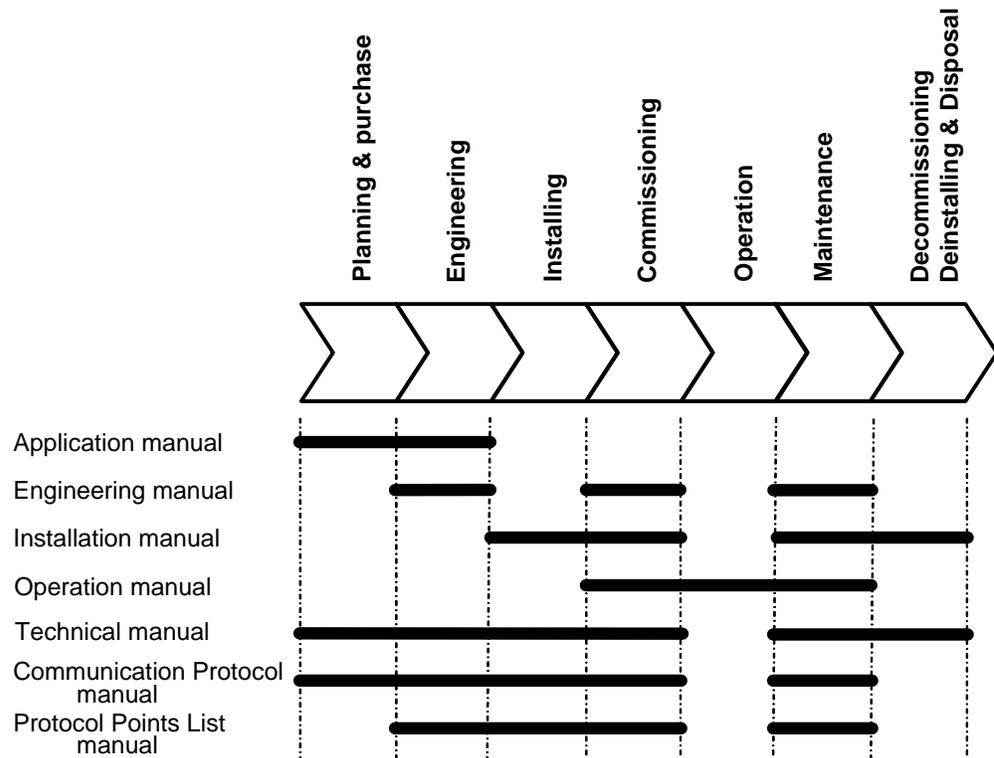


Figure 1: The intended use of manuals in different lifecycles

The engineering manual contains instructions on how to engineer the IEDs using the different tools in PCM600. The manual provides instructions on how to set up a PCM600 project and insert IEDs to the project structure. The manual also recommends a sequence for engineering of protection and control functions, LHMI functions as well as communication engineering for IEC 61850 and DNP3.

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

The operation manual contains instructions on how to operate the IED once it has been commissioned. The manual provides instructions for monitoring, controlling and setting the IED. The manual also describes how to identify disturbances and how to view calculated and measured power grid data to determine the cause of a fault.

The application manual contains application descriptions and setting guidelines sorted per function. The manual can be used to find out when and for what purpose a typical protection function can be used. The manual can also be used when calculating settings.

The technical manual contains application and functionality descriptions and lists function blocks, logic diagrams, input and output signals, setting parameters and technical data

sorted per function. The manual can be used as a technical reference during the engineering phase, installation and commissioning phase, and during normal service.

The communication protocol manuals describe the communication protocols supported by the IED. The manual concentrates on vendor-specific implementations. The point list manual describes the outlook and properties of the data points specific to the IED. The manual should be used in conjunction with the corresponding communication protocol manual.

1.3.2 Document revision history

Document revision/date	Product series version	History
A/2010-11-23	1.0	First release
B/2011-10-31	1.1	Content updated to correspond to the product series version
C/2018-08-31	1.1	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 Safety indication 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 to 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 should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2

Manual conventions

Conventions used in IED manuals. A particular convention may not be used in this manual.

- Abbreviations and acronyms in this manual 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, for example:
To navigate between the options, use  and .
- HMI menu paths are presented in bold, for example:
Select **Main menu > Settings**.
- LHMI messages are shown in Courier font, for example:
To save the changes in non-volatile memory, select `Yes` and press .
- Parameter names are shown in italics, for example:
The function can be enabled and disabled with the *Operation* setting.
- Parameter values are indicated with quotation marks, for example:
The corresponding parameter values are "Enabled" and "Disabled".
- IED input/output messages and monitored data names are shown in Courier font, for example:
When the function picks up, the `PICKUP` output is set to `TRUE`.
- Dimensions are provided both in inches and millimeters. Millimeters are used where the unit for dimension is not specified.

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 IED.

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 such as 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 a long lifespan have been proven through extensive testing during the design and manufacturing processes. Additionally, the long lifespan is supported by maintenance and repair services as well as the availability of spare parts.

Design and manufacturing have been performed under a certified environmental system. The effectiveness of the environmental system is regularly evaluated by an independent, third-party auditing organization. All relevant environmental rules and regulations are followed systematically to evaluate their impact on the associated products and processes.

2.2 Disposing of the IED

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 an IED or its parts contact a local waste handler who is authorized and specialized in disposing 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 IED parts

IED	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 plate	Steel
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

IEDs require careful handling.

1. Examine the delivered products to ensure that they have not been damaged during the transport.
2. Remove the transport packing carefully without force.



The cardboard packaging material is recyclable.

3.2 Inspecting the product

3.2.1 Identifying the product

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

3.2.2 Checking delivery items

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

3.2.3 Inspecting the IED

IEDs require careful handling before installation on site.

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

If the IED was damaged during transportation, make a claim against the transport contractor, and notify the local ABB representative.

3.2.4 Returning an IED damaged in transit

If damage has occurred during transport, the appropriate documentation must be made with the associated carrier. Please inform the nearest ABB office or representative. ABB should be notified immediately if there are any discrepancies in relation to the delivery documents.

3.3 Storing

If the IED 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. 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 areas where dust and moisture are present.
Avoid places susceptible to rapid temperature variations, powerful vibrations and shocks, rapid surge voltages of high amplitude, 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 IED to allow access to wires and optical fibers and to enable maintenance and future modifications.
- Flush mounted IEDs should be possible to be added or replaced without excessive dismantling.

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 plug-in unit is pushed about 0.25 inch (7 mm) out of the case and the connectors are separated.
4. Pull the unit out of the case.

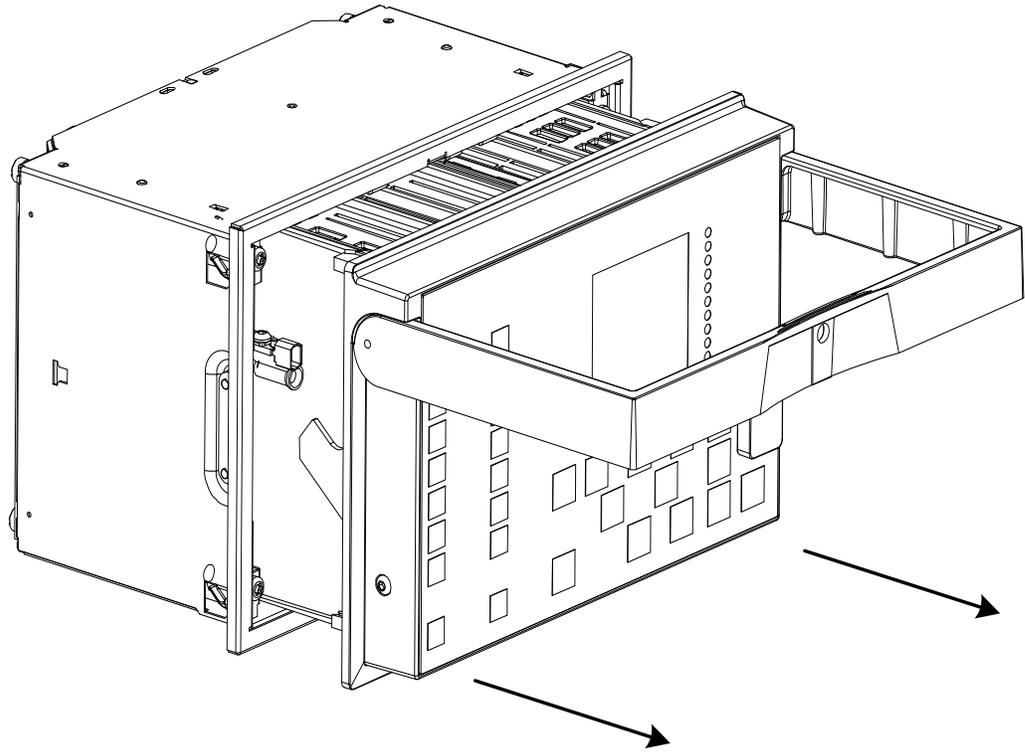


Figure 2: *Detaching a plug-in unit from the case*



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.



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

4.2.2

Installing the plug-in unit



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

The IED is constructed in such a way that a plug-in unit with voltage or current measuring inputs can only be plugged into a corresponding case. This prevents fitting a non-suitable plug-in unit into the wrong case.



Forcing a non-suitable plug-in unit into the case can break both the plug-in unit and the case and may cause injury.

1. Lift the handle to its fully opened position (90 degrees).
2. Push the plug-in unit into the case as far as it goes.

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

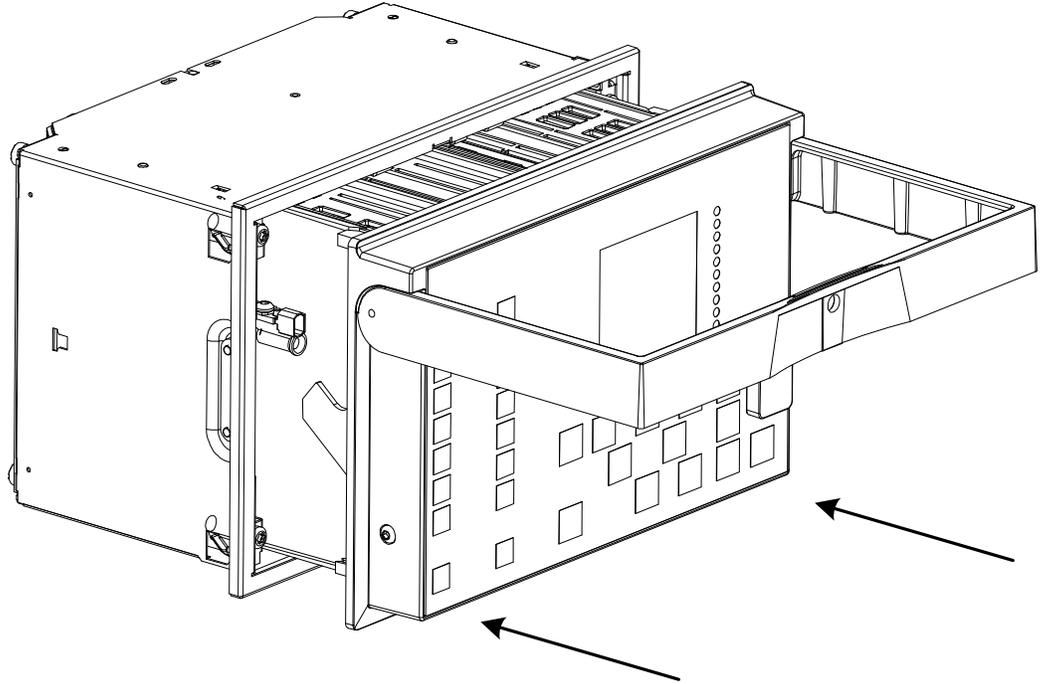


Figure 3: *Installing a plug-in unit into the case*



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 fully screwed-in and tightened, 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.

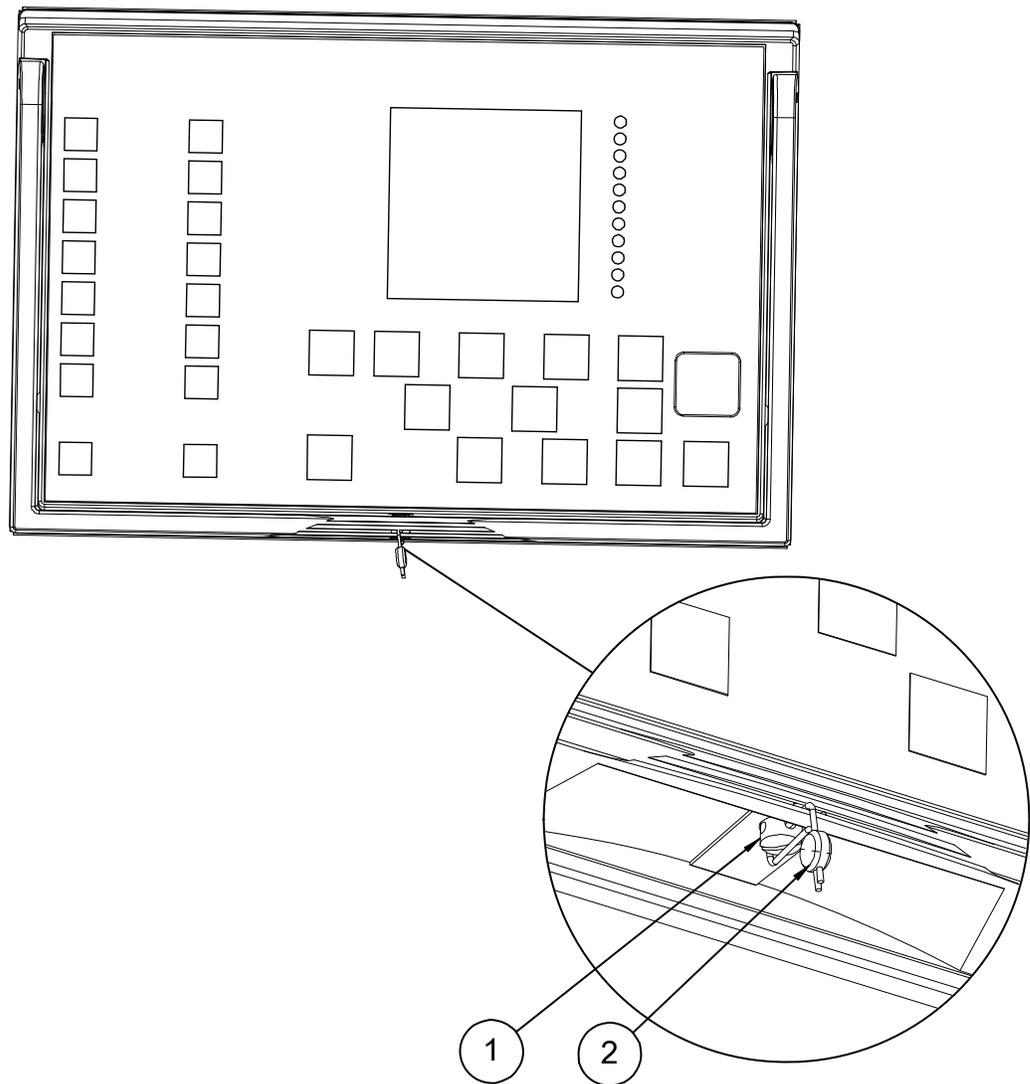


Figure 4: Sealing screw

- 1 Sealing screw
- 2 Sealing wire and seal

4.3 Mounting the IED

4.3.1 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.

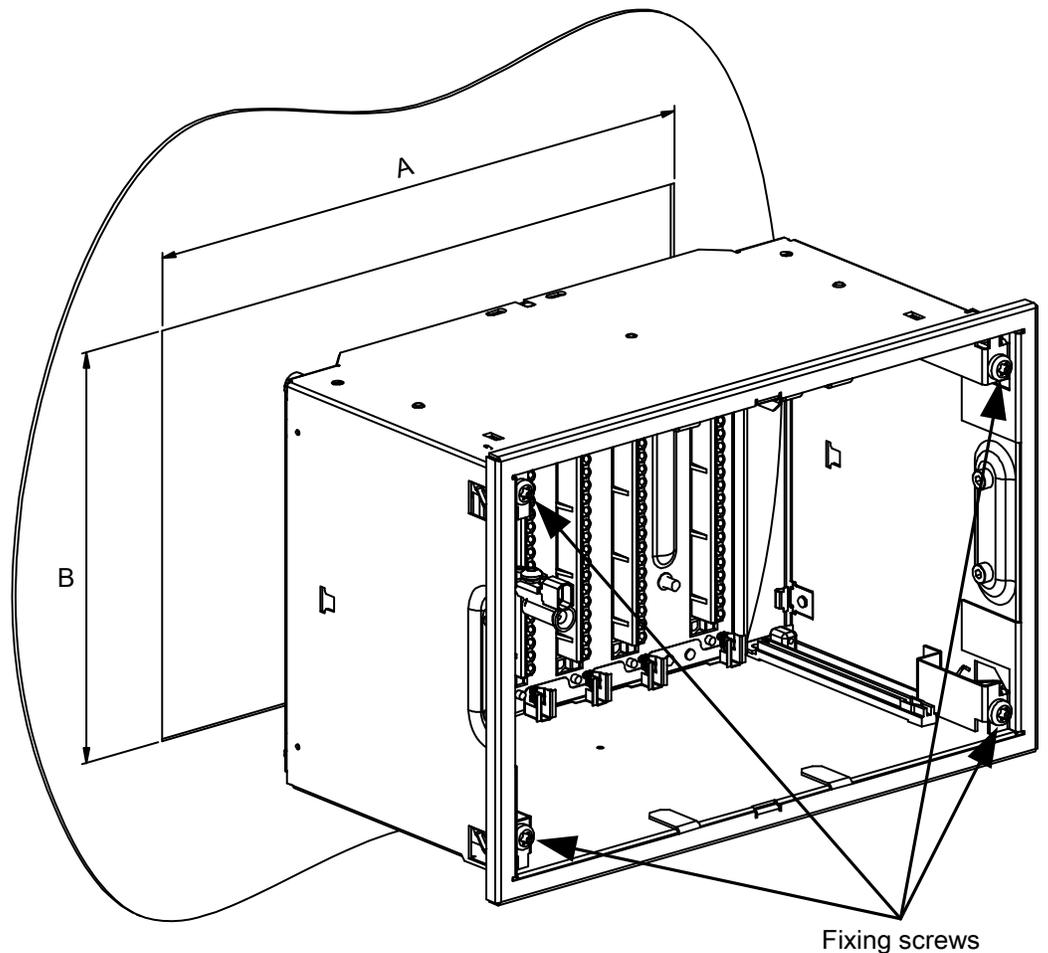


Figure 5: Flush mounting a case into a panel cut-out

- A 9.76 inches (248 ±1 mm)
- B 6.38 inches (162 ±1 mm)

3. Tighten the M5 fixing screws.
The allowed range for the fixing screws' tightening torque is 0.52 to 0.74 foot-pounds (0.7 to 1 Nm).

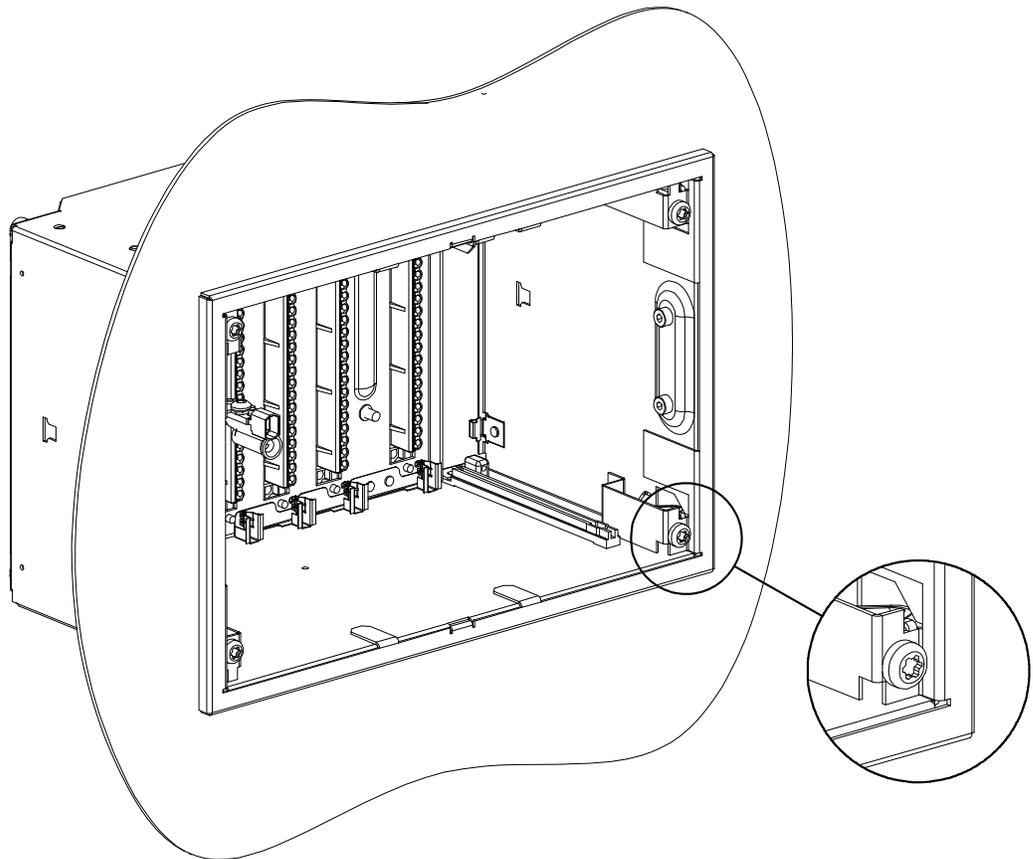


Figure 6: Flush mounted case, tightening the M5 fixing screws

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

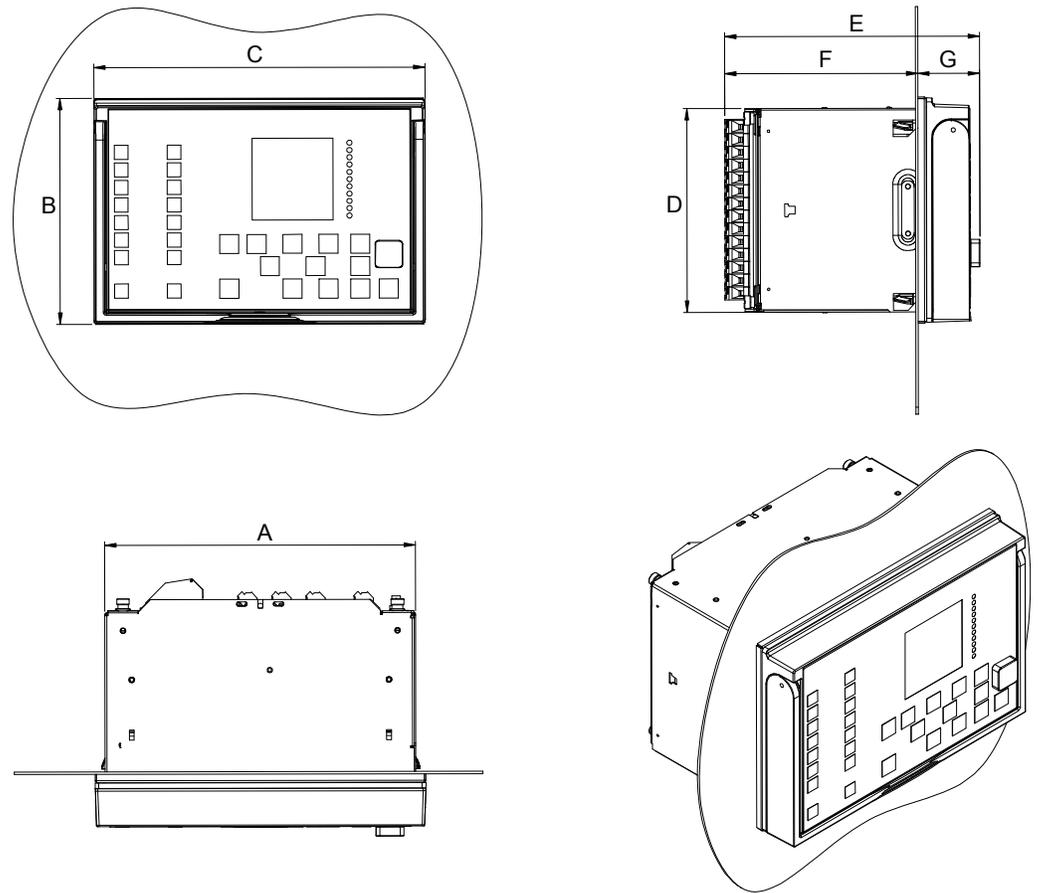


Figure 7: Flush mounted case and plug-in unit

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

Section 5 Connecting

5.1 Required tools

Only use a screwdriver and insert bits for Phillips (PH 1) cross-recessed head screws when handling CT/VT terminals (X2.1) of screw-compression type.

5.2 Connecting wires

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



See the application manual for product-specific connection diagrams.

- Connect each signal connector (X100 and X110) 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.

5.2.1 Connecting ring-lug type wires

Ring-lug type insulated terminal should be used for signal connector X120. Use a number 2 Philips screw driver for Ring lug terminals.

5.3 Connecting protective grounding



The ground lead must be a minimum a 10 gauge wire. If the length of the earth lead is too 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 to connect a separate ground protection lead.

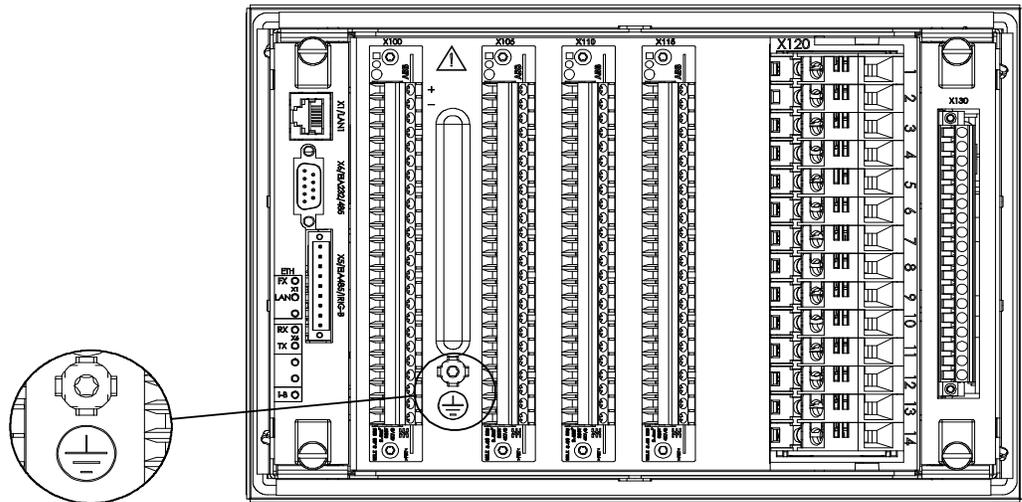


Figure 8: The protective earth screw is located between connectors X100 and X105



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 terminals.

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

5.4.1 Connecting current inputs

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



See the specific card variants from the application manual.

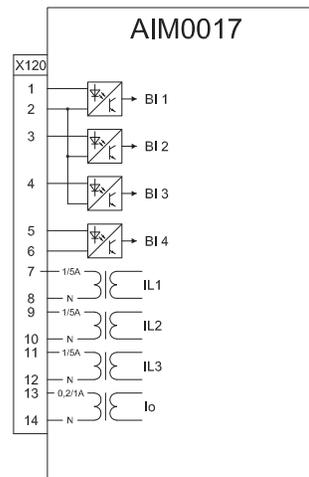


Figure 9: Example of AIM0017 card variant (4 I with 0.2/1 A Io channel)

5.4.2 Connecting voltage inputs

Connect the wires from the Recloser and external VT to the SIM card in the back pane as shown in the figure below.

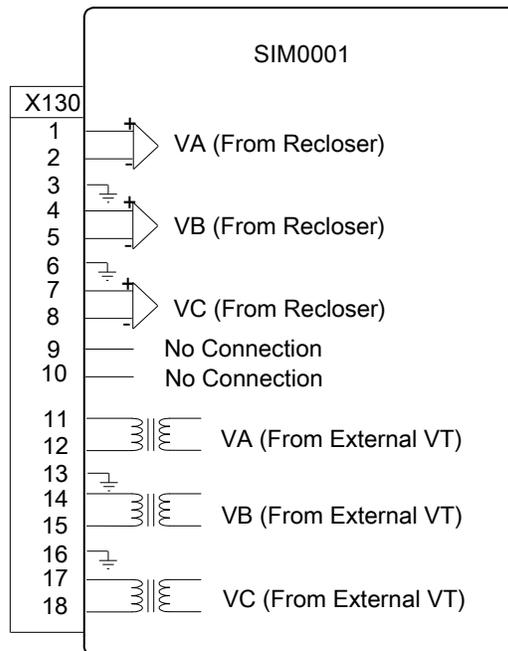


Figure 10: Example of voltage input connections to SIM0001

5.4.3 Connecting IED with a test switch

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

5.5 Connecting power supply

The IED's auxiliary voltage is connected to terminals X100-1 and X100-2. The positive lead is connected to terminal X100-1. The permitted auxiliary voltage range of the IED is marked on top of the IED's LHMI.

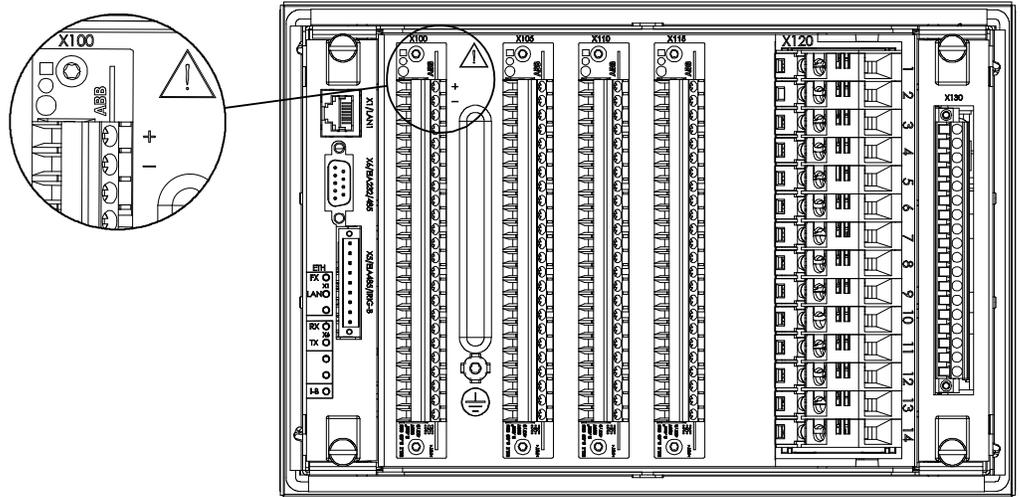


Figure 11: Connecting auxiliary voltage

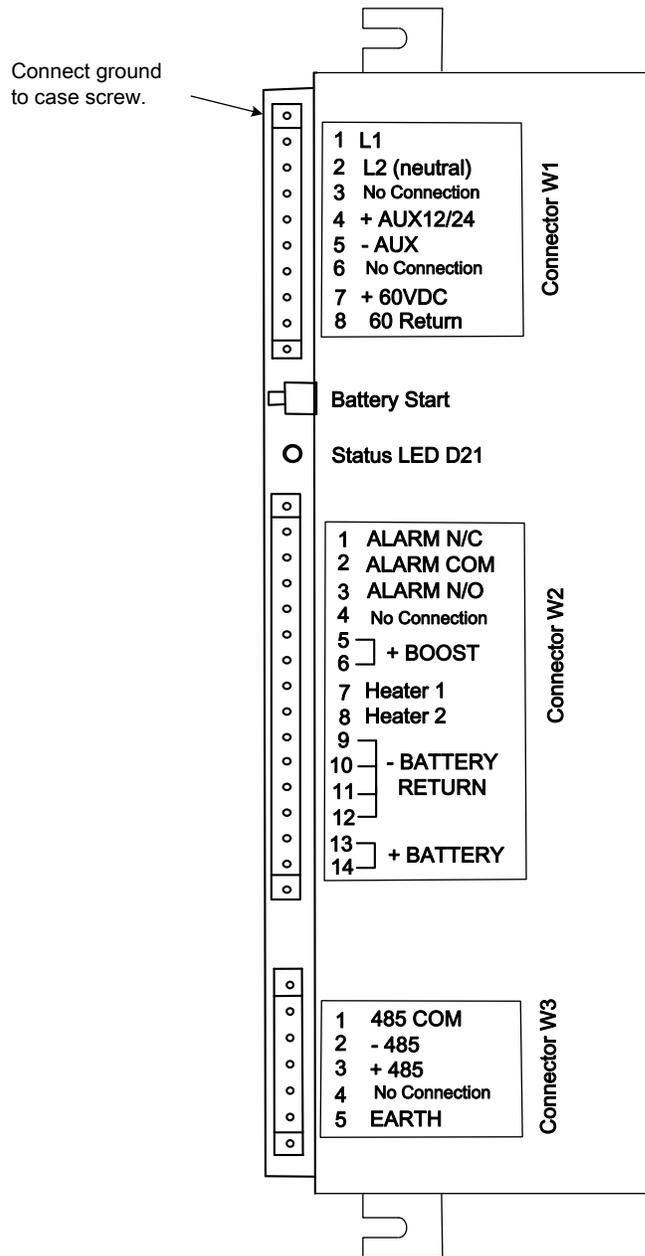


Figure 12: Connections to Uninterruptable Power Supply (UPS)

5.6 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.

5.7 Energizing the IED

Before you connect the auxiliary power, check that the terminal strip is wired and placed correctly.

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

During the product lifecycle, it may be necessary to upgrade the IED to a next-generation unit. Although such an upgrade will not likely be necessary for a minimum of 20 years after the initial installation, it is wise to consider beforehand the product lifecycle when considering the original product.

IED-specified options can be found from the Retrofit Solutions Database at www.abb.com by following the links within ABB Service Guide or the ABB Product Guide that may be found on the product specific Service & Support sheet.

6.2 Checking IED information

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

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

The **System identifiers** submenu contains the unique Technical key which cannot be changed.

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.

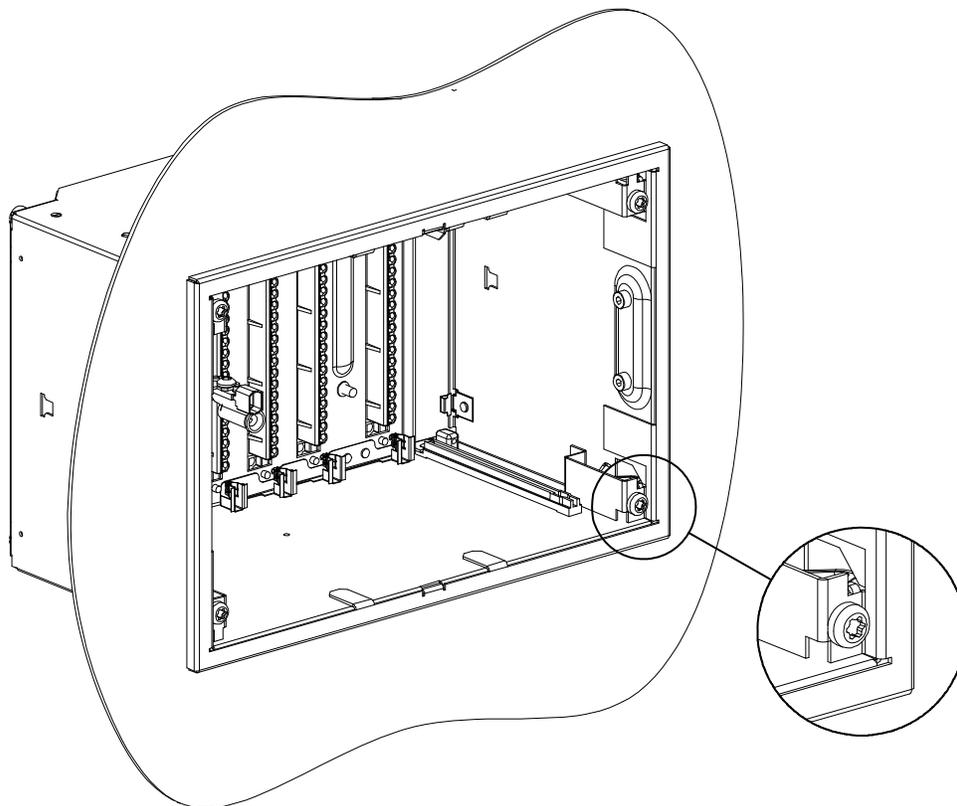


Figure 13: *Loosening the fixing screws*

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

6.4 Sending the IED for repair

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

6.5 Exchanging the IED

To exchange the IED with another identical unit, remove the IED 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 an IED for a different unit, change the case and connect the wires.



Check with your local ABB if the IED can be upgraded.

Section 7 Technical data

7.1 Case and HMI display variants

7.1.1 Front side of the IED



Figure 14: Large display

Table 3: Large display

Character size	Rows in the view	Characters per row
Large, variable width (13x14 pixels)	10	8 or more

7.1.2

Rear side of the IED

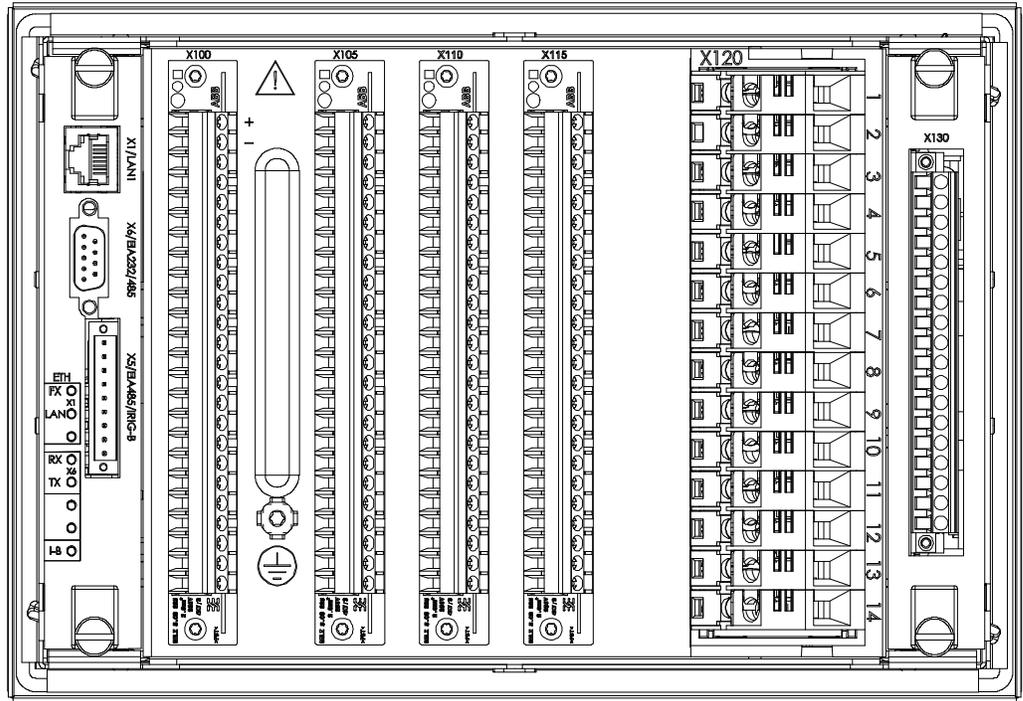


Figure 15: Rear view of an 620 series IED with communication module

7.2

Dimensions

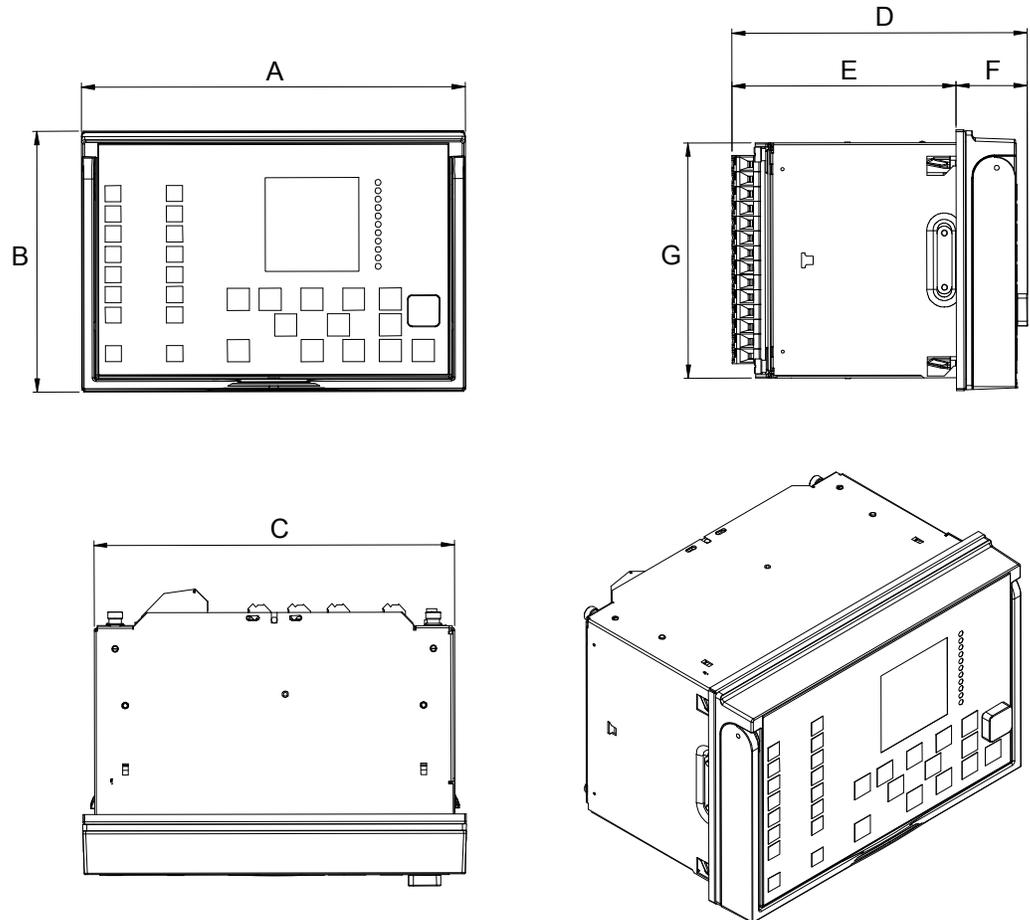


Figure 16: 620 series main dimensions

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 IED	10.5 lbs (4.8 kg)
	Plug-in unit only	6.0 lbs (2.8 kg)

7.2.1

Enclosure class

Table 5: *Degree of protection of flush-mounted IED*

Description	Value
Front side	IP 54

Section 8 Glossary

615/620 series	Series of numerical IEDs for low-end protection and supervision applications of utility substations, and industrial switchgear and equipment
ANSI	American National Standards Institute
CT	Current transformer
DNP3	A distributed network protocol originally developed by Westronic. The DNP3 Users Group has the ownership of the protocol and assumes responsibility for its evolution.
EMC	Electromagnetic compatibility
HMI	Human-machine interface
IEC 61850	International standard for substation communication and modelling
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	Personal computer; Polycarbonate
PCM600	Protection and Control IED Manager
RoHS	Restriction of the use of certain hazardous substances in electrical and electronic equipment
VT	Voltage transformer

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