

RELION® PROTECTION AND CONTROL

REX610

Installation Manual





Document ID: 2NGA000821
Issued: 2022-04-21
Revision: A
Product version: 1.0

© Copyright 2022 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.

abb.com/mediumvoltage

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. In case of discrepancies between the English and any other language version, the wording of the English version shall prevail.

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 the third party testing laboratory KEMA in accordance with the product standard 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.

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 earthed.



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.....	4
	Symbols and conventions.....	4
	Symbols.....	4
	Document conventions.....	5
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.....	9
	Returning a product damaged in transit.....	10
	Storing.....	10
Section 4	Mounting.....	11
	Checking environmental conditions and mounting space.....	11
	Detaching and installing plug-in unit.....	11
	Detaching plug-in unit.....	11
	Installing plug-in unit.....	13
	Sealing plug-in unit.....	14
	Securing handle.....	15
	Inserting or removing SD card.....	16
	Installing module cassettes.....	18
	Detaching module cassettes.....	20
	Mounting protection relay.....	23
	Required tools.....	23
	Flush mounting protection relay	23
	Rack mounting protection relay	28
	Wall mounting protection relay	28

Section 5	Connecting.....	33
	Required tools.....	33
	Connecting wires	33
	Connecting functional earthing.....	34
	Connecting analog signals.....	36
	Connecting current and voltage inputs	36
	Connecting protection relay with a test switch	38
	Connecting binary signals.....	38
	Connecting power supply.....	39
	Connecting communication.....	41
	Accessing Modbus termination jumper.....	41
	Connecting relay via USB.....	42
	Energizing protection relay	43
Section 6	Removing, repairing and exchanging.....	45
	Product lifecycle.....	45
	Checking protection relay information.....	45
	Removing protection relay.....	46
	Sending protection relay for repair	46
	Exchanging protection relay	47
Section 7	Technical data.....	49
	Case and HMI display variants.....	49
	Front side of the protection relay.....	49
	Rear side of the protection relay.....	50
	Dimensions.....	51
	Enclosure class.....	52
Section 8	Accessories and ordering data.....	53
Section 9	Glossary.....	55

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

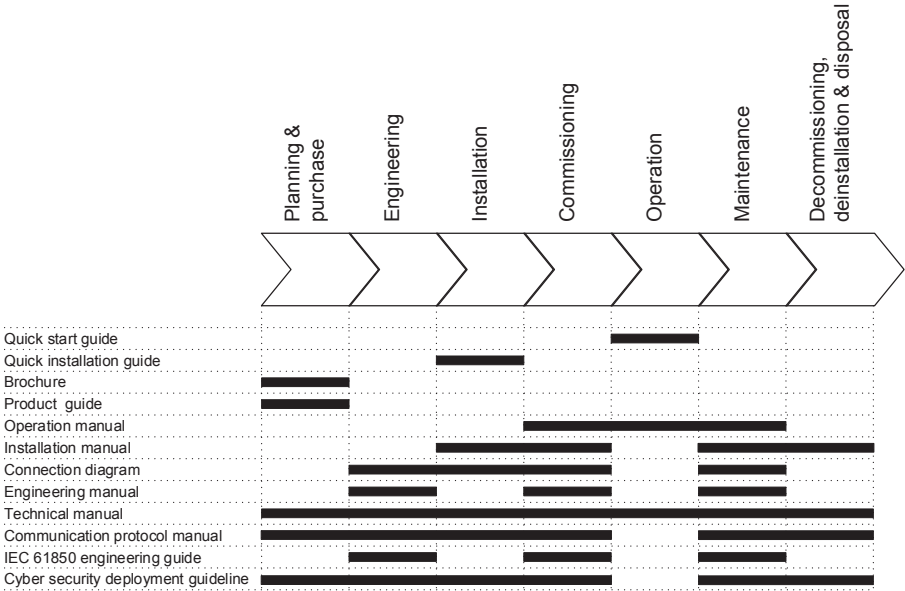


Figure 1: The intended use of documents during the product life cycle

1.3.2

Document revision history

Document revision/date	Product version	History
A/2022-04-21	1.0	First release

1.3.3

Related documentation

Download the latest documents from the ABB Web site abb.com/mediumvoltage.

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**.
- 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 "On" and "Off".
- Input/output messages and monitored data names are shown in Courier font.
When the function starts, the START output is set to TRUE.
- Values of quantities are expressed with a number and an SI unit. The corresponding imperial units may be given in parentheses.

-
- This document assumes that the parameter setting visibility is "Advanced".
 - A functional earth terminal is indicated in figures with the symbol .
 - Equipment protected throughout by double insulation or reinforced insulation (equivalent to class II of IEC 61140) is indicated in figures with the symbol .

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 suppliers has been made according to the EU RoHS directive 2011/65/EU and the amended EU directive 2015/863/EU. These directives limit the use of hazardous substances.

Table 1: *Maximum concentration values by weight per homogeneous material*

Substance	Proposed maximum concentration	In %
Lead - Pb	<1000 ppm (RoHS3)	0.001
Mercury - Hg	<1000 ppm (RoHS3)	0.001
Cadmium - Cd	<100 ppm (RoHS3)	0.0001
Hexavalent Chromium Cr (VI)	<1000 ppm (RoHS3)	0.001
Polybrominated biphenyls - PBB	<1000 ppm (RoHS3)	0.001
Polybrominated diphenyl ether - PBDE	<1000 ppm (RoHS3)	0.001

Operational reliability and long life time have been ensured 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	Metal plates, parts and screws	Steel
	Hard plastic parts	Polycarbonate, REACH and RoHS compliant
	Soft plastic parts	Silicone (UL94 HB) Thermoplastic elastomer
	Electronics modules in case	Various
Plug-in unit	Electronic plug-in modules	Various
	Electronics HMI module	Various
	Hard plastic parts	Polycarbonate, REACH and RoHS compliant
	Soft plastic parts	Silicone (UL94 HB) Thermoplastic elastomer
	Metal plates, parts and screws	Steel
Package	Box	Cardboard
Attached material	Manuals	Paper

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 the side of the HMI or the rear of the case.
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.

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 plug-in unit

4.2.1 Detaching plug-in unit



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

1. Turn off the power.
2. If a padlock has been used to secure the handle in place, remove the padlock.
3. Rotate the handle 90° to the left from its latched position.
The plug-unit is pushed 5...8 mm (0.1969...0.3150 in) out of the case and the connectors are separated.
4. Pull the plug-unit out of the case.

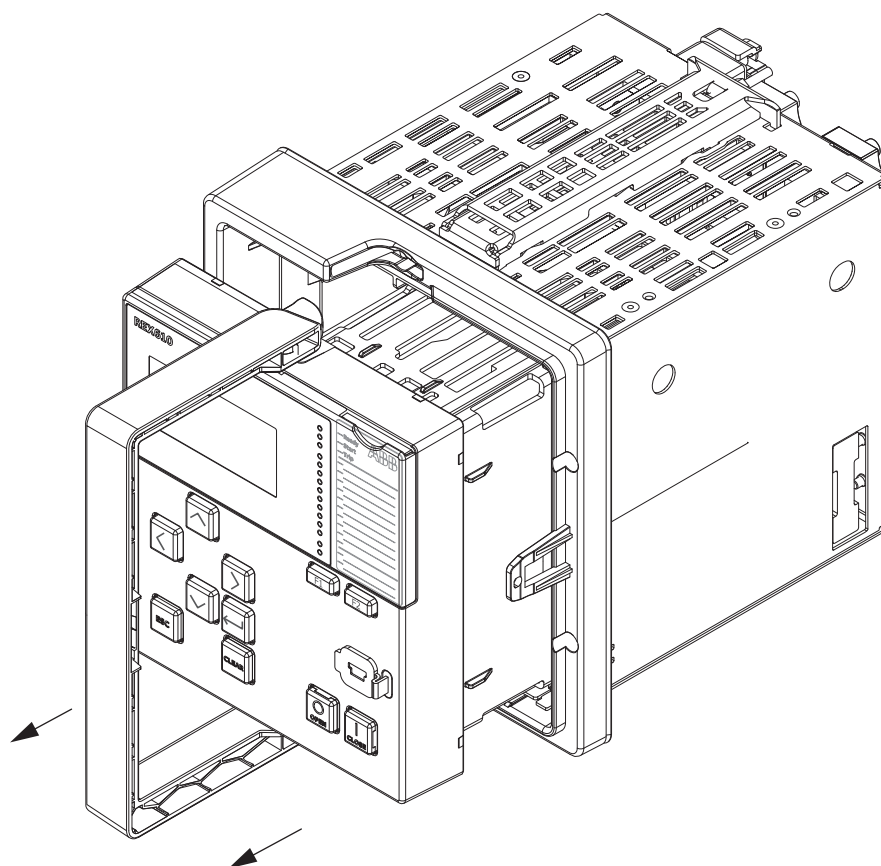


Figure 2: Detaching a plug-in unit from the case



The analog cards are part of the case. Therefore, detaching the plug-in unit does 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 can be plugged into any REX610 case. Analog cards are not part of the plug-in unit. They are separate modules that can be inserted or removed independently.



Remove the plug-in unit to insert or remove analog cards.

1. Rotate the handle 90° to the left and push the plug-in unit into the case.

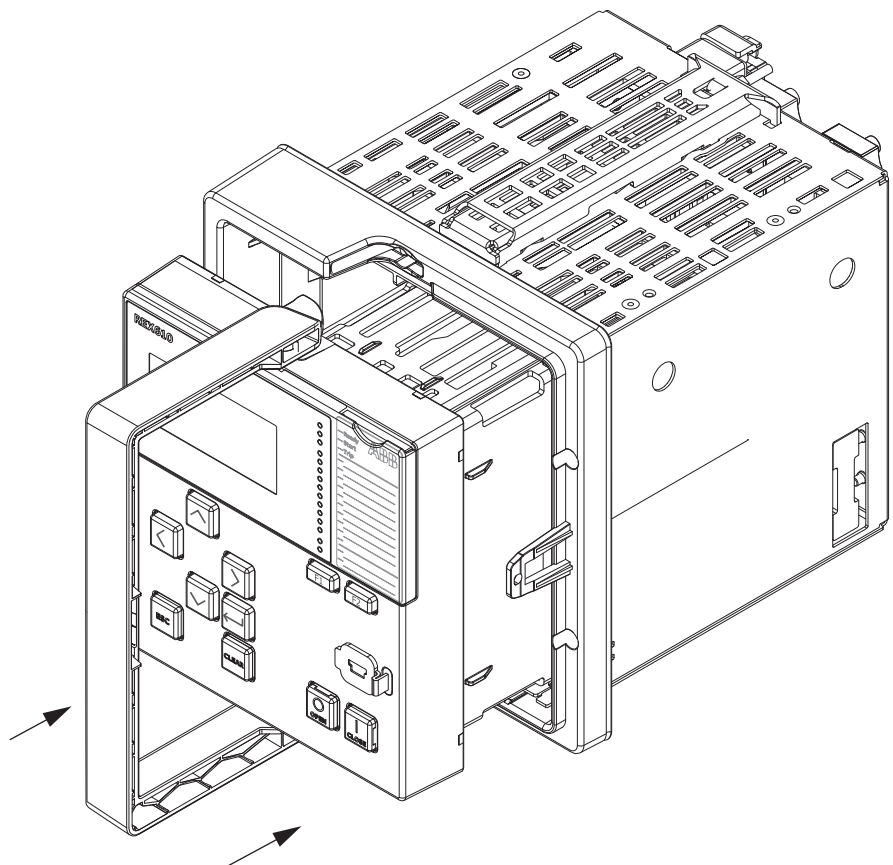


Figure 3: Installing a plug-in unit into the case

2. Hold the handle and push the plug-in unit into the case as far as it goes. The plug-in unit stops at a distance of 7...8 mm (0.2756...0.3150 in) from the case.

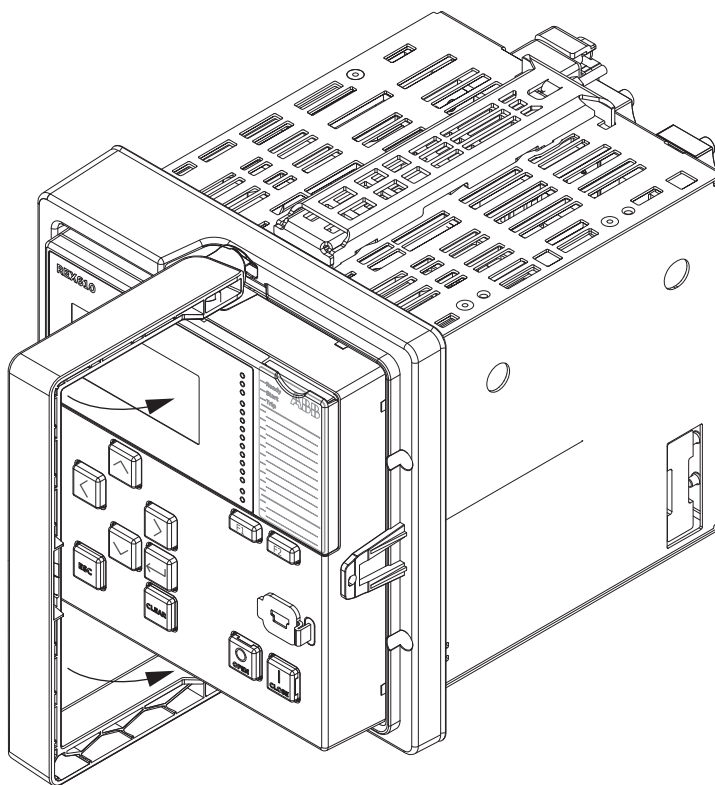


Figure 4: Pushing the plug-in unit into the case

3. Rotate the handle to the right until it latches to the case and a clicking sound is heard.
The handle is in the latched position.

4.2.3

Sealing plug-in unit

The front panel of the protection relay has a locking mechanism for sealing the plug-in unit.

- Thread a sealing wire through the holes in the locking mechanism and attach a seal.

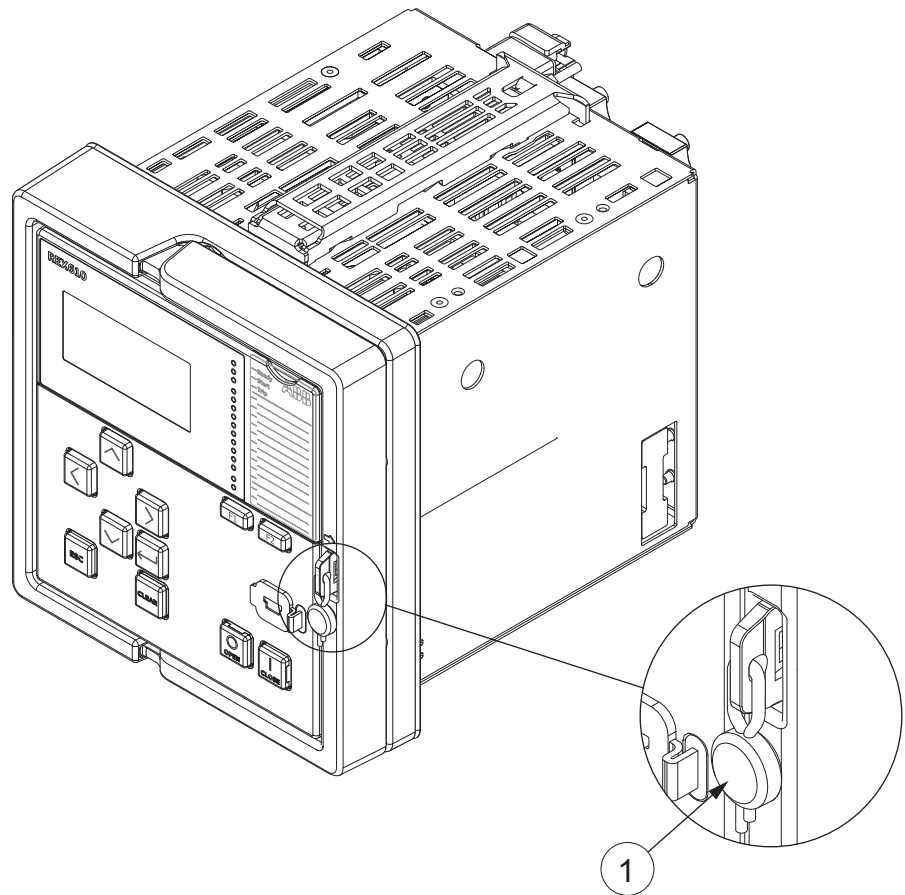


Figure 5: Sealing wire

1 Sealing wire and seal

4.2.4 Securing handle

The front panel of the protection relay has an additional locking mechanism to secure the handle in place. A padlock can be fitted to the locking mechanism to prevent the handle from opening. By default, the handle is locked in place without a padlock.

- For added security, use a padlock to lock the handle in place.

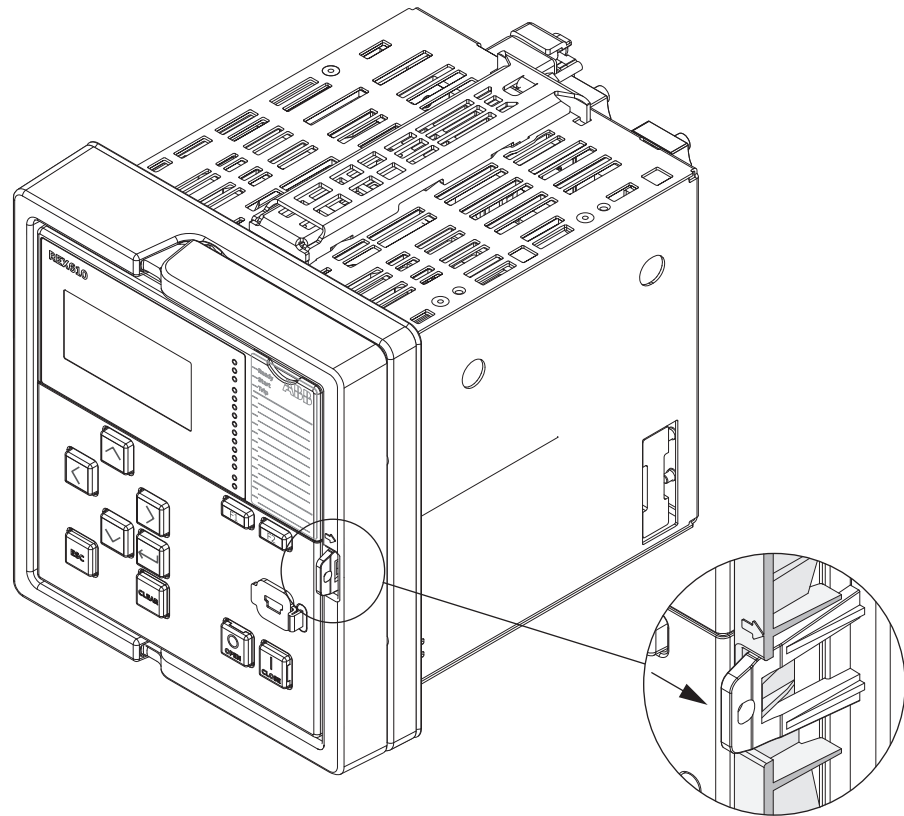


Figure 6: Locking mechanism for securing the handle

4.2.5

Inserting or removing SD card

1. Detach the plug-in unit from the case.
2. Locate the SD card slot on the rear of the plug-in unit.

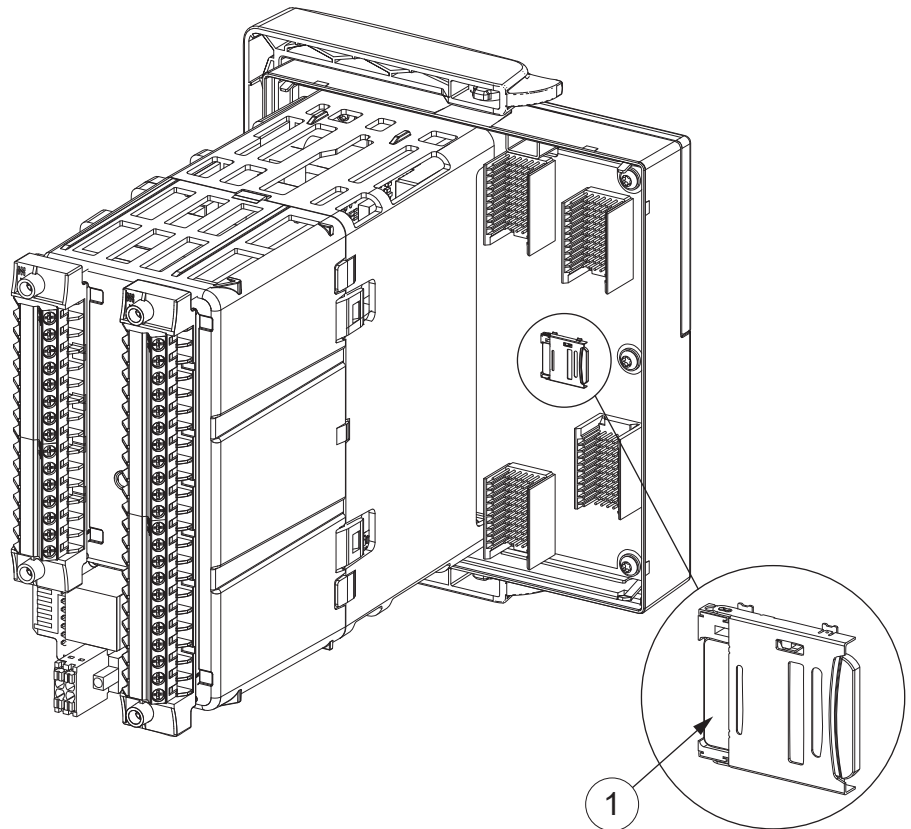


Figure 7: Locating the SD card

1 SD card

3. Unlock and lift the slot lid.
4. Insert the SD card, close the lid and lock it to hold the SD card in place.



The protection relay supports SD and MMC cards. It is recommended to use a card of type 16 GB or 32 GB Class 10. The device supports up to 128 GB MMC card.

5. Install the plug-in unit.



See the operation manual and the engineering manual for more details on the functionality supported with the SD card.

4.3 Installing module cassettes

The analog cards in REX610 are part of cassettes. The cassettes can be attached and removed from the case.



There are two types of analog CT modules, AIC2001 and AIC2002, which have compression type and ring-lug type terminals.

1. Detach the plug-in unit from the case as shown in [Detaching plug-in unit](#).

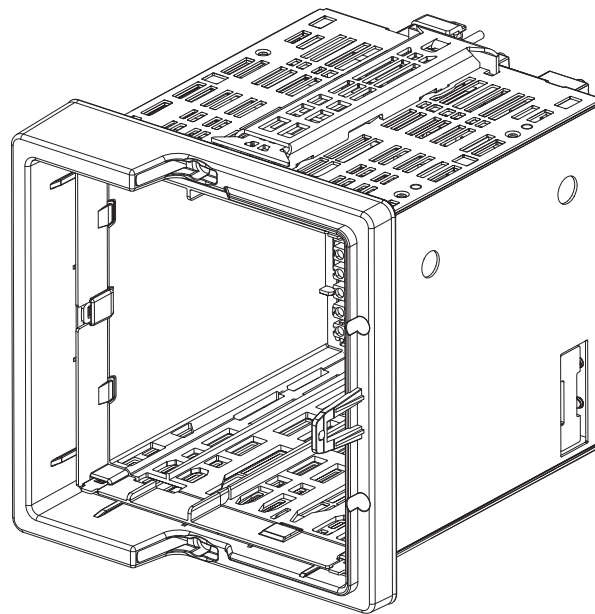


Figure 8: Plug-in unit detached from the case

2. Install a cassette by gradually pushing the cassette into its slot.
The AIU2001 cassette belongs to slot D which is the leftmost when viewing the relay from the front. The AIC2001 and AIC2002 cassettes belong to slot C and are designed so that they cannot be interchanged.

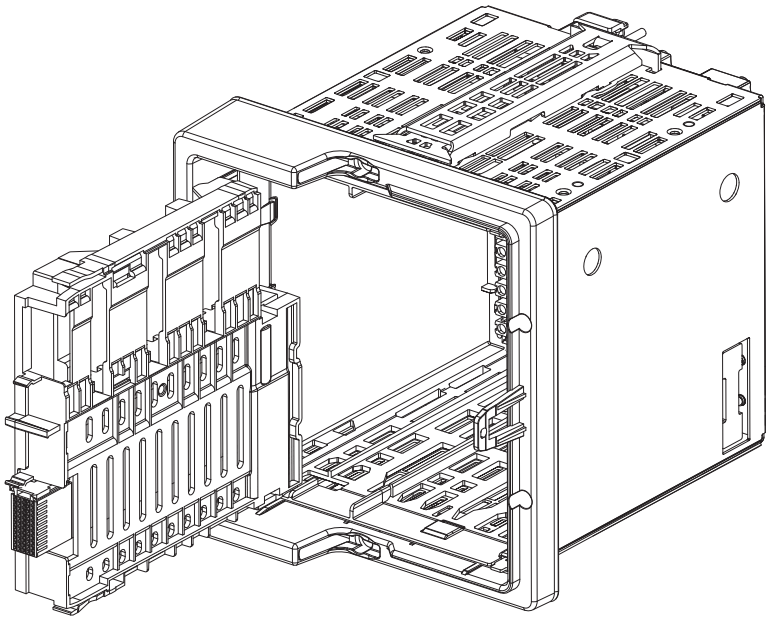


Figure 9: Installing AIU2001

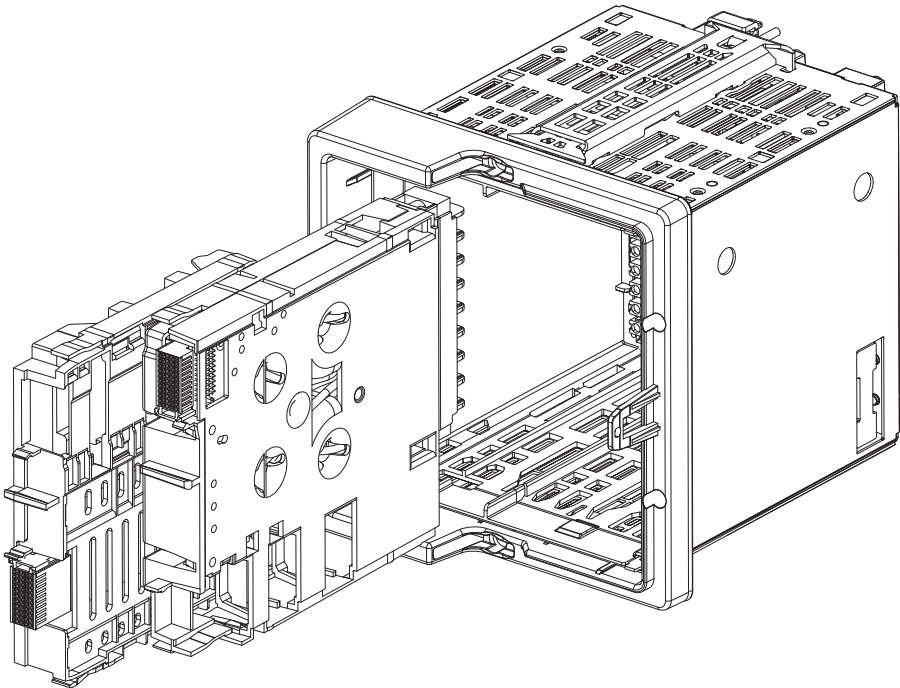


Figure 10: Installing AIC2001 and AIC2002

4.4 Detaching module cassettes

The analog cards in REX610 are part of cassettes. The cassettes can be attached and removed from the case.



There are two types of analog CT modules, AIC2001 and AIC2002, which have compression type and ring-lug type terminals.

1. Detach the plug-in unit from the case as shown in [Detaching plug-in unit](#).

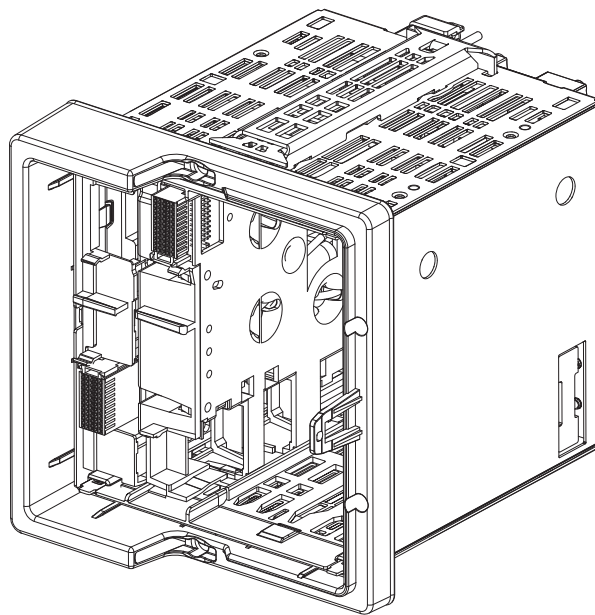


Figure 11: Removing module cassettes



If the product supports a ring-lug type CT module (AIC2002), the cover must be removed from the rear of the relay before removing the cassette from the case.

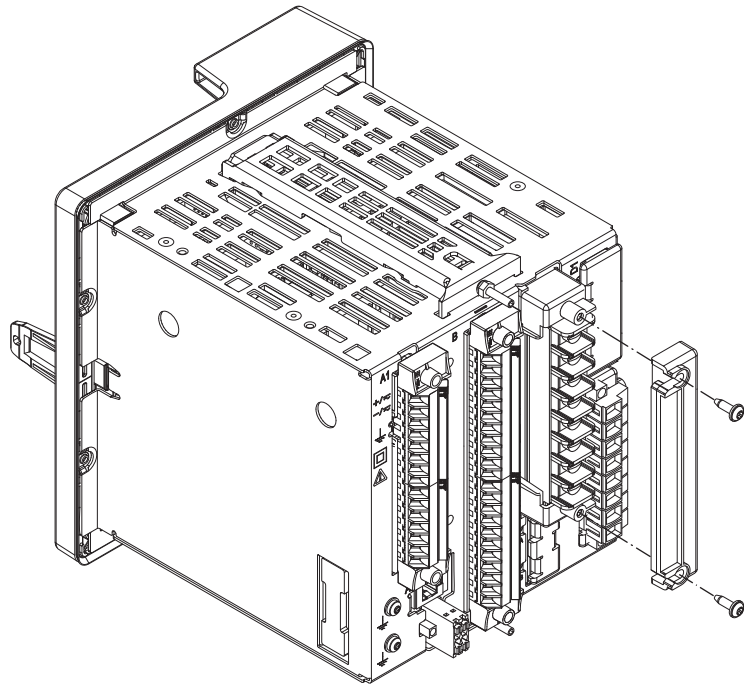


Figure 12: Removing CT module cover

2. Release the module cassettes by pressing the clip finger at the top or bottom of the module cassette using a flat-tip screwdriver.

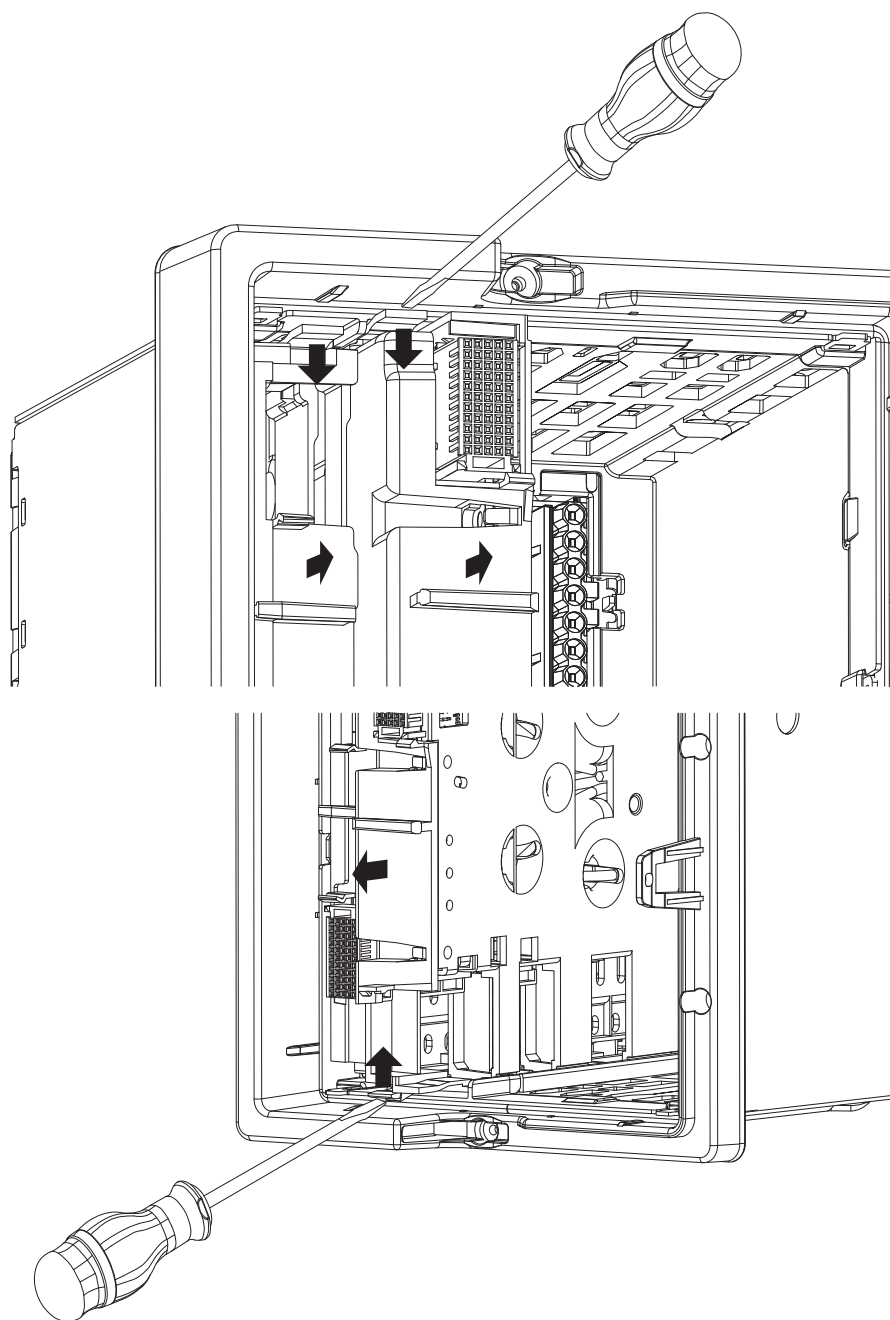


Figure 13: Releasing a module cassette

3. Pull the cassette out carefully.

4.5 Mounting protection relay

4.5.1 Required tools

- T10 Torx screwdriver for mounting the case and for connecting the protective earthing



Only use adjustable torque screwdrivers.

4.5.2 Flush mounting protection relay

All the mounting elements are integrated in the protection relay.

Requirements for installation:

- Panel cutout of $129.0 \pm 1 \times 139.0$ mm ($5.0787 \pm 0.03937 \times 5.4724$ in)
- Depth behind the panel 163.6 mm (6.4409 in)

1. Loosen the clamp screws from the top and bottom of the case.
2. Detach the fixing clamp assembly.

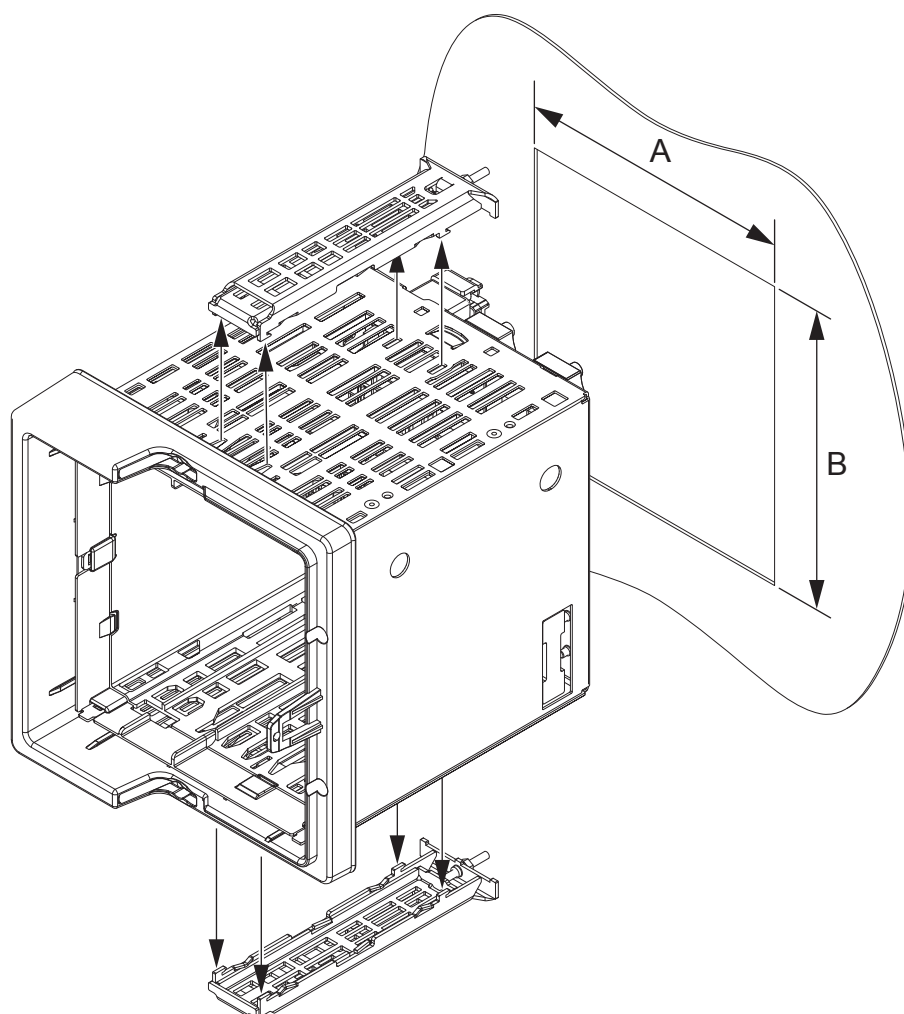


Figure 14: Detaching the fixing clamp assembly

A 129.0 ± 1 mm (5.0787 ± 0.03937 in)

B 139.0 mm (5.4724 in)

3. Mount the case to the panel cutout.
4. Mount the fixing clamp assembly back to the case.

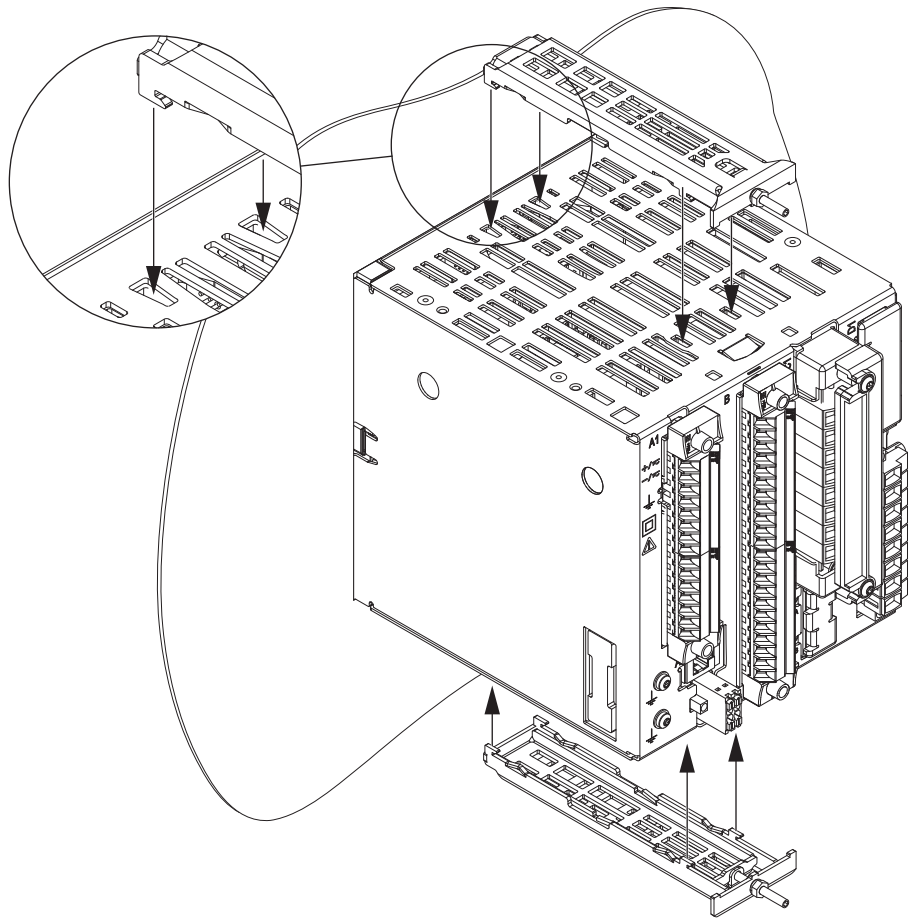


Figure 15: Mounting the fixing clamp assembly

5. Tighten the M3 (1.5 mm Allen key) screws to secure the case.



The allowed range for the fixing screws' tightening torque is $0.7 \pm 10\%$ Nm ($0.5162 \pm 10\%$ ft lb).

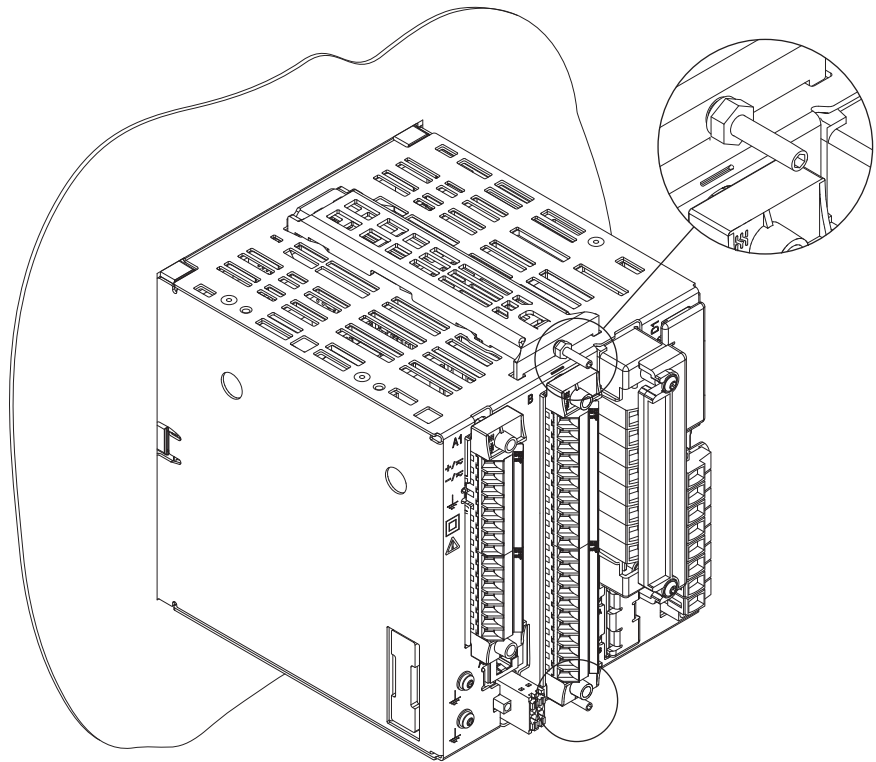


Figure 16: Tightening the M3 screws

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

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

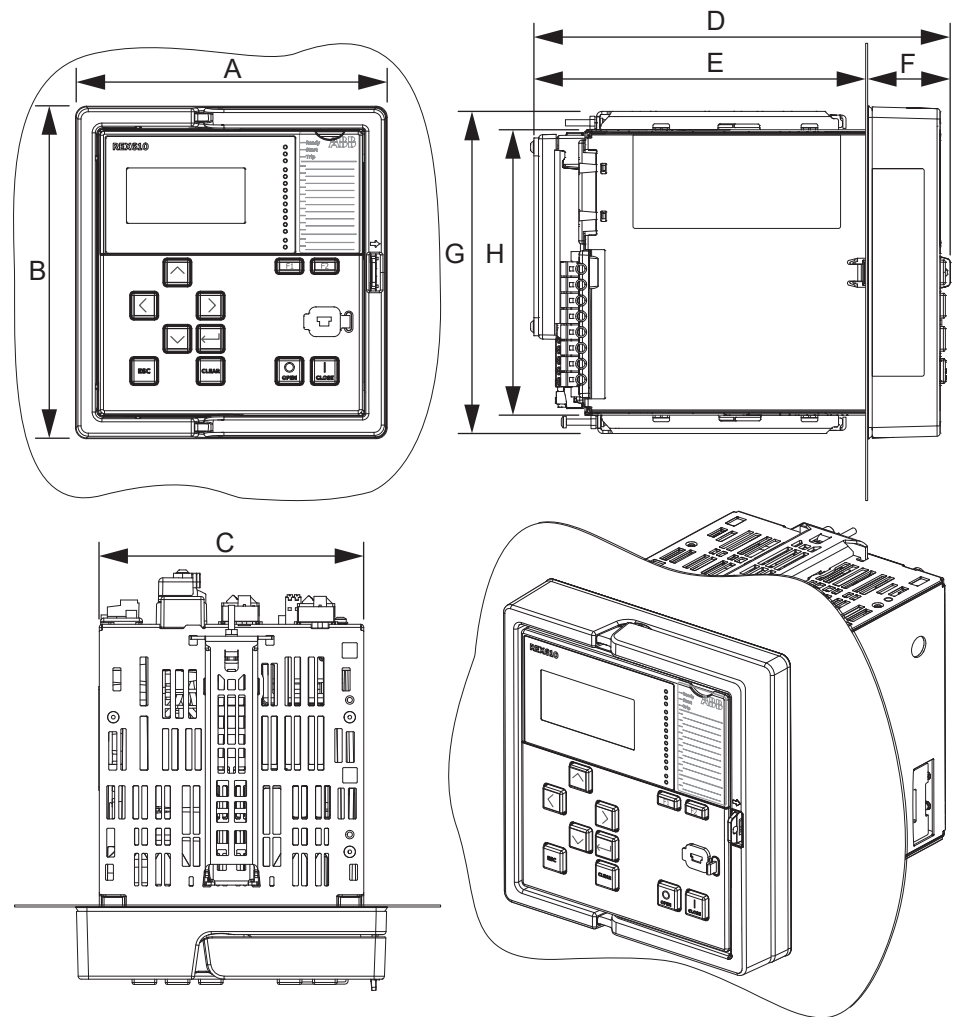


Figure 17: Flush mounted case and plug-in unit

- A 149.5 mm (5.8858 in)
- B 159.5 mm (6.2795 in)
- C 127.5 mm (5.0196 in)
- D 202.8 mm (7.9842 in)
- E 163.6 mm (6.4409 in)
- F 39.2 mm (1.5433 in)
- G 155.5 mm (6.1220 in)
- H 137.5 mm (5.4133 in)

4.5.3 Rack mounting protection relay

A mounting kit is needed for rack mounting the protection relay. In addition to the detailed mounting instructions, the 19" rack mounting kit includes:

- Mounting panel
- Screws



See [Flush mounting protection relay](#) for illustrations of the steps to mount the relay on a rack.

1. Loosen the clamp screws from the top and bottom of the case.
2. Detach the fixing clamp assembly.
3. Mount the case to the panel cutout.
4. Mount the fixing clamp assembly back to the case.
5. Tighten the M3 (1.5 mm Allen key) screws to secure the case.
6. Install the plug-in unit into the case.

4.5.4 Wall mounting protection relay

A mounting kit is needed for wall mounting the protection relay. In addition to the detailed mounting instructions, the wall mounting kit includes:

- Two side panels and one front panel
- Screws

1. Drill mounting holes according to the dimensional drawing.
2. Mount the two side panels to the wall, for example, with M6 screws (not included in package).
3. Mount the front panel with the included M5 screws.



The allowed range for the fixing screws' tightening torque is 0.7...1 Nm (0.52...0.74 ft lb).

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

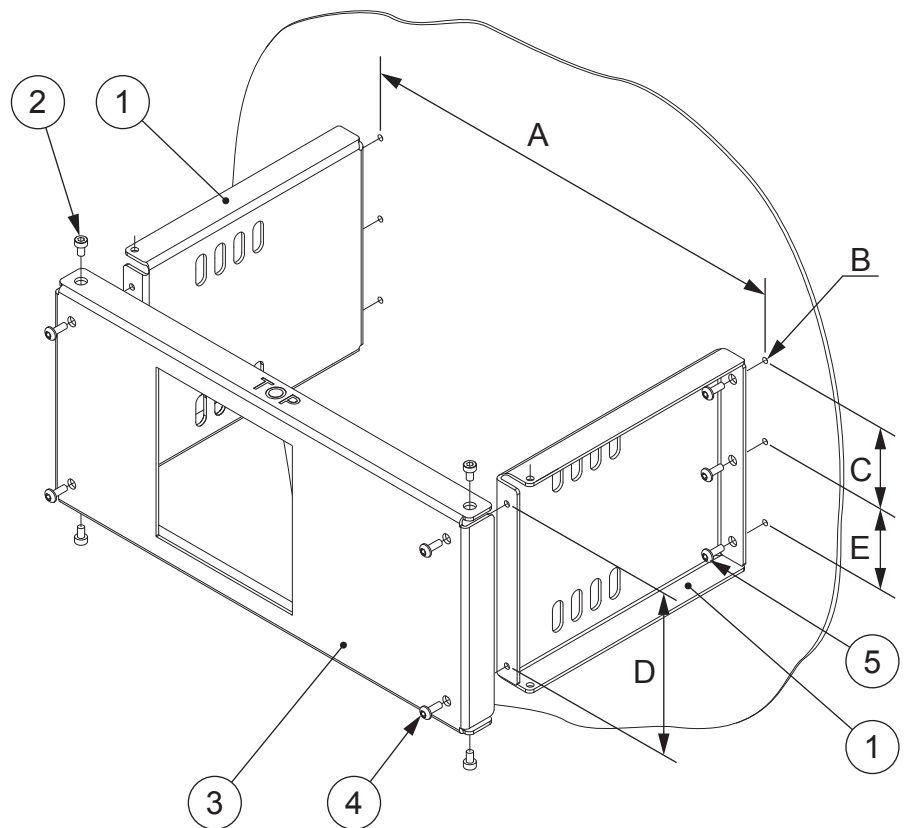


Figure 18: Wall mounting the protection relay

A 365 mm (14.3700 in)	1 Side panels
B \varnothing 7.5 mm (0.2952 in)	2 Hexagon socket head cap screw M5x8 (4 pieces)
C 66.5 mm (2.6181 in)	3 Front panel
D 133 mm (5.2362 in)	4 Torx screw M5x10 (4 pieces)
E 66.5 mm (2.6181 in)	5 Wall mounting screws (6 pieces)

4. Mount the case to the front panel cutout.

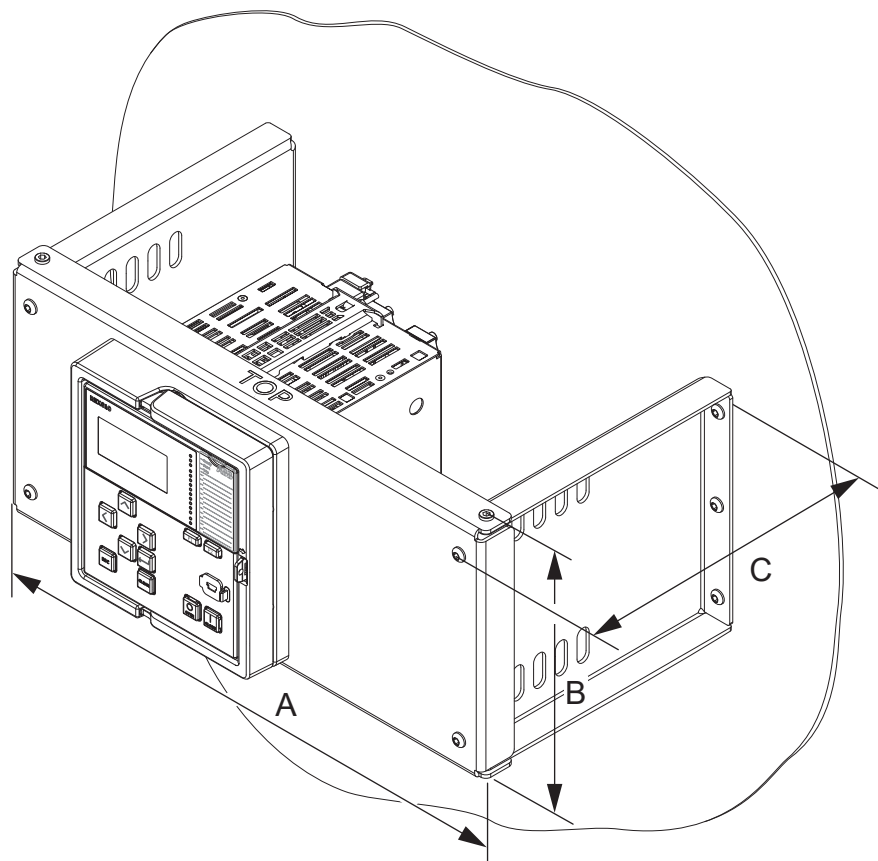


Figure 19: Wall mounted protection relay

- A 390 mm (15.3543 in)
- B 181.80 mm (7.1574 in)
- C 214.12 mm (8.4299 in)

5. Connect the wires.
A wall-mounted protection relay can be released by loosening the fixing clamp.

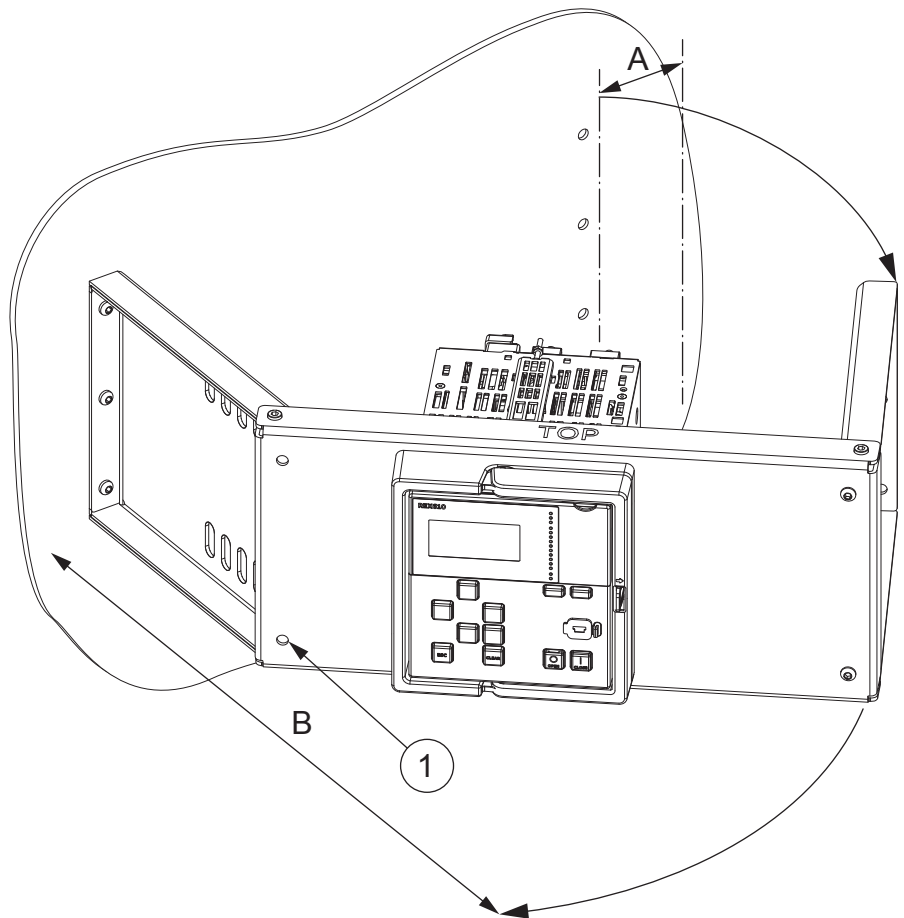


Figure 20: *Swinging out the protection relay*

- A 54 mm (2.1259 in) 1 Remove the screws before swinging out the frame
B 574 mm (22.5984 in)

6. Swing the frame back to the wall and insert the removed screws.

Section 5 Connecting

5.1 Required tools

When handling CT/VT terminals in slots C1 and D2 respectively, use a flat-blade screwdriver.

Table 3: *Required tools*

Terminal	Slotted screw (part of the connector)	Screwdriver blade	
		Width	Thickness
CT (C1)	M3	Ø3.5 mm (0.1377 in)	Max. Ø0.6 mm (0.02362 in)
VT (D2)	M2.5	Ø3.0 mm (0.1181 in)	Max. Ø0.5 mm (0.01968 in)

5.2 Connecting wires

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

- Open the screw-compression type terminals before inserting any wires. By default the terminals are closed at the time of delivery.
- Use fine wire in door mounting.

Table 4: *Wire specifications for connections on the rear of the relay*

Terminal	Wire size			Stripping length
	Solid and flexible	Wire-end ferrule	Plastic collar ferrule	
A1 (PSU2001) B (DIO2001)	0.5...2.5 mm ² (AWG 20-14)	0.5...2.5 mm ² (AWG 20-14)	0.5...1.5 mm ² (AWG 20-16)	7 ± 1 mm (0.2755 ± 0.03937 in)
A2 (COM2001)	0.14...1.5 mm ² (AWG 26-16)	0.14...1.5 mm ² (AWG 26-16)	0.14...1 mm ² (AWG 26-17)	10 mm (0.3937 in)
C1 (AIC2001)	Solid: 0.2...6 mm ² (AWG 24-10) Flexible: 0.2...4 mm ² (AWG 24-12)	0.25...4 mm ² (AWG 24-12)	0.25...4 mm ² (AWG 24-12)	9 mm (0.3543 in)
C1 (AIC2002)	4 mm ² (AWG 12) ¹⁾	0.25...4 mm ² (AWG 24-12)	0.25...4 mm ² (AWG 24-12)	-
D2 (AIU2001)	0.2...4 mm ² (AWG 24-12)	0.2...2.5 mm ² (AWG 24-14)	0.2...2.5 mm ² (AWG 24-14)	7 mm (0.2755 in)

1) Through ring terminal only; stud size M3.5 (# 6), max. outer size of ring terminal = 8 mm (0.3149 in)

5.3

Connecting functional earthing



The earth lead must be at least 1.5 mm² (AWG 16). If the earth lead is long, the cross section of the wire must be increased.



Use fine copper wire as the earth lead.

1. Loosen the upper functional earth screw (T10) to connect a separate earth protection lead.

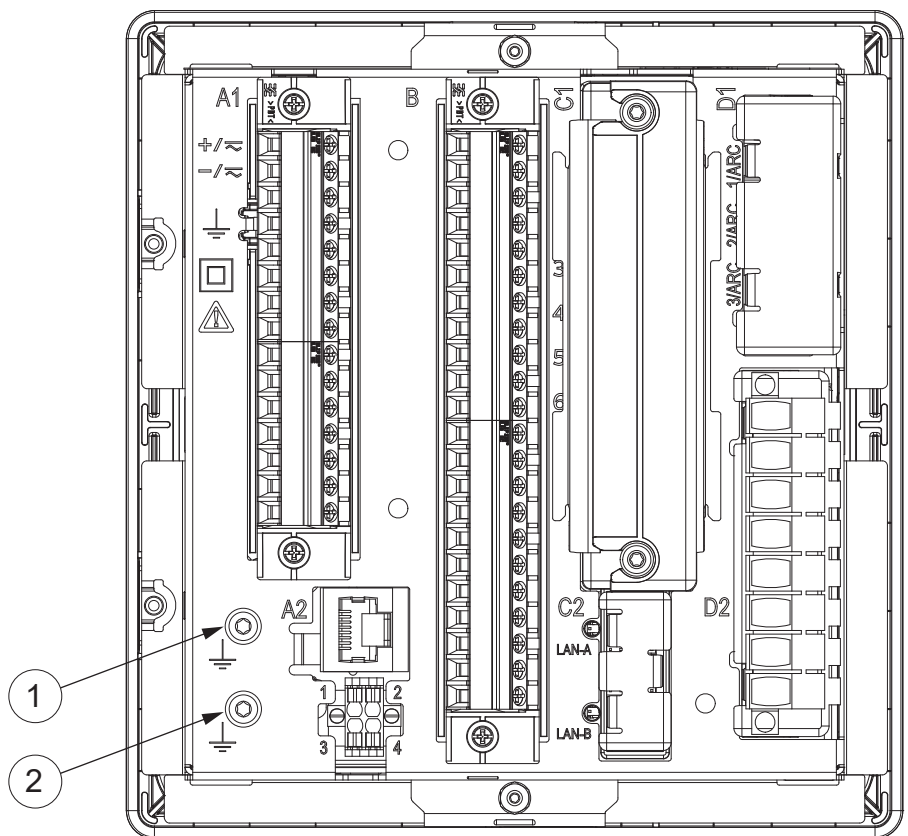


Figure 21: Locating the functional earth screw

- 1 Upper functional earth screw
- 2 Lower functional earth screw



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



Each protection relay must have its own earth lead connected to the earth circuit connector.

2. Connect the earth lead to the earth bar.
Use either a stripped wire screwed between a washer cup and the functional earth screw or a ring lug.



Select a suitable ring lug to fit under the M3 screw.

3. Tighten the functional earth screw.
The allowed tightening torque is $0.75 \text{ Nm} \pm 10\%$ ($0.55 \text{ ft lb} \pm 10\%$).
4. Use the lower functional screw to earth the RS-485 shield wire in the RS-485 cable when hard earth shielding is required.



To avoid earth loops, another capacitive coupled earth pin (pin-4) of RS-485 can be used to connect the cable shield on another RS-485 connected relay on the same bus.



Shielded Ethernet cables are recommended.

5. Support the earth 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. Unscrew the ring-lug connector cover to access the ring-lug terminals.
2. Remove the fixing screw.
3. 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 6.0 mm^2 (AWG 10) wire or for two wires of maximum 4.0 mm^2 (AWG 12).



The allowed tightening torque for the compression connector wire clamp is $0.60...0.80 \text{ Nm}$ ($0.4425...0.5900 \text{ ft lb}$). The allowed tightening torque for the VT connector wire clamp is $0.40...0.50 \text{ Nm}$ ($0.2950...0.3687$).

ft lb). The allowed tightening torque for the ring-lug wire clamp is 0.8 Nm ± 10% (0.5900 ft lb ± 10%).

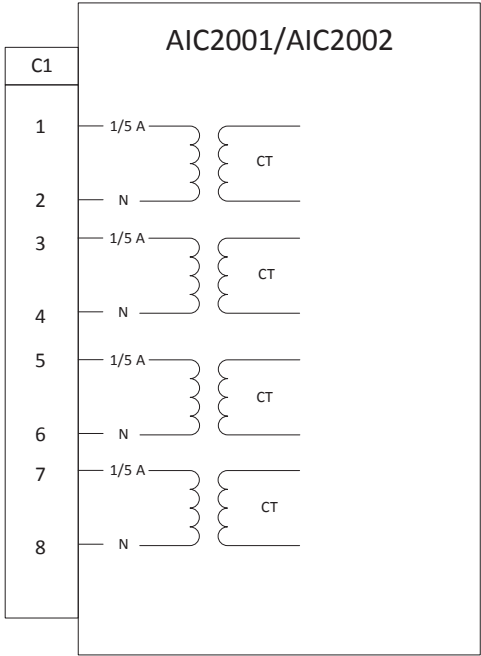


Figure 22: AIC2001/AIC2002 card

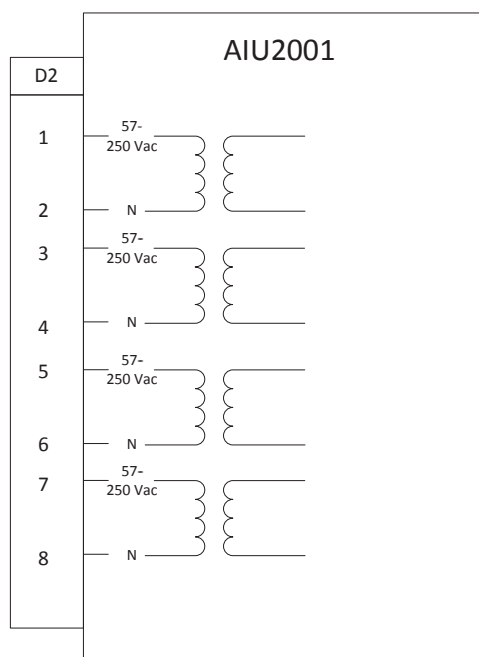


Figure 23: AIU2001 card

5.4.2 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 2.5 mm² (AWG 14) or 1.5 mm² (AWG 16) wire.



The allowed tightening torque for the wire clamp is 0.40...0.50 Nm (0.2950...0.3687 ft lb).

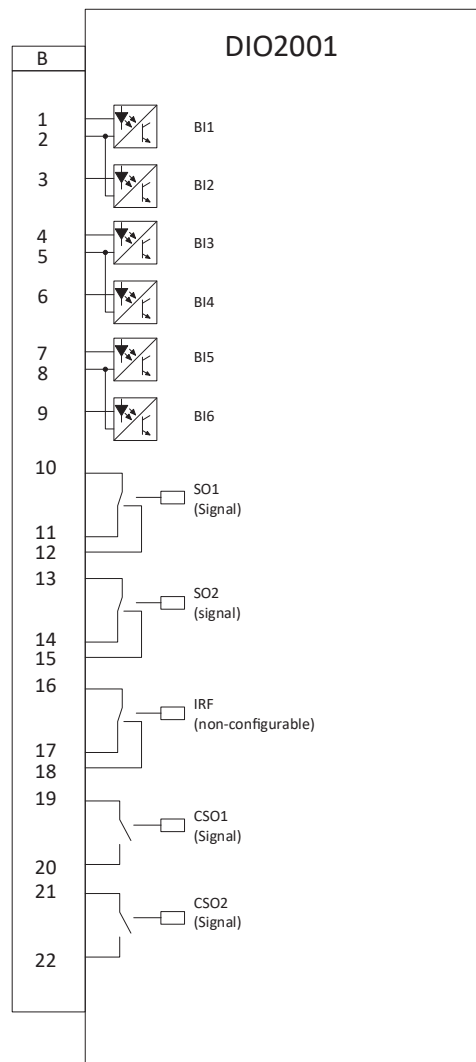


Figure 24: DIO2001 card

5.6 Connecting power supply

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

- Connect the relay's auxiliary voltage to terminals A1-1 and A1-2.
- Connect the positive lead to terminal A1-1.



The allowed tightening torque for the wire clamp is 0.40...0.50 Nm (0.2950...0.3687 ft lb).

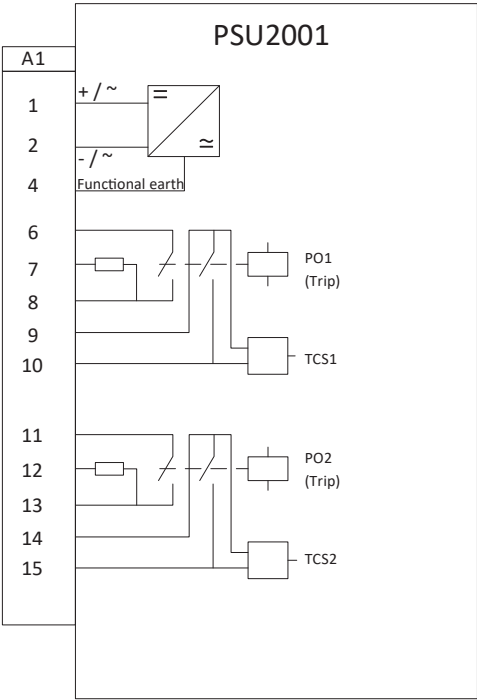


Figure 25: PSU2001 card

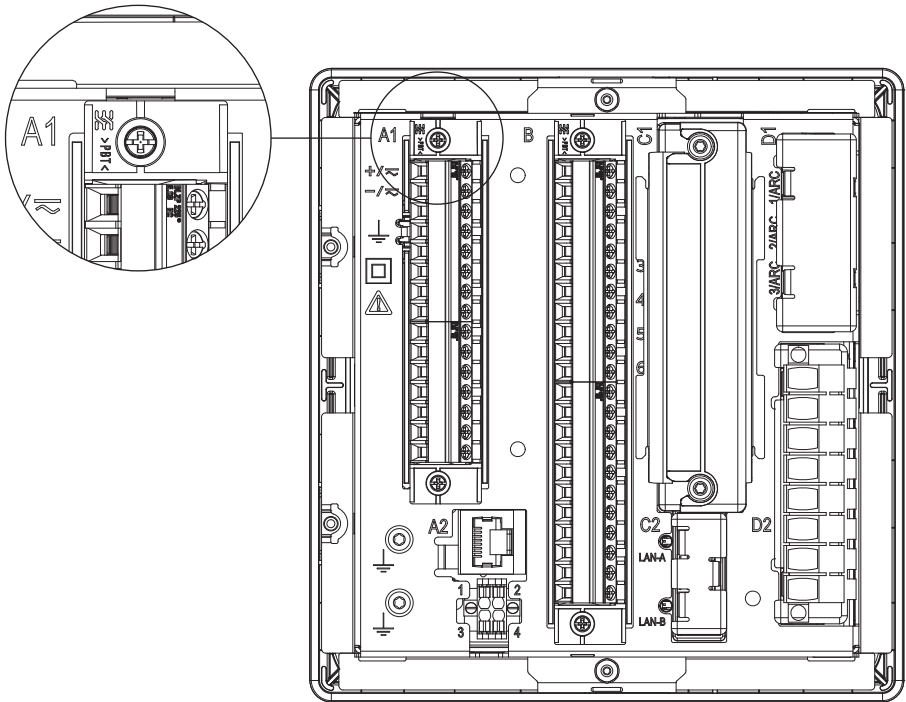


Figure 26: Connecting auxiliary voltage

5.7 Connecting communication

The isolated RS-485 interface is available with four pins. It features an isolated, bidirectional, balanced communication bus (A and B) and a connection for isolated ground. The fourth pin is an AC coupled shield terminal. Typical connection is through a shielded twisted-pair (STP) cable. The RS-485 connection is compliant with TIA/EIA-485. The RS-485 serial port is shown in [Figure 27](#).

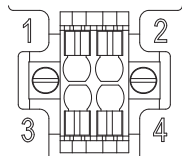


Figure 27: RS-485 4-pin terminal

Table 5: RS-485 connector pins

RS-485 connector pin	Signal	Type
1	A_485	Data signal A (normal)
2	B_485	Data signal B (inverted)
3	SHIELD	AC coupled shield pin
4	GND_485	Common pin for A/B

- Ensure the communication interfaces are properly connected.
The relay's communication interfaces are located on the lower left side of the protection relay when viewing it from the rear.



The allowed tightening torque for the RS-485 interface is 0.15...0.20 Nm (0.1106...0.1475 ft lb).



See the technical manual for product-specific communication interfaces.

5.7.1 Accessing Modbus termination jumper

Bus termination can be activated through a jumper on the PSU module that is accessible when the plug-in unit is removed from the base casing.

1. Locate the access hole to the jumper on the rear of the plug-in unit.
2. Remove or attach the jumper using appropriate nose pliers.

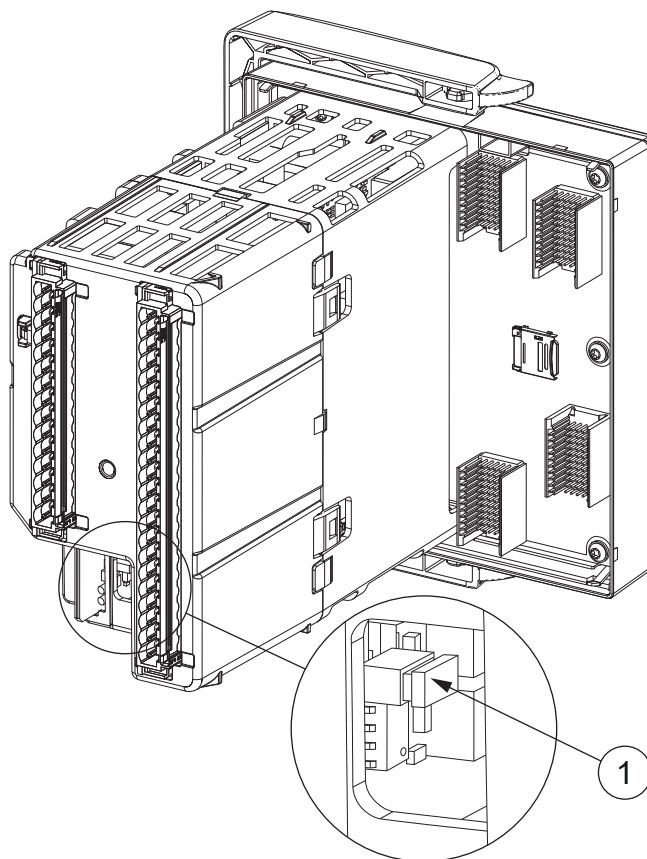


Figure 28: Locating the Modbus termination jumper

1 Modbus termination jumper

5.8 Connecting relay via USB

The protection relay can be connected from the front USB using a micro USB (type B) connector.

The relay supports USB based power-up. The relay turns on with limited functionality when it is connected from the front port and it supports USB based connectivity for specific actions.

- Use a standard micro USB cable to connect to the relay.



See the technical, engineering and operation manuals for details on features supported by the USB based connectivity and the USB based power-up.

5.9

Energizing protection relay



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

- 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.

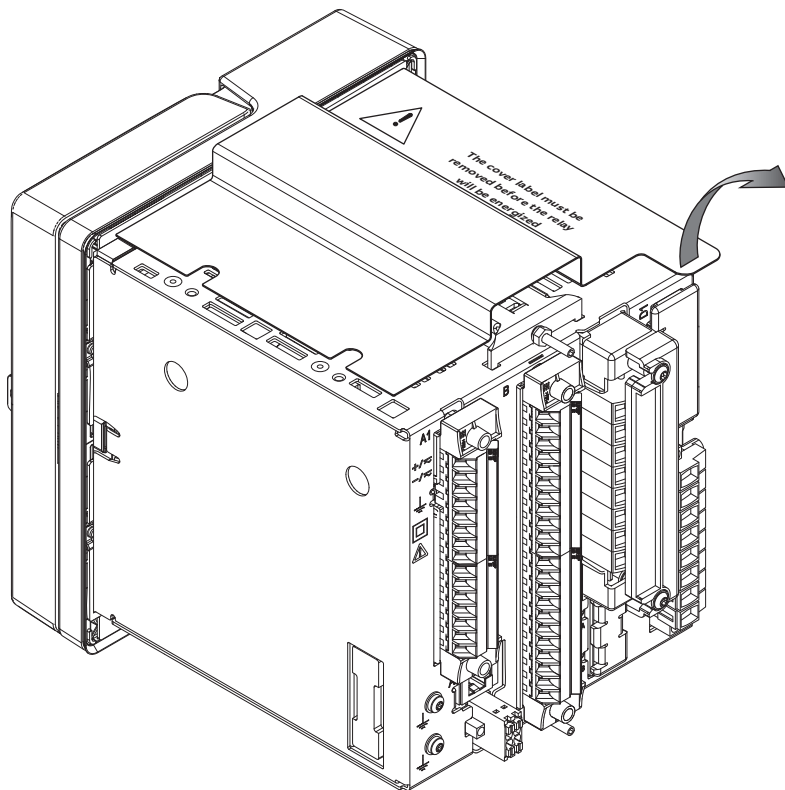


Figure 29: Removing the protective film

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

If the protection relay 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. The current HW composition can be found by reading the HW composition data.

6.3 Removing protection relay

1. Turn off the power.
2. Detach the plug-in unit from the case.
3. Disconnect the wiring.
4. Loosen the M3 screws on the fixing clamp on the top and bottom.

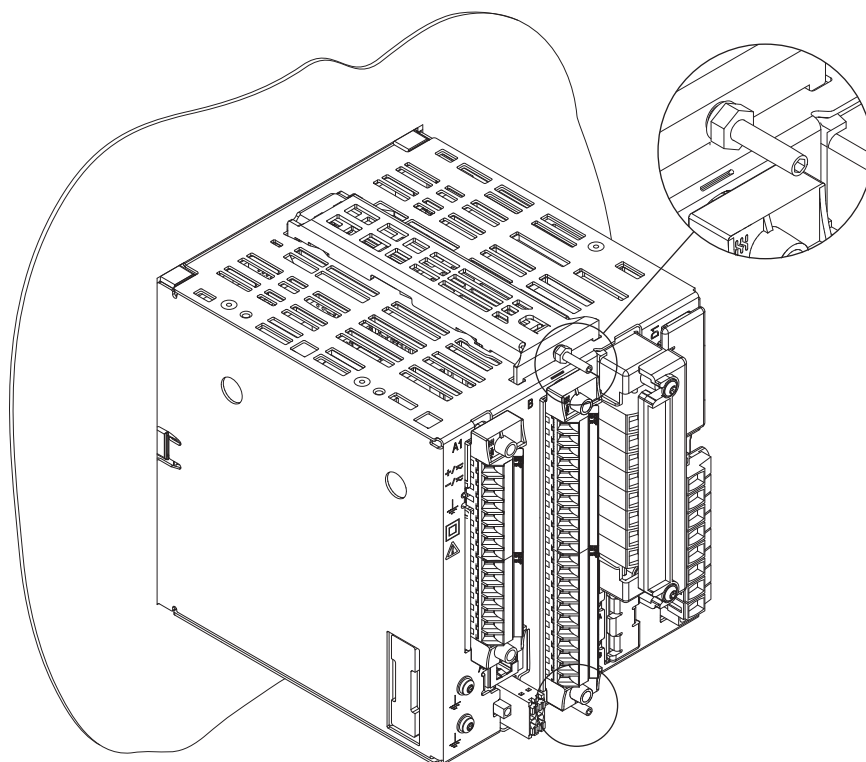


Figure 30: Loosening the M3 screws

5. Detach the panel fixing clamp from the case.
6. Remove the case from the panel cutout.

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 protection relay



Figure 31: Display

Table 6: Display

Character size ¹⁾	Rows in the view	Characters per row
Small, mono-spaced (6 × 12 pixels)	5	20

1) Depending on the selected language

7.1.2 **Rear side of the protection relay**

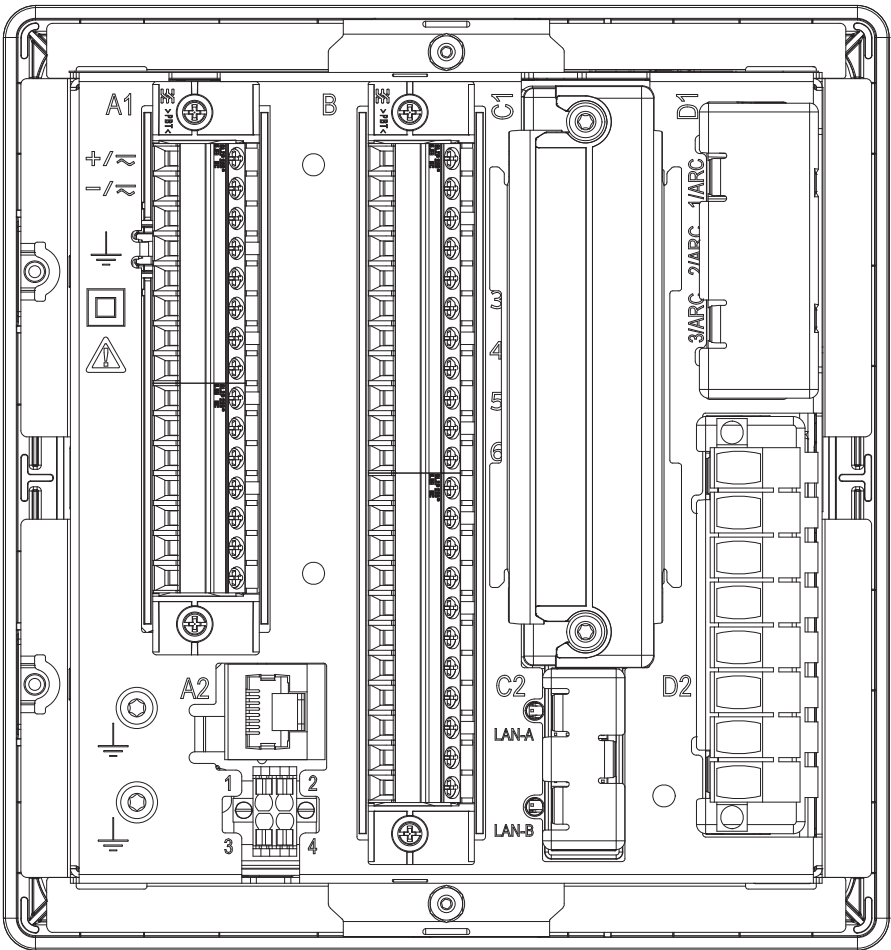


Figure 32: Rear view of the protection relay

7.2

Dimensions

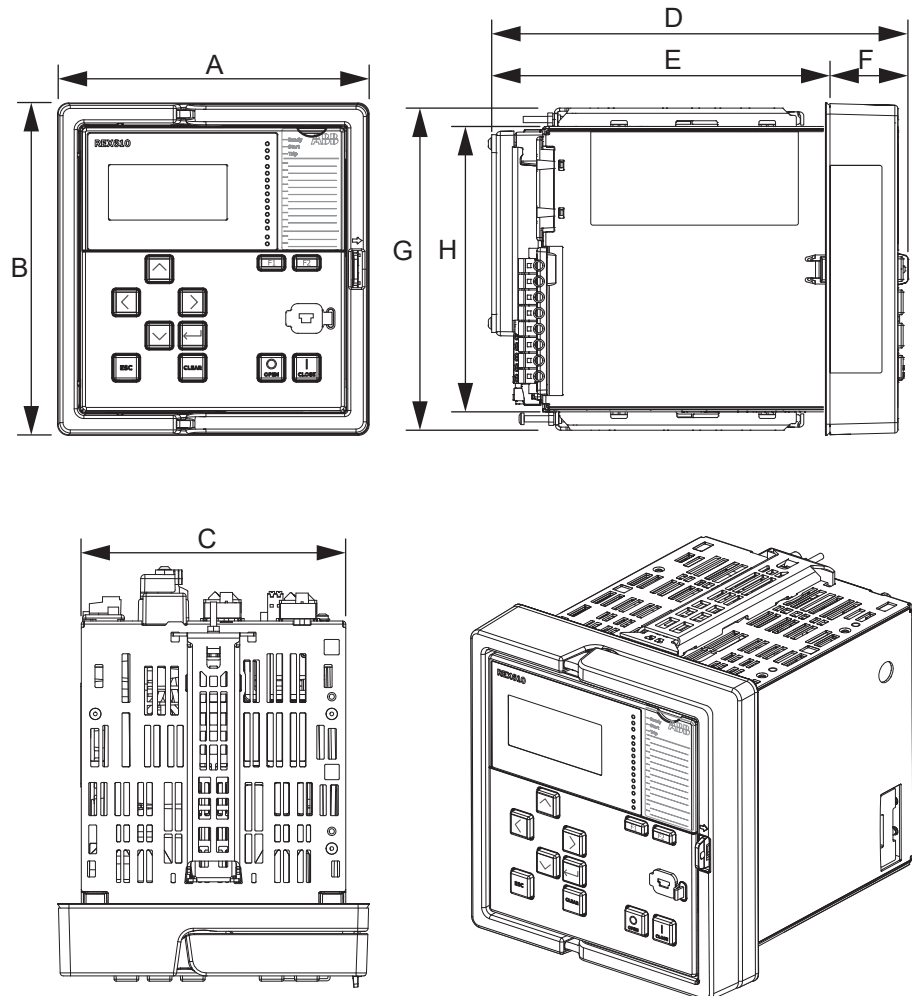


Figure 33: REX610 main dimensions

- A 149.5 mm (5.8858 in)
- B 159.5 mm (6.2795 in)
- C 127.5 mm (5.0196 in)
- D 202.8 mm (7.9842 in)
- E 163.6 mm (6.4409 in)
- F 39.2 mm (1.5433 in)
- G 155.5 mm (6.1220 in)
- H 137.5 mm (5.4133 in)

Table 7: *Dimensions*

Description	Value	
Width	Frame	149.5 mm (5.8858 in)
	Case	127.5 mm (5.0196 in)
Height	Frame	159.5 mm (6.2795 in)
	Case	155.5 mm (6.1220 in)
Depth	202.8 mm (163.6 mm + 39.2 mm) (7.9842 in)	
Weight	Protection relay with the four separate connectors	2.5 kg (5.5 lbs)

7.3

Enclosure class

Table 8: *Degree of protection of the protection relay*

Description	Value
Front side	IP 54
Left and right side	IP 20
Top and bottom	IP 20
Case inside ¹⁾	IP 20

1) Plug-in unit removed

Section 8 Accessories and ordering data

Table 9: Mounting accessories

Item	Order number
Wall mounting kit	2RCA055188A0001
19" rack mounting kit with cutout for one relay	2REA060349A0001
19" rack mounting kit with cutout for two relays	2REA060349A0002

Section 9 Glossary

AWG	American wire gauge
CT	Current transformer
EMC	Electromagnetic compatibility
Ethernet	A standard for connecting a family of frame-based computer networking technologies into a LAN
HMI	Human-machine interface
HW	Hardware
IEC	International Electrotechnical Commission
LCD	Liquid crystal display
LED	Light-emitting diode
LHMI	Local human-machine interface
RoHS	Restriction of hazardous substances
RS-485	Serial link according to EIA standard RS485
SI	Sensor input
STP	Shielded twisted-pair
SW	Software
USB	Universal serial bus
VT	Voltage transformer



ABB Distribution Solutions

P.O. Box 699

FI-65101 VAASA, Finland

Phone +358 10 22 11

abb.com/mediumvoltage