

Megger[®]



SFC250 **SmartFuse 250**

USER GUIDE

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Consultation with Megger

The present system manual has been designed as an operating guide and for reference. It is meant to answer your questions and solve your problems in as fast and easy a way as possible. Please start with referring to this manual should any trouble occur.

In doing so, make use of the table of contents and read the relevant paragraph with great attention. Furthermore, check all terminals and connections of the instruments involved.

Should any question remain unanswered or should you need the help of an authorized service station, please contact:

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This warranty does not cover wear parts, lamps, fuses, batteries and accumulators.

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For damage resulting from a violation of their duty to repair or re-supply items, Megger can be made liable only in case of severe negligence or intention. Any liability for slight negligence is disclaimed.

Since some states do not allow the exclusion or limitation of an implied warranty or of consequential damage, the limitations of liability described above perhaps may not apply to you.

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1 General Notes

Safety precautions This manual contains basic instructions for the commissioning and operation of the device / system. For this reason, it is important to ensure that the manual is always available to the authorised and trained operator. He needs to read the manual thoroughly. The manufacturer is not liable for damage to material or humans due to non-observance of the instructions and safety advices provided by this manual.

Locally applying regulations have to be observed!

Labelling of safety instructions The following signal words and symbols are used in this manual and on the product itself:

Signal word / symbol	Description
DANGER	Indicates a potential hazard which will result in death or serious injury if not avoided.
WARNING	Indicates a potential hazard which may result in death or serious injury if not avoided.
CAUTION	Indicates a potential hazard which may result in moderate or minor injury if not avoided.
NOTICE	Indicates a potential hazard which may result in material damage if not avoided.
	Serves to highlight warnings and safety instructions. As a warning label on the product it is used to draw attention to potential hazards which have to be avoided by reading the manual.
	Serves to highlight warnings and safety instructions that explicitly indicate the risk of an electric shock.
	Serves to highlight important information and useful tips on the operation of the device/system. Failure to observe may lead to unusable measurement results.

Working with products from Megger It is important to observe the generally applicable electrical regulations of the country in which the device will be installed and operated, as well as the current national accident prevention regulations and internal company directives (work, operating and safety regulations).

After working on the system, it must be voltage-free and secured against reconnection as well as having been discharged, earthed and short-circuited.

Use genuine accessories to ensure system safety and reliable operation. The use of other parts is not permitted and invalidates the warranty.

Operating staff The system may only be installed and operated by an authorised electrician. DIN VDE 0104 (EN 50191), DIN VDE 0105 (EN 50110) and the German accident prevention regulations (UVV) define an electrician as someone whose knowledge, experience and familiarity with the applicable regulations enables him to recognise potential hazards.

Anyone else must be kept away!

Declaration of Conformity (CE) The product meets the following security requirements of the European Council Directives:

- EMC Directive (2004/108/EC)
- Low Voltage Directive (2006/95/EC)
- RoHS Directive (2011/65/EU)

Use of LGPL software This product includes software components that are covered by the GNU Lesser General Public License (LGPL). You are hereby granted the right to request the source code of the following components licensed according to LGPL v.2.1, modify it and distribute it:

- Libxml 2.3.0
- GNU C Library 2.19
- Qt 5.4.0

Intended application The operating safety is only guaranteed if the delivered system is used as intended (see page 10). Incorrect use may result in danger to the operator, to the system and the connected equipment.

The thresholds listed in the technical data may not be exceeded under any circumstances.

Behaviour at malfunction of normal operation The equipment may only be used when working properly. When irregularities or malfunctions appear that cannot be solved consulting this manual, the equipment must immediately be put out of operation and marked as not functional. In this case inform the person in charge who should inform the Megger service to resolve the problem. The instrument may only be operated when the malfunction is resolved.

2 Technical description

2.1 Abbreviations

The following abbreviations are used in this manual:

APN	Access Point Name
CSV	Comma-separated values
DHCP	Dynamic Host Configuration Protocol (network communication protocol)
GPS	Global Positioning System
GSM	Global System for Mobile Communications
LAN	Local Area Network
M2M	Machine-to-Machine
LH	Niederspannungs-Hochleistungs-Sicherung (low-voltage high-power fuse)
SIM	Subscriber Identity Module
SMS	Short Message Service
SSID	Service Set Identifier (ID / name of a wireless network)
UMTS	Universal Mobile Telecommunications System
URL	Uniform Resource Locator
VPN	Virtual Private Network
WLAN	Wireless Local Area Network
WPA	Wi-Fi Protected Access (encryption method for a wireless network)

2.2 System description

Intended use The use of the SmartFuse 250 (SFC250) allows the low-voltage power supply to be safely disconnected and automatically restored in the event of faults and overload. The possibility to configure how often and how fast the power network is reconnected and to be informed about any events increases the reliability and stability of the power supply for consumers and minimises downtime.

To this end, the SFC250 is inserted into the fuse holder (sizes NH 2 and NH 3; fuse value ≤ 250 A) in place of the normal NH fuse link.

Single-phase installation



Three-phase installation



After successful installation and configuration the SFC250 behaves similar to a normal fuse element. Unlike a normal fuse, after being tripped, the SFC250 can switch the fused circuit back on if desired (after an adjustable waiting time).

The consumer does not, as is the case for classic fault location using high voltage, have to be completely disconnected from the power supply network. This is often not even possible, for example because the residents are not accessible, leading to a risk of property damage to the household appliances and building wiring. Instead, the pre-location of detected faults can be carried out under voltage directly with the internal location algorithm.

To pinpoint the location of a fault (using an acoustic ground microphone or the FaultSniffer), the SFC250 can be set to 'automatic reactivation' mode. With faults that can be triggered reliably, this mode causes continuous arcing at the fault location. To keep the load on the equipment and consumers as low as possible, automatic reactivation can be enabled and disabled directly from the suspected fault location via a mobile device (GSM connection) or the remote control SFC250-RC.

Alternative corrective actions, which require the use of a test van, can be scheduled with some lead time, because in most cases the SFC250 can maintain the supply of the fused network section for a certain period.

Features The SFC250 combines the following features in one device:

- Intelligent monitoring of the low-voltage network
- Minimised downtimes
- Cable fault location with households connected
- Safe installation in the distribution box
- Intuitive user interface
- Variable control via Touchscreen, Smartphone, Tablet, PC or remote control
- Monitoring of up to three phases with one supply module

Scope of delivery The delivery scope includes at least the following components:

Quantity	Component	Description	Item number
1 ... 3	Power module SFC250-PM	Fuse unit incl. Thyristor switch and measuring technology	1005787
1	Supply module SFC250-SM	Control and processing unit incl. communication interfaces	1005924
1	Remote control SFC250-RC	Incl. antenna and batteries	1006110
1	Connection cable, black/blue	1.5 m long line with alligator clip for connecting to the neutral conductor	2012921
1	Plug-in power adapter	Universal power supply (90 ... 264 VAC; 12 VDC / 2.08 A) for configuration of the device in the office	90025083
1	Transport case		90014263
10	Fuse	F1.25 A / 500 V, 6.3x32 mm, breaking capacity: 50 kA	90013082
1	Manual		85431

Check contents Check the contents of the package for completeness and visible damage right after receipt. In the case of visible damage, the device must under no circumstances be taken into operation. If something is missing or damaged, please contact your local sales representative.

Optional accessories The following optional accessories can also be ordered from the sales department if required:

Accessory	Description	Item number
Upgrade kit SFC 250-1-2-VS	To upgrade a single-phase set to a two-phase set	1010753
Upgrade kit SFC 250-1-3-VS	To upgrade a single-phase set to a three-phase set	1010754
"Fault location" option SFC 250-FL	Automatic fault location with display of the determined distance and external trigger output	90015840
SFC 250-CA	Adapter for connecting up to three power modules to a supply module	1009649
Additional emergency backup	Size: SQB1 (with flush end connections); rated breaking capacity: 200 kA (AC 700 V)	90007524
External GPS receiver SFC 250-GPS	Incl. cable (approx. 3 m)	2007960
SFC 250-HC	Robust and waterproof 7" tablet for remote control of the SFC250	1008357
Fork adapter SFC 250-GA	Adapter for narrow fuse bases	2009960

2.3 Technical data

The SFC250 is defined by the following parameters:

Parameter	Value
Triggering threshold	20 A ... 250 A (adjustable)
Reclose attempts	0 – 50
Waiting time until reclose	1 – 50 seconds
Operating temperature	-20°C to 50°C
Operating humidity	50% at 40 °C 90% at 30°C
Storage temperature	-25°C to 70°C
Memory for mains failure	Non-volatile event memory
Power supply Power and supply module	100 ... 240 V, 50 Hz / 60 Hz (direct tap at low-voltage distributor)
Power consumption	20 VA + 1 W/A load current

The power module is defined by the following parameters:

Parameter	Value
Load current	max. 250 A continuous current
Short-circuit/surge current	max. 9000 A
Internal fuses	F1: 1 x 800 A and F2: 1 x 1.25 A
Cut-out capacity	200 kA
Compatibility	Fuse holders NH 2 or NH 3
Display elements	LED for indicating the switching status
Weight	3 kg
Dimensions (W x D x H)	130 x 155 x 82 mm
Ingress protection rating (in accordance with IEC 60529 (DIN VDE 0470-1))	IP 20

The supply module is defined by the following parameters:

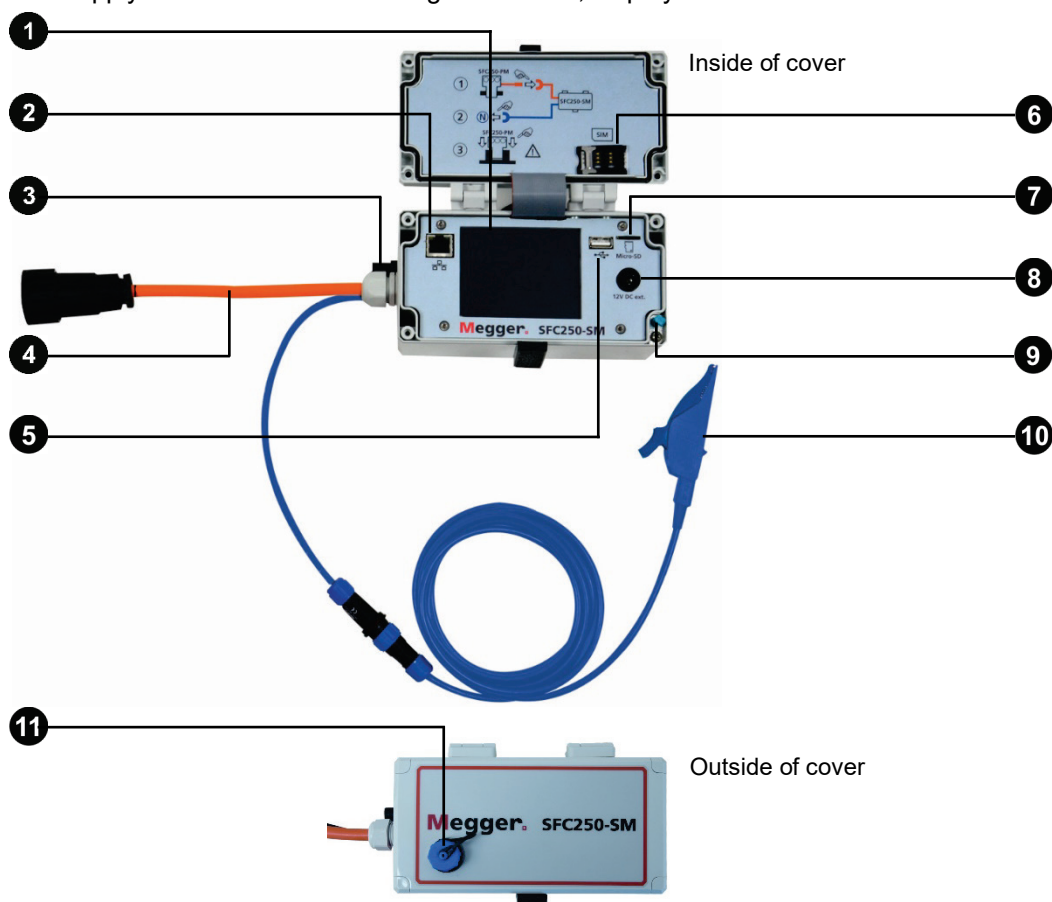
Parameter	Value
Display	Illuminated 3.5-inch colour touch screen (resistive)
Indicator elements	LED for indicating the switching state (when the cover is closed)
Memory	microSD card, 8 GB
Interfaces and connections	<ul style="list-style-type: none"> • GSM / 2G / 3G / LTE (SIM card required) • WLAN (IEEE 802.11x) with WPA2 safety standard • Ethernet • Radio interface (868 MHz) (communication with remote control) • USB 2.0 • GPS receiver (integrated) • Connection for external GPS receiver (optional) • Neutral conductor connection • Activatable trigger output (15 ... 20 V voltage pulse on fuse tripping or switch reclose) • Connection coupling for direct connection of a power module or for connection of the three-phase adapter
Weight	900 g
Dimensions (W x D x H)	160 x 103 x 97 mm
Ingress protection rating (in accordance with IEC 60529 (DIN VDE 0470-1))	IP 42
Protection class (in accordance with IEC 61140 (DIN VDE 0140-1))	II

The remote control is defined by the following parameters:

Parameter	Value
Batteries	2 x Mignon (AA)-Batterie Alkali-Mangan
Operating time	>10 hours with fresh batteries
Radio interface	868 MHz (communication with remote control)
Weight (incl. batteries and antenna)	200 g
Dimensions (W x D x H)	62 x 31 x 150 mm
Ingress protection rating (in accordance with IEC 60529 (DIN VDE 0470-1))	IP 40

2.4 Connections, controls and display

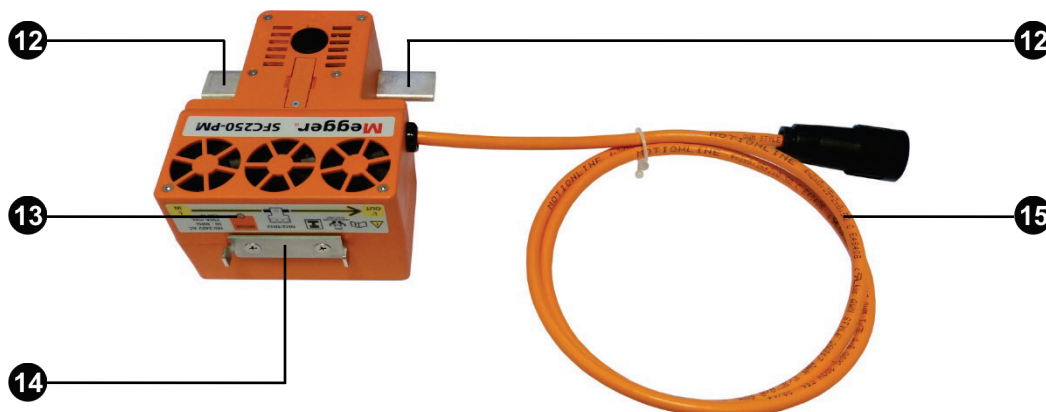
Supply module The supply module has the following connection, display and control elements:








Element	Description
1	Touchscreen
2	Ethernet port
3	Trigger output (see page 53)
4	Connection cable for direct connection to a power module or for connection to the three-phase adapter SFC 250-CA
5	USB port
6	SIM card slot
7	microSD card slot
<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> The microSD card contains the software needed for operation and may only be removed from the device and the content changed upon express instruction of an authorised service technician. </div>	

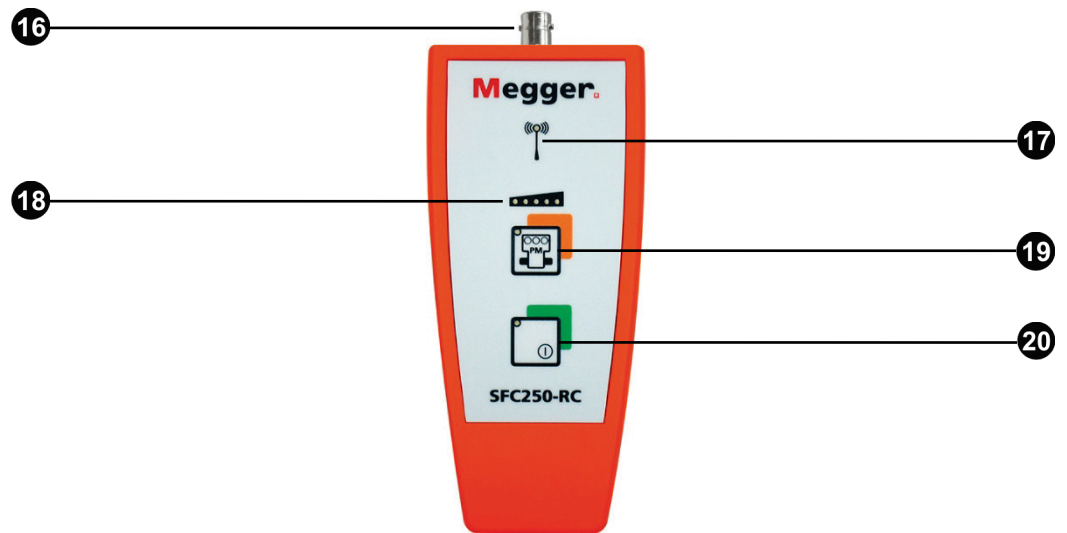
Element	Description
8	12 V DC input for connecting the supplied power supply
9	Stylus for operating the touch screen
10	Connection cable for connecting to the neutral or protective conductor
11	Socket for connecting the external GPS module (see page 53)

Power module The power module has the following connection and display elements:



Element	Description
12	Blade contacts
13	<p>Status indicator</p> <p> The power switch is switched off. (green)</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;">  <p>CAUTION Even when switched off, the power switch (thyristor switch) does not represent a galvanic isolation. For this reason, it must always be assumed that the outgoing cable is energised! With a voltage tester (for example, Duspol), the mains voltage can be measured on the cable at any time. Only under load (for example due to the load resistance integrated in the voltage tester), does the voltage drop to a much lower value.</p> </div> <p> The power switch is on and the protected circuit connected to the power network. (red)</p> <p> Ongoing start or update procedure. If the LED is white over a longer period, this may indicate firmware incompatibility (see page 75). (white)</p> <p> The supply module does not supply power (see page 75). (off)</p>
14	Grip lugs for attaching a fuse plug-in grip
15	Connection cable for direct connection to the supply module or to the three-phase adapter SFC 250-CA

Remote control The remote control features the following connection, display and control elements:



Element	Description
16	BNC coupling for connecting the antenna
17	LED for display of the wireless connection (is lit when wireless connection is established)
18	LEDs for display of the amount of current
19	Buttons for switching the power switch on and off, or for triggering a pulse in pulse mode. The integrated LED signals the status of the power switch the same way as the LED on the power module 13 (see previous page).
20	Buttons for switching the remote control on and off. The integrated status LED can assume the following states: <ul style="list-style-type: none"> ● Remote control switched on (green) ● Low battery power (red) ⊗ Remote control switched off (off)

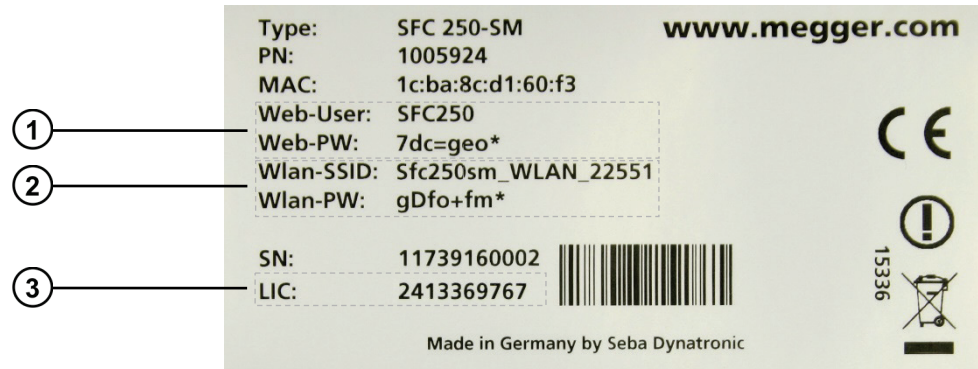
Connection adapter SFC 250-CA The connection adapter is used to connect up to three power modules to a supply module and has the following connection and display elements:



Element	Description
21	Connection cable to the supply module
22	Sockets for connecting up to three power modules
23	Power LED The LED lights up as soon as the power module connected to the PM-A socket has been installed in the control cabinet and provides mains voltage. From this moment on, the connected supply module is also supplied with voltage and automatically switched on.

2.4.1 Information plate

The information plate is attached to the backside of the supply module and provides the following information necessary for the operation of SFC250:




Element	Description
①	The factory preset login information for access via web browser
②	The factory preset name of the wireless network (WLAN SSID) and the password for authentication (WLAN PW)
③	[optional] License key for activation of the "fault location" option

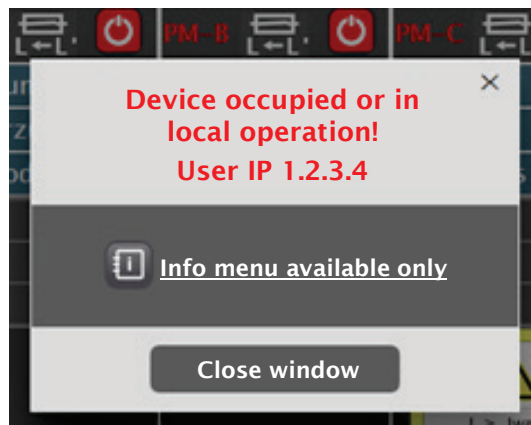
3 User interface

3.1 Access to the user interface

The user interface can be accessed both locally on the supply module and remotely (using a web browser). The latter requires a data connection between the SFC250 and the device (PC, smartphone or tablet).


In general, the software can be operated remotely almost like as it is operated on the device itself. However, for safety reasons, when the symbol  indicates in the status bar (see page 23) that the cover of the supply module is open, it is not possible to make changes to the settings.

A corresponding notification will appear if another person is already accessing the interface remotely or locally.



In this case, only information can be displayed but no changes can be made.

3.1.1 Local operation


Local operation is performed using the stylus  on the touch screen of the supply module and is in principle always possible as long as the supply module is supplied with voltage from the power module or the power supply unit.

3.1.2 Access through a web browser

The supply module provides various network interfaces, through which users can connect to the device and access the user interface.

In general, the user interface can be accessed from any internet-connected device (PC, smartphone or tablet) that has a JavaScript-capable web browser.

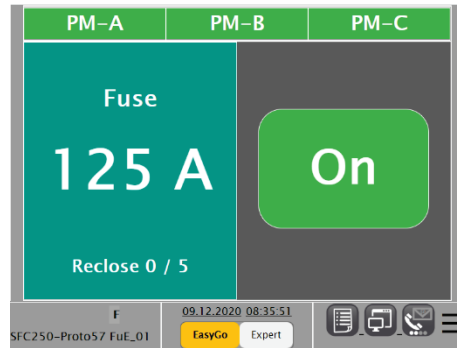
The following table provides an overview of the advantages/limitations of each network interface and the requirements and steps needed to obtain access:

	GSM connection	WLAN connection	LAN connection
When is the use of this network interface recommended?	Complete remote control over the internet, including notifications (see page 32)	Wireless access in the vicinity (for example, for configuration after installation)	Preliminary configuration in the office
Which requirements need to be fulfilled?	The activated supply module must be equipped with a suitable SIM card and accessible via the internet (see page 35)	The smartphone / tablet may be up to 15 m from the activated supply module	The activated supply module must be connected via the Ethernet port 2 with a network socket of the local network
What steps are necessary?	Connect to the wireless network of the supply module and enter the password. The factory preset network name and password can be found on the nameplate (see page 20) on the backside of the supply module.		
	Locally on the supply module, ensure that the stored network settings (see page 33) can be used to log on in the local network.		
	On the terminal device you are using, open a JavaScript-capable web browser.		
	Enter the IP address / URL of the supply module in the address line of the browser or call up the direct link in the portal of the commissioned service provider (see page 37).	Enter the IP address stored in the WLAN settings as URL in the address bar of the browser. If the browser attempts to connect to this IP over the Internet, you must disable the mobile data connection of your device	Enter the IP address of the supply module into the address bar of the browser. The IP address used by the network can be read locally on the supply module if necessary (see page 33).
 Depending on the connection type and quality, it may take up to two minutes before the login screen appears.			
<p style="text-align: center;">Log in with the corresponding login information. The factory preset login information can be found on the information plate (see page 20) on the backside of the supply module.</p>			

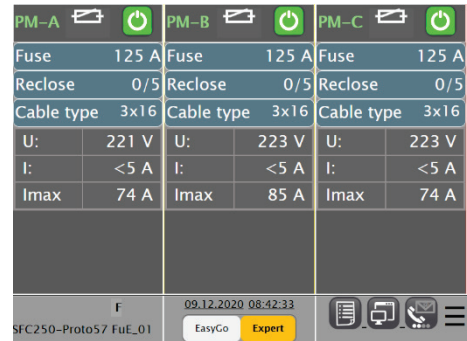
3.2 The main screen

EasyGo / Expert mode Depending on the mode you set, the main screen will appear in one of the following two views after you log in.

EasyGo mode
(from software version 2.438)



Expert mode



The main screen displays only a few items of essential information and allows all power modules to be switched on and off simultaneously.





This mode is particularly suitable for pre-configured devices, which only need to be put into operation safely and quickly by the technician on site.

The main screen provides detailed information about the measured values and events that have occurred and allows individual power modules to be switched on and off.

This mode is intended for experienced users who are familiar with the software and are working on locating a specific fault.

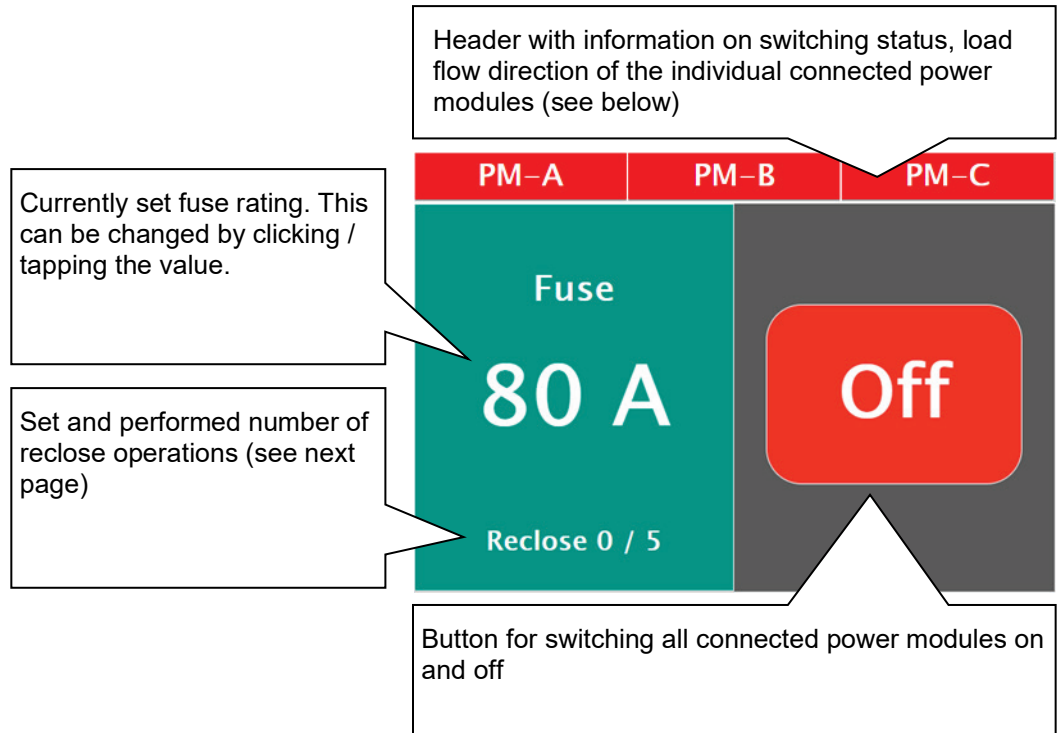
Status bar Regardless of the set mode, the status bar offers the following buttons and status information:

Symbol	Meaning
	Access to the menu.
	Cover of the supply module is closed. The device can be monitored and configured remotely using a web browser.
	The cover of the supply module is open. The device is probably being operated locally right now. Remote access to the user interface for a status query is possible. However, changing the settings can only be performed locally on the device. With the cover open, switching operations with the remote control also cannot be performed.
	The remote control is coupled with the supply module and activated. Switching operations and changes to the settings can only be made using the remote control or directly on the supply module (but not via remote accessing). If this icon is not visible, the remote control must first be paired and activated (see page 39) to be used.
	The supply module is not registered in the GSM network. This indicates that either the GSM signal strength is too weak or no SIM card is inserted and configured (see page 35).


Symbol	Meaning
	There is a GSM connection and therefore notifications can be sent via SMS. However, no mobile data connection could be established (necessary for e-mail delivery and remote access), indicating a very weak GSM signal strength or an access point (see page 35) that is not configured or configured incorrectly. The current GSM signal strength is indicated by the white dots (4 points = very good signal strength).
	The supply module is registered in the GSM network and there is a mobile data connection. The basic requirements for sending notifications (via SMS and e-mail) and remote access via the Internet (if configured accordingly) are present.
	Quick access to the event log (see page 57) where all past events, such as tripped fuses, are recorded.
	<p>Switch between Expert and EasyGo mode. The active mode is highlighted in orange.</p> <p>After switching to Expert mode, the actual operating mode (Monitoring or Fault location) must be selected (see page 45) in a second step.</p>
M F	This icon indicates whether Fault location mode (F) or Monitoring mode (M) has been enabled in the device settings (see page 45).
<u>16.11.2020 15:25:41</u>	Date and time display with a direct link to the corresponding settings menu (see page 29).

3.2.1 Main screen layout in EasyGo mode

Screen layout In EasyGo mode, the main screen provides the following buttons and information:



Information in the header The designation in the header (**PM-A**, **PM-B** and **PM-C**) is used to identify the power modules and corresponds to the designation on the sockets of the three-phase adapter. The colour indicates the current status of the circuit breaker:

Symbol	Meaning
<div style="background-color: green; color: white; padding: 2px; display: inline-block;">PM</div> (green)	The power switch is switched off.
	<p>CAUTION</p> <p>Even when switched off, the power switch (thyristor switch) does not represent a galvanic isolation. For this reason, it must always be assumed that the outgoing cable is energised!</p> <p>With a voltage tester (for example, Duspol), the mains voltage can be measured on the cable at any time. Only under load (for example due to the load resistance integrated in the voltage tester), does the voltage drop to a much lower value.</p>
<div style="background-color: red; color: white; padding: 2px; display: inline-block;">PM</div> (red)	The power switch is on or will be switched on again within a short time. The protected circuit connected to the supply network or can be reconnected at any time.

Automatic reclose status If automatic reclose (see page 41) has been activated for one or more of the connected power modules, their status is signalled according to the scheme **Reclose XX/YY**, whereby the following agreements apply:

Display	Meaning
XX	Number of reconnections made so far. If several power modules are connected, the value of the power module that has had to be reconnected the most often is displayed.
YY	Configured number of maximum permissible reclose operations. Once a power module reaches this number, it is no longer switched on. However, the remaining power modules remain active.

3.2.2 Main screen layout in Expert mode

Screen layout In Expert mode, the main screen contains the following buttons and information:

The screenshot shows a three-column interface for power modules PM-A, PM-B, and PM-C. Each column displays a status bar with a power icon, a table of settings (Fuse, Reclose, Cable type), and a table of readings (U, I, I_{max}). PM-B's I_{peak} reading is highlighted in red at 167A. A notification icon is present at the bottom of the PM-B column.

Header with information on switching status, load flow direction of the individual connected power modules (see next page)

Current protection settings (tap to open the respective menu):

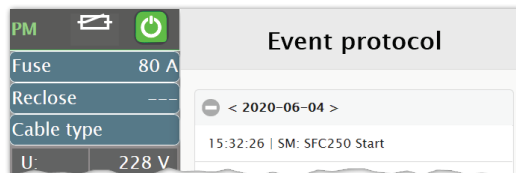
- Shutdown limit
- Reclose operations (see next page)
- Specified cable type

Current readings:

- U/I:** RMS values averaged over the last 10 periods
- I_{max}:** Maximum current measured during operation (RMS)
- I_{peak}:** Peak value of the current in the event of a fault

Notifications about thresholds being exceeded, shutdowns and other problems





If only one power module is connected directly to the supply module without using the adapter, it will always be displayed in the left-hand column and the two remaining columns will be used to display the event log.




Information and functions in the header

The designation in the header (**PM-A**, **PM-B** and **PM-C**) is used to identify the power modules and corresponds to the designation on the sockets of the three-phase adapter. After clicking/tapping on the designation, the status LED of the respective power module flashes for about 5 seconds, which enables a reliable visual identification of the power modules installed in the control cabinet (for example, in the case of tangled connecting cables).

The symbols next to the designation signal the current status of the power switch and can be used to switch it on and off:

Symbol	Meaning
 (green)	The power switch is switched off. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  <p>CAUTION</p> <p>Even when switched off, the power switch (thyristor switch) does not represent a galvanic isolation. For this reason, it must always be assumed that the outgoing cable is energised!</p> <p>With a voltage tester (for example, Duspol), the mains voltage can be measured on the cable at any time. Only under load (for example due to the load resistance integrated in the voltage tester), does the voltage drop to a much lower value.</p> </div>
 (red)	The power switch is on and the protected circuit connected to the power network.
 (red)	The power switch is switched off, but can be automatically reclosed at any time due to the activated automatic reclose feature.

The respective power switch can be switched on or off by pressing the  /  button.

Automatic reclose status

The display in the **Reclose** line depends directly on the configuration (see page 41) of the individual power modules and can take on the following states:

Display	Meaning
---	Automatic re-activation has been deactivated for this power module.
XX/YY	This power module is allowed to automatically reclose up to YY times and has already done so XX times.
∞	This power module can automatically switch back on an unlimited number of times.

Flashing letters indicate that a step-by-step adjustment of the fuse rating after automatic re-activations (for a maximum of five 5 re-activations) has been specified for this power module (see page 41).

4 Configuration



If the device has been configured before, it does not need to be reconfigured from scratch every time. Normally, only the fuse settings and the cable data need to be checked and adapted (see page 41) in preparation of a new deployment while the device settings and the communication settings (see following pages) remain the same.

Making preparations It is recommended to prepare the SFC250 for the upcoming usage in advance in the office so that this does not have to be done in bad weather or under time constraints directly on site.

To this end, the supplied power cable must be used to create a connection between an outlet and the 12 V DC input **8** of the supply module.

Then, locally or using a web browser, the interface can be accessed (see page 21) and the software preliminary configured for the intended application.



4.1 Device and communication settings


4.1.1 Defining basic settings

Using the **☰** → **Settings** → **Basic settings** menu item, the following basic settings and adjustments can be defined:

Parameter	Description
Status	
Device name	Device name, which can also be modified when necessary
Serial number	Serial number of the supply module, which should also be provided when contacting customer service
License key	The license key entered for activation of the "Fault location" option.
Date/Time/Language	
Date/Time	Fields for manually entering the date and time in the displayed format.
Date verification (Ein/Aus)	Enables/disables the automatic date check prompt, which appears whenever the supply module is put back into service for the first time after more than ten days.
Date/Time (lokal/GPS)	If GPS reception exists, the GPS setting is automatically activated. In this case, the time and date are automatically read from the GPS signal and cannot be entered manually.
Ext. Sync (On/Off)	When this switch is active, the time is automatically synchronised with the remote devices that are accessing the user interface.
Time zone	The time zone in which the device is currently located
Language	Language of the user interface

Parameter	Description
Service	This password-protected area is only accessible to authorized service staff and only locally on the supply module.
Tools	
Reboot SFC250-SM	Forces the supply module to restart. The power modules, on the other hand, are not restarted and remain in their current switching state.
System reset	Forces the connected power modules and the supply module to restart. This measure could be helpful, for example, if one or more power modules are no longer responding to the switching operations. Resetting the entire system causes a voltage interruption of approximately one minute in the monitored circuits. Depending on the active mode (see page 45), the circuit breakers in the power modules may have to be switched on again manually after the restart.
Save properties	Saves the current configuration so that it can be reloaded at any time. This enables a frequently used standard configuration to be stored in the internal memory. Only one configuration can be saved at a time. If a new save is made, the previously saved configuration data is overwritten.
Restore properties	Loads the saved configuration (see above) as the current configuration.
Load factory settings	Resets all settings back to the original factory settings.
Calibrate touch screen	Starts the procedure for touch-screen calibration (see page 73)

Parameter	Description
<p>Firmware update SFC250-PM</p>	<p>Starts a manual software update of the connected power modules. This step is not usually necessary because all of the connected power modules are updated when the firmware of the supply module is updated (see page 67).</p> <p>This menu item should therefore only be used if the power module has failed to update automatically and the supply module and power module are running different firmware versions as a result. In this case, the status indicator 13 on the power module will be lit white after the module is switched on.</p> <p>The files needed for the update are loaded from the internal memory of the supply module and do not need to be provided by a USB flash drive. After pressing the button, the update starts immediately and is indicated using the following symbol in the main screen:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Experte-Modus</p>  </div> <div style="text-align: center;"> <p>EasyGo-Modus</p>  </div> </div> <p>The installation may take several minutes. Do not disconnect the supply module from the supply voltage or the power module during installation!</p> <hr/> <div style="border: 1px solid black; padding: 5px;"> <p>i The software can only be installed manually if the power module is connected directly to the supply module. This means that, if the software needs to be installed manually on multiple power modules, installation must be carried out individually, one after the other, for each power module.</p> </div> <hr/>
<p>Import / Export VPN configuration</p>	<p>Import / Export of a VPN configuration (see page 35)</p>

When changes have been made to the basic settings, they must be saved using the  button.

4.1.2 Modifying the notification and network settings

4.1.2.1 Modifying the notification settings



SMS or E-mail notifications can only be sent when the supply module has been configured for mobile data communication (see page 35) and is connected with a cellular network or cellular data network (see page 23).

Using the menu → **Settings** → **Communications** → **GSM** → **Notifications**, the following notification settings can be defined (also accessible by clicking on the communications symbol in the main screen):

Parameter	Description
Notification in case of warning threshold crossing?	Using this drop-down menu, you can define how often a notification should be sent when a warning threshold is violated.
Send notification for the following events:	Using these checkboxes, you can specify the events for which a notification should be sent.
SMS recipient number 1 / 2	Mobile phone numbers to which notifications will be sent by SMS. The country code does not need to be used as long as the number to be notified is in the same country. In this case, the numbers must be entered with a leading 0 (for example, 0172 *****). If the number is entered with country code, a + must be used as a prefix (for example, +49172 *****). There must be no spaces or special characters between the individual digits.
Send test SMS	Using this button, a test message (SMS and/or E-mail) can be sent to the specified phone numbers / E-mail addresses as a way to check for correct entry of the numbers and to also test the GSM connection.
E-Mail 1 / 2	E-mail addresses to which notifications will be sent. In order to be able to send notifications to the specified email addresses, the data of an SMTP outgoing mail server must be specified (see page 38).

The settings must then be saved using the button.

4.1.2.2 Modifying WLAN and LAN settings

Modifying WLAN settings Using the → **Settings** → **Communication** → **WLAN** menu, the following settings of the wireless access point can be modified:

Parameter	Description
Network ID	Network name (or SSID) that is displayed when the device searches for wireless networks.
Password	Password that authorises the connection to the wireless network.
IP address	IP address that opens the user interface in the browser with an active WLAN connection (see page 22). Default: 10.0.0.22
Subnet mask	Subnet mask of the wireless network. It is recommended to keep the default: 255.255.255.0.


The settings must then be saved using the button.



A restart is necessary for the changes to the WLAN settings to take effect!
When changes are made to the name and/or password of the WLAN network, the data on the information plate (see page 20) on the backside of the supply module are no longer applicable. It may therefore be necessary to inform other colleagues about the change.

Modifying LAN settings Using the ☰ → **Settings** → **Communication** → **LAN** menu, the network adapter settings can be modified:

Parameter	Description
Static / DHCP	<p>Because most local networks automatically distribute the network settings to the clients, it is recommend that you select the setting DHCP. After a successful registration in the network, the provided settings (including the IP address at which the device is accessible) are displayed in the fields below.</p> <p>If the network to which the supply module is connected does not support DHCP, the switch must be set to Static and the network settings must be adapted to the configuration of the network.</p>
IP address	<p>IP address at which the device is available within the network.</p> <p>When a fixed IP address is entered manually, it must be ensured that this address is not already assigned to another computer.</p> <p>Default: 192.168.1.22</p>
Subnet mask	<p>Subnet mask of the local network.</p> <p>Default: 255.255.255.0</p>
Broadcast	<p>Broadcast address of the local network.</p> <p>Default: 192.168.1.255</p>
Gateway	<p>Address of the standard gateway computer (router) of the local network.</p> <p>Default: 0.0.0.0</p>

The settings must then be saved using the  button.

4.1.2.3 Ensuring Internet accessibility



Due to the diverse solution approaches and network types, within the scope of this section actions can only be described in detail which are to be undertaken on the SFC250 itself.

When adaptations to the network configuration are necessary and when selecting a suitable service provider, you should seek the assistance of your IT administrator.

Available technical solutions To connect the supply module with the cellular network and to make accessing from the Internet possible, the following options are available:

Complete solutions from a single supplier

Various service providers, such as the German company mdex AG, have specialised in making industrially used systems and devices accessible via the Internet. These service providers offer all necessary services – from compatible SIM cards, in-house access points and IP services to the required data security – in a one-stop solution.

VPN connection over an OpenVPN server

In the event that in-house SIM cards are available or if the previously described solution is not appropriate for other reasons, the connection to the supply module can also be established through a secure VPN tunnel. The OpenVPN server required for this must either be rented from a VPN service provider or made available through an in-house IT department.

Inserting the SIM card and defining the access point

In the SIM card slot **6** of the supply module, only data-compatible and M2M communication suitable SIM cards should be inserted that meet the following requirements:


- Format: Mini SIM
- Enabled for data connection via 2G, 3G or 4G (LTE)
- Provider with good network coverage



The monthly data volume used by status queries and sending notifications depends greatly on the device settings and the user behaviour and can rise to a few gigabytes. Data that exceeds the volume included in the package may be charged at an expensive rate by the mobile operator. For this reason, it is recommended that you select a data plan with a high included volume (for example, 5 GB) and modify this selection later based on the actual consumption, if necessary.

Proceed as follows to prepare the supply module for data communication via the cellular network:

Step	Action
1	Insert a suitable SIM card into the SIM card slot 6 of the switched-off supply module.
2	Use the supplied power cable to create a connection between an outlet and the 12 V DC input 8 of the supply module.
3	Open the menu ☰ → Settings → SIM card PIN code .

Step	Action
4	Enter the card PIN in the field PIN and confirm the input with OK . Often, the PIN code query is deactivated for the specially designed SIM cards for M2M usage. For reasons of security however, we recommend activating the PIN query using the switch Switch SIM Card PIN code on/off .
5	Open the menu ☰ → Settings → Communication → GSM → Access point .
6	Activate Mobile data .
7	Under Login , Password and APN , enter the access point data into the mobile data network. If you have selected the SIM card of an All-In-One service provider with in-house access points (see above), you must enter the data made available by this provider here. Otherwise, you need only enter the access point of your network provider (e.g. Web.vodafone.de) and you can dispense with the entering of Login and Password .
8	Save the settings using the button  and then also as basic settings (see page 29).
9	To ensure that the SFC250 was able to log into the cellular network, you should send a test SMS (see page 32).

Configuring the OpenVPN client (optional)

If the access to the user interface is to occur over a VPN connection, an OpenVPN server must be rented or set up and configured for the intended purpose by the server provider or the IT department, respectively.

When doing this, the configuration files of the server must be adapted so that each supply module logging on as a client is always assigned the same fixed IP. When configuring the server, the following files must also be created and made available which are required for the activation and configuration of the pre-installed OpenVPN client on the supply module:


- Certificate file (*.cert) for identification of the client on the server
- Key file (*.pem) with the required keys for the communication between client and server
- Configuration file (*.conf) with the essential parameters

In addition, a text file must be created with a suitable editor along the lines of the following example, which contains the login information (login name in 1st line and password in 2nd line) for logging onto the server:



The file must then be saved as a text file with the suffix *.login.

Proceed as follows to activate the OpenVPN client and import the configuration files onto the supply module:

Step	Action
1	Copy the 4 files mentioned above into the <code>\FIRMWARE\openvpn</code> directory of a USB flash drive.
2	Insert the USB flash drive into the USB port 5 of the supply module.
3	Open the menu ☰ → Settings → Communication → VPN .
4	Call up the menu item Import VPN configuration . <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">  Using the menu item Export VPN configuration, the files can also be exported back onto the inserted USB flash drive if necessary for transfer to another device. </div>
	Result: The files are copied onto the supply module. After the copying is completed, a beeping tone sounds.
5	Remove the USB flash drive.
6	Activate VPN connection .

Access to the user interface The way in which the user interface of the SFC250 can be accessed with an Internet-compatible device differs according to the technical solution selected.

If the access point in the cellular network and the fixed IP address is made available by a specialised service provider, the IP / URL for accessing the device must also be retrieved from that provider. Often, the access occurs over the service provider’s password-protected portal containing corresponding direct links.


With the VPN solution, it must first be ensured that the device used can create a secure VPN connection to the supply module. This requirement is met if the end device is a part of the network connected with the VPN gateway (e.g. workstation PC in the company network) or the device itself has been logged on as a client to the VPN server. To call up the user interface, only the IP address assigned to the supply module then needs to be entered in the address line of the browser.

4.1.2.4 Specifying the outgoing mail server

To send email notifications, the data of an SMTP server (used by mail providers to send mail messages) must be entered. An existing or specially set-up account with a public email provider can also be easily used for the sending of emails. The address and port of the SMTP server can usually be found very easily in the Internet.

The data of the SMTP server can be entered under the menu item **Settings** → **Communication** → **Email service**:






Parameter	Description
IP address of mail server	IP address of the SMTP server If only the URL of the server is known, the IP address can be determined with the command nslookup (followed by the URL of the server) in the Windows console (e.g. <code>nslookup smtp.gmail.com</code>).
Port	Port of the SMTP server
Login	Login of the email account used
Password	Password of the email account used


The settings must then be saved using the  button.

4.1.3 Pairing the remote control

Coupling the remote control In order to use the remote control for switching the power switch on / off, it must be coupled with the supply module. **For reasons of safety, the coupling can only be performed directly on the supply module.** Proceed as follows:

Step	Action
1	If not already installed, insert two mignon-type batteries (AA) in the remote control. However, do not switch the remote control on yet!
2	Open the user interface locally on the supply module and open the page SFC250-RC . Result: The dialogue for managing the remote control opens.
3	Call up the menu item Couple a SFC250-RC . Result: The message Perform RC pairing appears in the Status line.
4	Take the remote control and move about 2 meters away from the supply module.

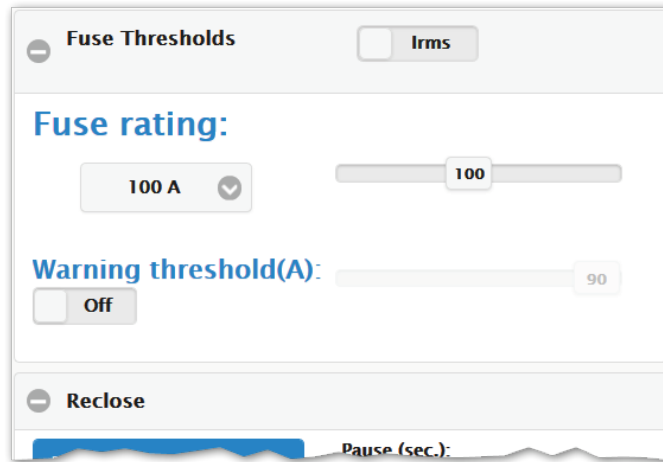
Step	Action
5	<p>Press and hold the  button on the switched-off remote control. Now press the  button briefly and let it go again directly. Then release the  button as well.</p> <div data-bbox="738 443 1241 808" style="text-align: center;">  </div> <p>Result: The beginning of the pairing process is acknowledged at the supply module with a signal tone. All three LEDs should light up on the remote control. After the pairing has been successfully completed, the line Status displays the message SFC250-RC active and the serial number of the paired remote control. The remote control can now be used (see page 47). The pairing also remains active after a change of location of the supply module and is only canceled when another remote control is connected to the supply module.</p>
6	<p>Turn on the remote control by briefly pressing the  button, if you do not want to use it directly after pairing.</p>

 One and the same remote control can in principle be paired with several supply modules. However, it is imperative to ensure that the distance of the supply modules from each other is large enough (> 500 m), so as not to accidentally cause switching operations on the wrong power module!

4.2 Fuse parameters and cable data

4.2.1 Configuring the shutdown and reclose behaviour

The relevant individual parameters for disconnecting and reclosing the power modules can be defined in the menu → **Settings** → **Fuse** (they can also be accessed by clicking on the fuse value in the main screen).




The operating parameters can also be adapted during operation at any time, either directly on the supply module or remotely.

A change to the parameters does not influence the switching state of the power switch.

The following parameters are configurable:

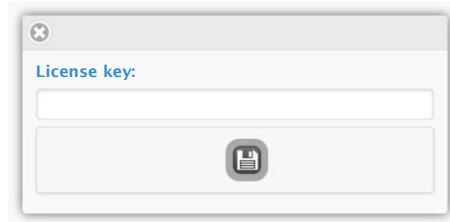
Parameter	Description
Fuse thresholds	
Irms I²t	Switching behaviour of the fuse. Irms The fuse trips as soon as the set fuse rating is exceeded. I²t In this setting, the tripping behaviour resembles a melting integral which results in a reduced sensitivity of the fuse to short-term overloads (e.g. input surge current spikes).
Fuse rating	Here the rated current is to be set according to the replaced fuse. When the current set here is exceeded for a certain amount of time (depending on the switching behaviour), the power switch automatically turns off and disconnects the protected LV distribution line from the supply network.
Warning threshold	Current value above which a warning is displayed in the main menu and, depending on the notification settings (see page 32), when desired a notification is sent. The warning threshold monitoring can be activated/deactivated via the switch.

Parameter	Description																					
Reclose PM-A PM-B PM-C Count (x) Pause (sec.)	<p>Activate/deactivate automatic reclosing for the connected power modules individually</p> <p>Number of automatic reclosing operations until final shutdown.</p> <p>If this setting is changed during operation, the counter for the previously performed reclosing operations is reset.</p> <p>The maximum value of 200 reclosing operations should only be set during fault pinpointing. In this setting the pre-location algorithm is deactivated.</p> <p>Wait time in seconds after which the power switch turns back on independently.</p>																					
Reclose-Step	<p>If this switch is activated, it is possible to specify modified fuse ratings for operation after the first five reclose operations.</p> <p>After activating the feature, all sliders are set to the current fuse rating and can then be varied.</p> <div data-bbox="826 922 1362 1368" data-label="Image"> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>Fuse rating</td> <td>80</td> <td>A</td> </tr> <tr> <td>Reclose 1</td> <td>80</td> <td>A</td> </tr> <tr> <td>Reclose 2</td> <td>85</td> <td>A</td> </tr> <tr> <td>Reclose 3</td> <td>90</td> <td>A</td> </tr> <tr> <td>Reclose 4</td> <td>100</td> <td>A</td> </tr> <tr> <td>Reclose 5</td> <td>110</td> <td>A</td> </tr> </tbody> </table> </div> <p>If the set number of reclosing operations exceeds the number of steps, the value set under Reclose 5 is maintained until the final shutdown. After that, the fuse value is reset to the initial value.</p>	Parameter	Value	Unit	Fuse rating	80	A	Reclose 1	80	A	Reclose 2	85	A	Reclose 3	90	A	Reclose 4	100	A	Reclose 5	110	A
Parameter	Value	Unit																				
Fuse rating	80	A																				
Reclose 1	80	A																				
Reclose 2	85	A																				
Reclose 3	90	A																				
Reclose 4	100	A																				
Reclose 5	110	A																				

The settings must then be saved using the  button.

4.2.2 Entering cable data and adjusting the fault location settings

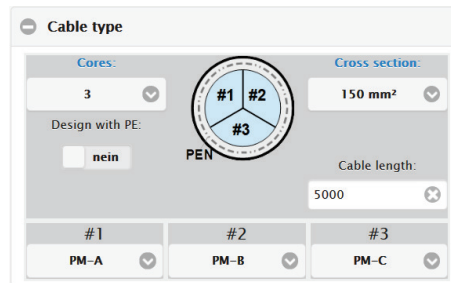
Unlocking the menu Cable data entry and location settings can be made in the **☰ → Settings → Fault location** menu. If the license key required to activate the “fault location” option has not yet been entered, access to the menu is blocked and instead the following screen appears:



The license key to be entered can be found on the nameplate (see page 20) on the back of the supply module. If the license was purchased directly with the device, it can be ordered at any time (see page 10).

After entering the license key, it must be saved using the button. The basic settings should then also be overwritten (see page 29) to save the license key permanently.

Entering the cable data The fault location algorithm needs the cable data to calculate the distance to the fault location when a power switch switched off. The data can be entered through the **Cable type** mask:



The following cable parameters can be configured:

Parameter	Description
Number of cores	Total number of cable cores incl. PE and N conductors.
Cross section	Conductor cross-section. In case of a four-core cable, it is also necessary to specify the design of the PEN conductor via a second drop-down menu. normal Same cross-section as the phase cores N reduced Reduced cross-section, e.g. 3x95/50 N(A)KBA Return conductor also via shield
Design with PE	This switch can be used, if a three-core cable is selected, to specify whether the cable is single-phase or three-phase.



Parameter	Description
#1 #2 #3	If more than one power module is connected, these drop-down menus can be used to assign the phases and power modules according to the actual installation situation. This means that, in the event of a fault, conclusions can quickly be drawn regarding the affected phase without needing to open the switch cabinet.
Return conductor	This switch can be used, if a five-core cable is selected, to determine whether the return conductor cable of the supply module is connected to the N conductor or the PE conductor.
Cable length	Length of the cable or cable section respectively.

For homogeneous cable systems the cable type and cable length have only to be specified once using the mask described above. By contrast, in case of a mixed cable you have to proceed as follows:

Step	Action																									
1	Tick the Cable sections checkbox under Expert settings .																									
2	In the now available Cable section input mask, click on the + button repeatedly until the number of cable sections equals the actual number. <div data-bbox="758 981 1220 1249" data-label="Image"> <table border="1"> <thead> <tr> <th>No.</th> <th>Cores</th> <th>m</th> <th>mm²</th> <th>N</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td>5000</td> <td>150</td> <td>--</td> </tr> <tr> <td>2</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> </tr> <tr> <td>3</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> </tr> <tr> <td>4</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> </tr> </tbody> </table> </div> <p>If you accidentally created too many cable sections, you can remove needless sections by clicking the – button.</p>	No.	Cores	m	mm ²	N	1	3	5000	150	--	2	---	---	---	---	3	---	---	---	---	4	---	---	---	---
No.	Cores	m	mm ²	N																						
1	3	5000	150	--																						
2	---	---	---	---																						
3	---	---	---	---																						
4	---	---	---	---																						
3	Specify the details of the first section (starting from the distribution cabinet) in the Cable section input mask.																									
4	Click on the 1 button to assign these details to the first section.																									
5	Repeat steps 3 to 4 for the remaining sections.																									

Configuring trigger events for connected measurement equipment


If a suitable measuring device (for example, a reflectometer) has been connected to the trigger output **3** of the supply module, then you can use the **Trigger** input mask to define at which points in time the measuring device will be triggered by the supply module with a voltage pulse between 15 and 20 V:


Parameters	Description
PM-A PM-B PM-C	Selection of the power modules whose switching operations entail triggering of the connected device.
	Triggering always occurs when the power switch in one of the activated power modules is switched on.
	Triggering always occurs when the power switch in one of the activated power modules is switched off manually or due to a fault current. Caution: In this setting, triggering also takes place if the phase control pre-measurement causes the power switch to open briefly. This can only be safely ruled out by deactivating the pre-measurement.

Configuring the expert settings

The following modes and functions can be enabled and disabled under **Expert settings**:

Parameter	Description
SFC Mode	Switching between the following operating modes: Fault location (default): The power module circuit breakers are always switched off when the system is restarted. Generally speaking, you should always work in this mode if you are trying to locate an acute fault that can be triggered reliably in a short measuring operation. In this scenario, loss of the supply voltage is usually caused by the power module being deliberately unplugged. Automatic reactivation is therefore undesirable or even dangerous. Monitoring : After a restart of the supply module, the power module circuit breakers switch to the state before the last switch-off. If switched off for longer than an hour, this feature is disabled and the system automatically switches to Fault location mode on restart to avoid an unexpected connection during a subsequent reinstallation. Monitoring mode is particularly suitable for monitoring intermittent cable faults. When the supply module is restarted, which could be caused by a short-term busbar failure, for example, the monitored phase output is immediately reconnected after the supply voltage returns. EasyGo : In this mode, the circuit breaker behaves in the same way as in Fault location mode. However, only essential information and functions are displayed (see page 23) on the main screen and all connected power modules are switched on or off together. This mode should be activated if the configuration has been made in advance in the office and the device only needs to be put into operation safely and quickly by the technician on site.
Detect transient	Short-term exceeding of the fuse threshold does not necessarily force the fuse to trip. However, in order for these transients to be detected as an event and signalled on the main page, this checkbox must be activated.
Cable sections	This box must be ticked in order to enter the individual cable sections of mixed cable lines (see previous page).

Parameter	Description
Averaging	<p>If this box is ticked, if the fuse trips several times in succession due to faults, an average value is generated from all the previously calculated fault distances and displayed as the fault distance. In most cases, this results in higher accuracy.</p> <p>Under certain conditions (e.g. if a fault keeps changing), this can actually make the calculated values implausible or cause them to change constantly and erratically. Resetting the data of the measurement algorithm by going to the menu  → and pressing the Reset button under Settings → Fault location can often solve this problem.</p>
Phase control pre-measure	<p>If this box is ticked, a preliminary test is carried out when the power switch is switched on manually following installation (but not following an automatic reactivation) in order to determine the expected short-circuit current.</p> <p>In this case, the voltage is connected as the phase increases before the zero crossing (phase control) in order to limit the potential residual current in the event of a possible tripping operation. If the SFC250 trips during this preliminary test lasting approx. 80 ms, the expected residual current can be interpolated. If this is more than 6000 A, which could be the case with very low-resistance faults, for example, a safety warning about the potential destruction of the internal fuse appears. The switch-on process can then be cancelled or continued by the user.</p> <p>If it is an intermittent fault that does not trigger during the preliminary test, the test does not provide an indication of the expected residual current. Destruction of fuse [F1] when the fault is triggered cannot be completely ruled out!</p>

Saving the settings After the cable data have been entered and the fault settings have been made, the changes must be saved via the  button.


5 Using the remote control

Purpose With the aid of the remote control, the power switch in the power module can be opened and closed in close range (150 m with unobstructed view) at the press of a button, without having to open the distribution cabinet or log on via remote accessing.

In addition, the status LED **19** will permanently indicate the switching status of the power switch as soon as the activated remote control is within wireless range.

Requirements To perform switching operations using the remote control, the remote control must be connected to the supply module first (see page 39).


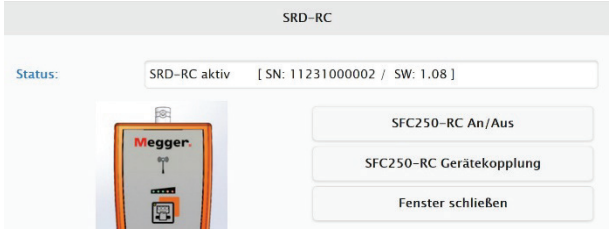
Limitations If the connection is multi-phase and there are multiple power modules, **only the switching status of the PM-A power module can be queried and changed.**

Activating/deactivating the remote control Immediately after pairing, the remote control is activated on the software side and remains so until it is manually deactivated in the software. The  symbol at the bottom of the user interface indicates that the remote control is switched on.


A permanently activated remote control has the advantage that it can be switched on and used directly if required. However, in order to avoid parallel and conflicting operator actions, **operation and configuration via remote access is deactivated when the remote control is activated.**


If you do not want to give up the option of remote configuration, you can also disable the remote control by default. When needed, however, you will need to reactivate it before using it.

To enable/disable the remote control, proceed as follows:

Step	Action
1	<p>Call up the page  → SFC250-RC locally on the device or via remote accessing (only possible if remote control is deactivated).</p> <p>Result: The dialogue for managing the remote control opens.</p>  <p>The Status line shows whether the remote control is active or inactive.</p>
2	<p>Call up the menu item SFC250-RC ON/OFF.</p> <p>Result: The coupled remote control is either activated or deactivated, depending on its current status.</p>

Switching on and establishing the wireless connection


The remote control can be switched on with a brief press of the button . If, after switching on, the LED integrated in this button lights up red, this indicates that the residual capacity of the batteries is low.






Directly after switching on, the remote control attempts to establish the wireless connection to the coupled supply module. This is signalled by the flashing blue wireless status LED .



As soon as the connection has been established, the LED lights up permanently blue.


The remote control will attempt to connect to the supply module for about 1 minute before turning off automatically. If no radio connection can be established within this time, this may indicate that the distance to the supply module is too great or one of the conditions described on the previous page has not been met. In order to be able to rule out the first cause safely, you should work with the antenna plugged in (without antenna the range is only 20 m max.) and the distance to the supply module should be reduced.

Performing switching operations

Once a wireless connection has been established, the LED in the  button indicates the current switching status of the power switch. The status can be one of the following:

Color	Meaning
 (green)	The power switch is switched off. <div style="border: 1px solid black; padding: 5px;">  <p>CAUTION Even when switched off, the power switch (thyristor switch) does not represent a galvanic isolation. For this reason, it must always be assumed that the outgoing cable is energised! With a voltage tester (for example, Duspol), the mains voltage can be measured on the cable at any time. Only under load (for example due to the load resistance integrated in the voltage tester), does the voltage drop to a much lower value.</p> </div>
 (red)	The power switch can be activated by pressing the button  The power switch is on and the protected circuit connected to the power network. The power switch can be deactivated by pressing the button  .

 If the button  is pressed for at least 3 seconds, a kind of emergency shutdown is performed and all power switches are switched off, independent of the current status.

After the desired switching operations have been carried out and the remote control is no longer required, it should be switched off with the button  for a few seconds.

6 Comissioning

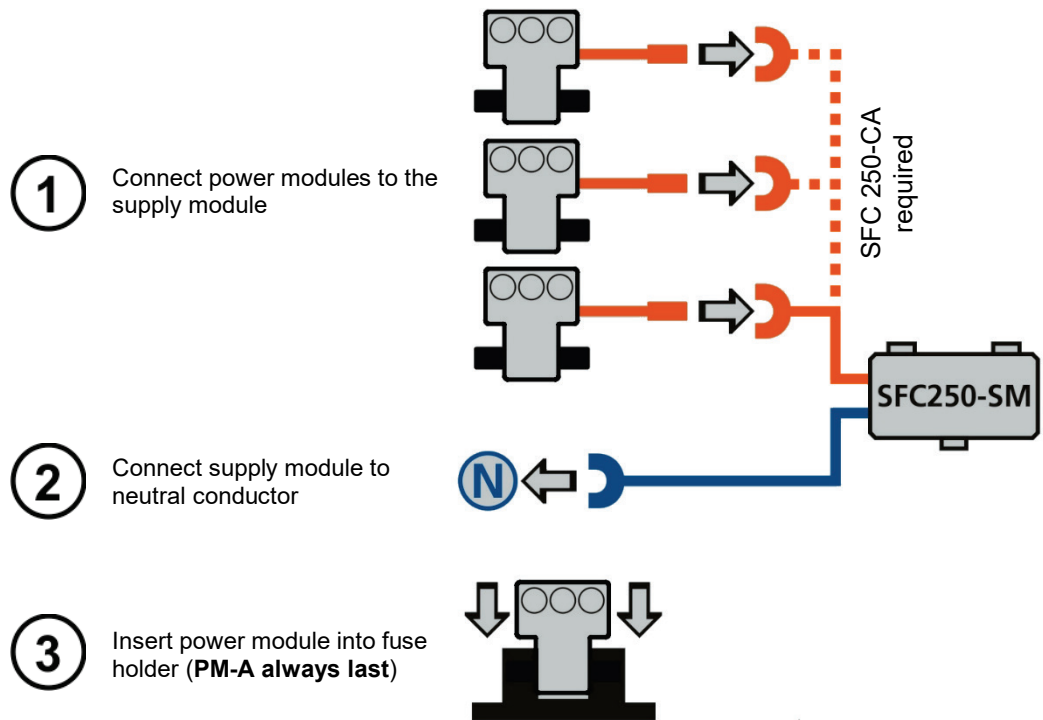


Disconnect ring circuits

The inductance of the cables cannot be determined precisely in ring circuits, which makes it impossible to calculate the fault distance correctly. To successfully locate a cable fault in a ring circuit, all phases and, if possible, the PEN conductor must be disconnected at a suitable position and the ring broken as a result.

6.1 Installation on site

Connection sequence The SFC250 must be connected in the following sequence:

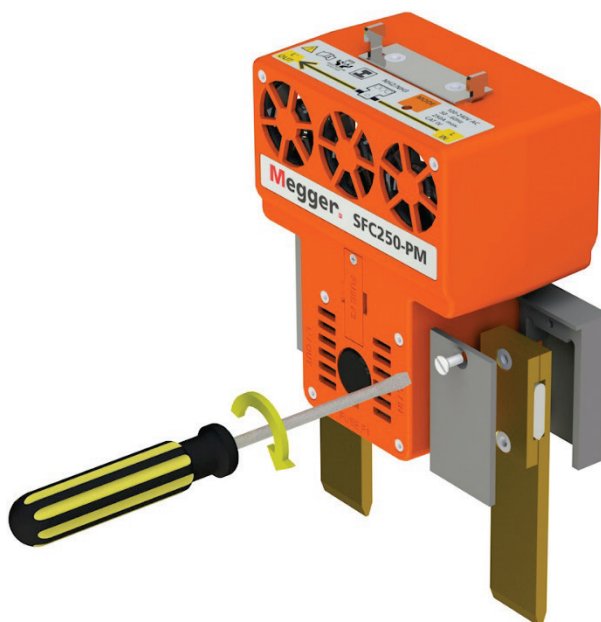


WARNING

Danger to life due to arcing

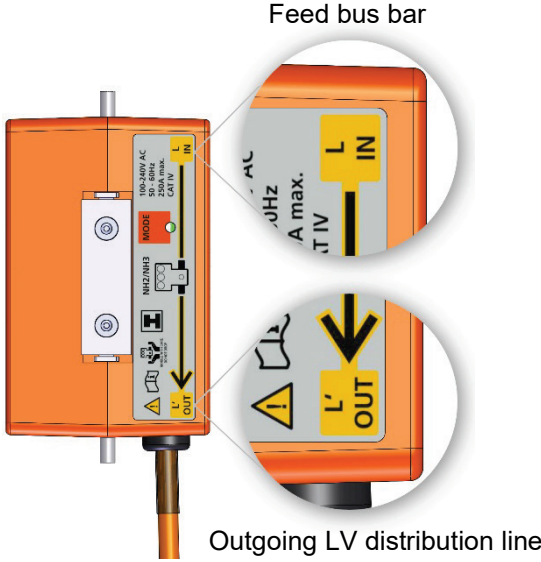
- Insertion into the fuse holder may only be performed by qualified electricians.
- During insertion, the prescribed personal protective equipment (PPE) must be used for this type of work.

Installation of the fork adapter (optional) If the power module cannot fit into the fuse base due to design issues, the optionally available fork adapter (see page 10) can help under certain circumstances. The installation is carried out with the help of a Torx and a slotted screwdriver according to the following figure.



After inserting a power module with a fork adapter, check for a firm hold of the blade contacts by pulling lightly.

Procedure Proceed as follows to install the SFC250 on site:

Step	Action
1	Clean the interior of the distribution cabinet to remove dirt that could otherwise accumulate in the vents of the power module during operation. When necessary, also clean the vents themselves again before insertion (see page 70).
2	If you only want to install one power module in the distribution cabinet, you can connect it directly to the supply module using the RS-485 connection cable 15. If you want to install 2 or 3 power modules, you will need to connect the optionally available three-phase adapter (see page 10) to the supply module and then connect the individual power modules to the adapter. It is important to connect a power module to the socket PM-A , as the supply module receives its supply voltage via this connection.
3	Connect the supply module using the blue connection cable 10 with the neutral conductor of the low voltage distribution.
4	Inform yourself about the flow of direction of the load in the low-voltage distribution and the necessary orientation for inserting the power module into the fuse holder. A corresponding warning sign can be found on the back of the power module. 

Step	Action		
5	<p>Insert all power modules into the respective fuse base with the aid of a slip-on handle with cuff.</p> <p>With a multi-phase connection, always proceed in the following order: PM-C → PM-B → PM-A.</p> <div data-bbox="751 450 1209 987" data-label="Image"> </div> <p>Result: The power modules now draw their supply voltage from the bus bar and also pass it on to the supply module, whose software starts directly afterwards.</p> <p>The green glowing status LED 13 on the power modules indicates that the power switch is not yet switched on and the feeding bus bar is still disconnected from the outgoing cable strands.</p> <div data-bbox="512 1274 1449 1563" data-label="Complex-Block"> <table border="1"> <tr> <td data-bbox="512 1274 651 1406"> </td> <td data-bbox="651 1274 1449 1563"> <p>CAUTION</p> <p>Even when switched off, the power switch (thyristor switch) does not represent a galvanic isolation. For this reason, it must always be assumed that the outgoing cable is energised!</p> <p>With a voltage tester (for example, Duspol), the mains voltage can be measured on the cable at any time. Only under load (for example due to the load resistance integrated in the voltage tester), does the voltage drop to a much lower value.</p> </td> </tr> </table> </div>		<p>CAUTION</p> <p>Even when switched off, the power switch (thyristor switch) does not represent a galvanic isolation. For this reason, it must always be assumed that the outgoing cable is energised!</p> <p>With a voltage tester (for example, Duspol), the mains voltage can be measured on the cable at any time. Only under load (for example due to the load resistance integrated in the voltage tester), does the voltage drop to a much lower value.</p>
	<p>CAUTION</p> <p>Even when switched off, the power switch (thyristor switch) does not represent a galvanic isolation. For this reason, it must always be assumed that the outgoing cable is energised!</p> <p>With a voltage tester (for example, Duspol), the mains voltage can be measured on the cable at any time. Only under load (for example due to the load resistance integrated in the voltage tester), does the voltage drop to a much lower value.</p>		

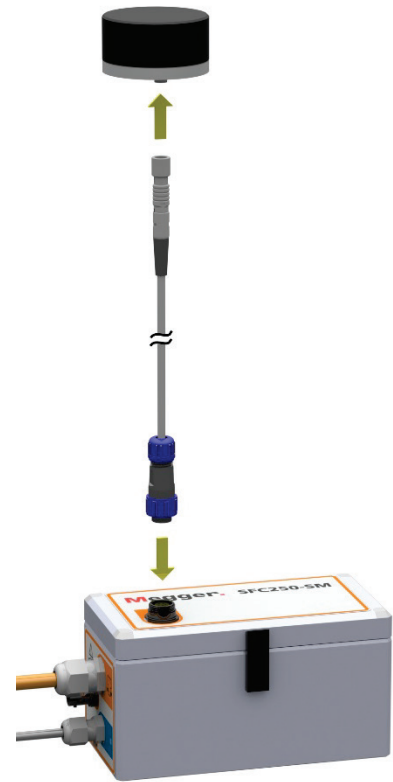
Installing the GPS receiver (optional)

On the top of the cover of the supply module there is a socket 11, to which an optionally available GPS received (see page 10) can be connected.

In this way, it can be ensured that the supply module is able to determine time and position data and to display it on the software interface, even if the internal GPS module fails to receive GPS signal (the value shown under ≡ → Info → Communication → GPS → Signal is 0).

The GPS module has an M8 thread on its underside, making it possible to fasten it securely to the distribution cabinet.

If the conditions in the distribution cabinet do not allow for fixed installation, the GPS module can be secured on the ceiling of the cabinet using the supplied Velcro/adhesive tape. To ensure good adhesion, the surfaces to be used with the adhesive tape on the GPS and module and on the cabinet should be cleaned with a suitable cleaner and degreased.



Connecting a meter to the trigger output (optional)

In order to be able to locate, for example, a sporadic error a measuring device (such as a reflectometer) can be connected to the trigger output 3 of the supply module with a suitable trigger input, which in the moment of triggering (short voltage pulse between 15 and 20 V) measures into the safe low-voltage circuit.

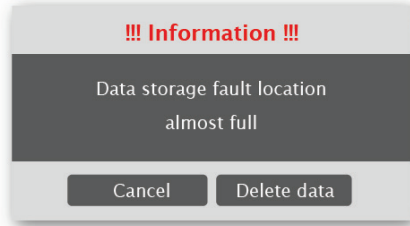
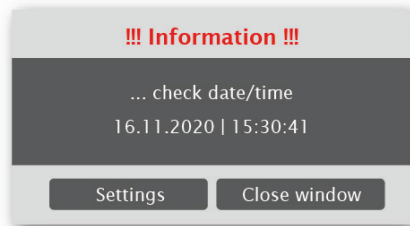
Depending on which phases the meter is connected to and at which time it is to be triggered, the trigger events must be configured (see page 43) in the settings of the supply module.



The connected measurement device is to be configured according to its operating instructions so that when triggering occurs, the desired measurement procedure (for example, an arc reflection measurement) can be performed.

6.2 Completing switch-on and commissioning


Step 1: Configuration After the supply module has completed its boot process, the user interface can be accessed (see page 21) locally or via a web browser. If the need for user interaction has been identified during the software launch, this is indicated by one of the following messages on the main screen:


Message	Description
	<p>The event log, and thus the internal memory of the supply module, contains a large amount of data. It is recommended that you clear the event memory.</p> <p>If the data in the memory is no longer needed, the deletion can be initiated directly via the Delete data button.</p> <p>Otherwise, the data can first be exported via the ☰ → Settings → Fault location menu and then reset.</p>
	<p>The supply module was out of service (de-energised) for at least ten days, which means the time and date settings should be checked. If the settings are to be corrected, the corresponding menu can be called directly via the button.</p> <p>If desired, the check can also be deactivated (see page 29).</p>

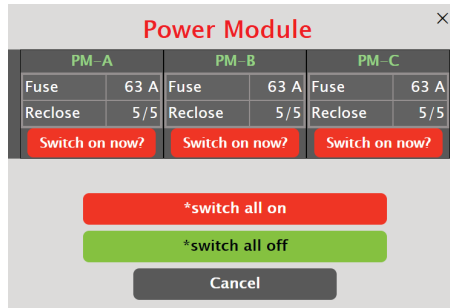
Once any messages have been confirmed and the necessary actions have been taken, the system should be configured for the upcoming measuring operation (see page 29), if this has not been done in the office in advance.

If the remote control is to be used to switch on the power modules, it must be activated in the software (see page 47).


Step 2: Switching on the power modules

In **EasyGo** mode, pressing the  button on the main screen once is sufficient to immediately switch on all circuit breakers in the connected power modules one after the other.

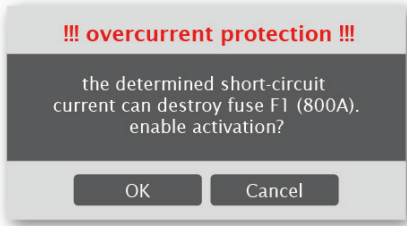
In **Expert** mode, pressing the  button on the main screen calls up the actual switch-on dialogue:


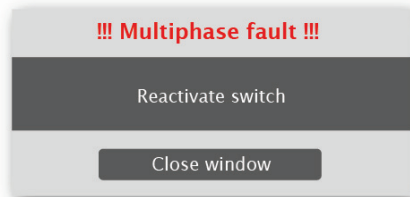


With the **Switch on now?** button, the circuit breakers of the respective power modules can now be switched on individually. The ***switch all on** button also enables all circuit breakers to be switched on together in the case of a multi-phase connection.

In a single-phase installation, switching can also be carried out using the remote control. To do this, switch on the remote control and press the  button once.

When the circuit breakers are switched on, a series of preliminary measurements are carried out which, depending on the result, can produce the following messages:

Message	Description
	<p>During a preliminary test, an expected short-circuit current of more than 6000 A was determined, which may be the case with very low-resistance faults, for example. Continuing the switch-on process could destroy the internal fuse.</p> <p>You can choose whether to switch on the circuit breaker regardless (OK) or cancel switch-on.</p> <p>Caution: If you continue with switch-on despite the warning, the check will be disabled until the device is restarted.</p> <p>You can also disable (see page 45) the check if necessary.</p>

Message	Description
	<p>This message appears if a fuse trip occurred in EasyGo mode within 10 seconds of switching on the circuit breakers. All connected power modules are then switched off.</p> <p>Tripping the fuse early indicates that it is a fast-triggering cable fault, which means that further work should not be carried out in EasyGo mode.</p> <p>Instead, a switch to Expert mode should be made (see page 23) and the fault analysed more closely by an experienced user.</p>
	<p>A multi-phase fault was detected, but the distance could not be determined due to the fast successive connection of the power modules.</p> <p>After this message is confirmed and a reconnection is made via the *switch all on button, the power modules are switched on in an automatic sequence adapted to the fault in order to be able to perform a distance calculation.</p>

Step 3: Completing commissioning After installation was successfully completed and the power switches have been turned on, the following must be ensured before leaving the premises:

- If the SFC250 is to be monitored and configured via the internet, there needs to be an existing connection to the cellular network (see page 23) and the housing cover must be closed.
- The components and the connection cables of the SFC250 must be placed appropriately and stumbling hazards eliminated.
- The distribution cabinet must be closed and secured against unauthorised access according to the operational stipulations.

7 Controlling and monitoring in running operation

The user interface of the SFC250 can at any time during running operation be called up (see page 21) directly on the supply module or from a remote device in order to...

- investigate problems that were signaled (see next sections),
- change operating parameters (see page 41) or
- adapt the device configuration (see page 29).

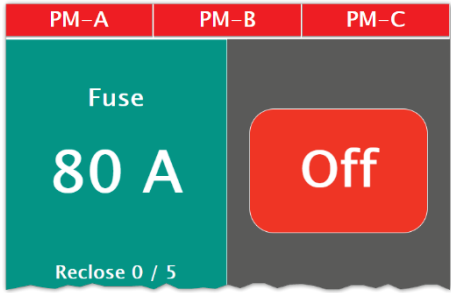
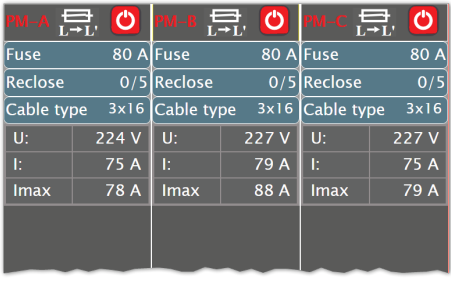
A change in the operational or configuration parameters in the normal case has no influence on the switching state of the power switch, unless a reduction in the fuse value directly triggers a tripping.

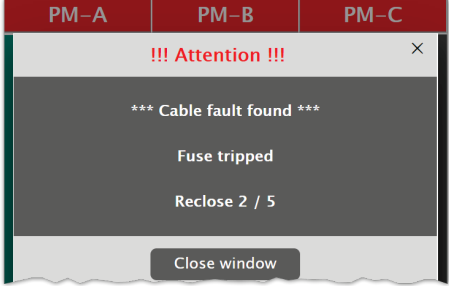
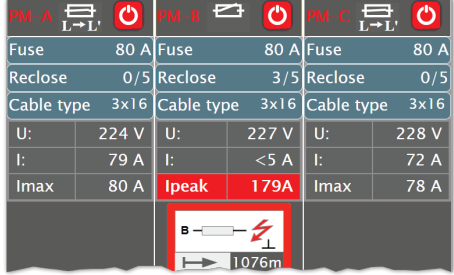
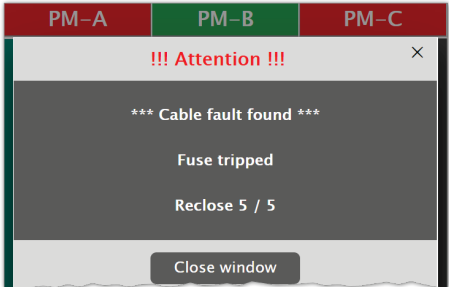
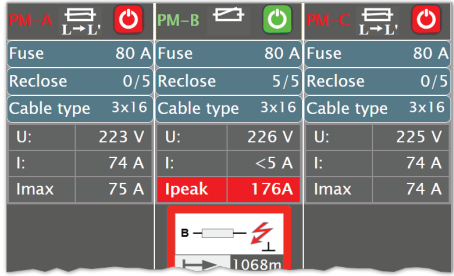
7.1 Monitoring, analysis and fault location

Notifications and regular checks When the necessary conditions for sending notifications have been created, depending on the notification settings (see page 32), the configured recipients will be informed immediately and reliably about problems that occur.

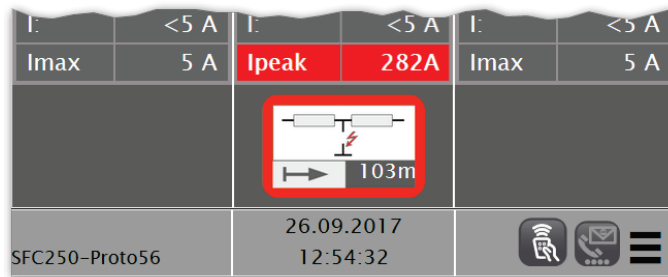
Furthermore, it is recommended to regularly log on to every SFC250 in operation in order to check the switch status and the recorded events / measurements.

Event display on the main screen Regardless of the activated mode, the main screen provides all the necessary information about the switching state of the connected power modules and the number of reconnections made in the previous measuring process. In principle, the following states can be distinguished:

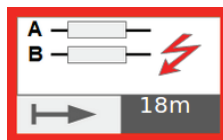
Status	EasyGo mode	Expert mode
No shutdowns / reclose operations so far	<p>All connected power modules are marked as switched on and the previous number of reconnections is 0.</p> 	

Status	EasyGo mode	Expert mode
<p>At least one power module had to be reclosed</p>	<p>A message informs you that the reclose operation has been performed. The identification of the affected power module must be carried out via the event log (see page 57).</p> 	<p>The number of previous reclose operations and the residual current responsible for the last shutdown event is displayed for the affected power module.</p> 
<p>At least one power module has reached the maximum permissible number of reclose operations</p>	<p>The affected power module has been switched off (green) and a message informs you that the maximum permissible number of reclose operations has been reached.</p> 	<p>The affected power module has been switched off (green).</p> 

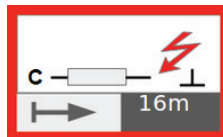
Information about the fault If "fault location" is enabled (see page 43) on the supply module, **Expert** mode also displays information on the type and distance of the fault on the main screen, if this has been determined.



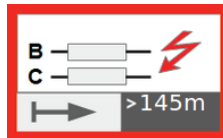
Depending on the type of fault and the cable data entered, the following information can be read:



Based on the measured current and voltage values, an impedance calculation could be performed and, in correlation to the entered cable data, the probable fault distance could be determined.

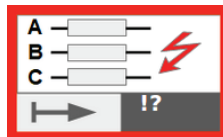


In addition to the fault distance, the conductors affected by the fault are also displayed (first example: L-L fault; second example L-N fault).



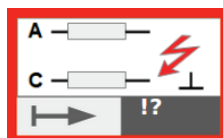
Although the algorithm was able to perform a calculation, the resulting fault distance exceeds the entered cable length by far.

In this case, the indicated fault distance is preceded by a ">".

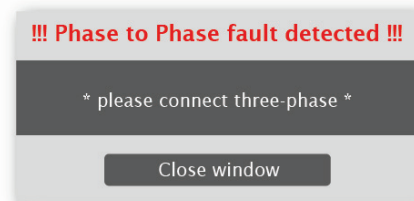
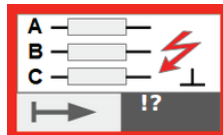


No impedance/distance calculation could be made due to the topology of the fault.

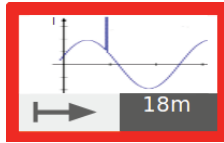
This especially occurs in the case of a multi-phase fault between more than two conductors (e.g. between two phases and the neutral conductor or between all three phases).



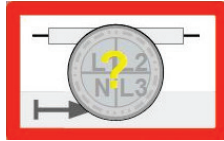
Fault distance calculation may also fail, if the fault characteristic indicates a fault between two phases but only one power module is installed. In this case, the following message appears:



If possible, a three-phase connection should be made and the measurement repeated.



A brief violation of the fuse threshold has occurred, which has not caused the fuse to trip due to the set tripping characteristic.



The cable data necessary for calculating the fault distance has not yet been saved (see page 43).

The measurement algorithm includes past events and measurements in the calculation of the fault distance to provide more accurate results thanks to mean value and median calculation. However, under special conditions (e.g. changing fault characteristics) this may result in fault distance values which are not plausible or constantly changing. In those cases, it may be helpful to use the Reset button in the **☰ → Settings → Fault location** menu in order to reset the data of the measurement algorithm.

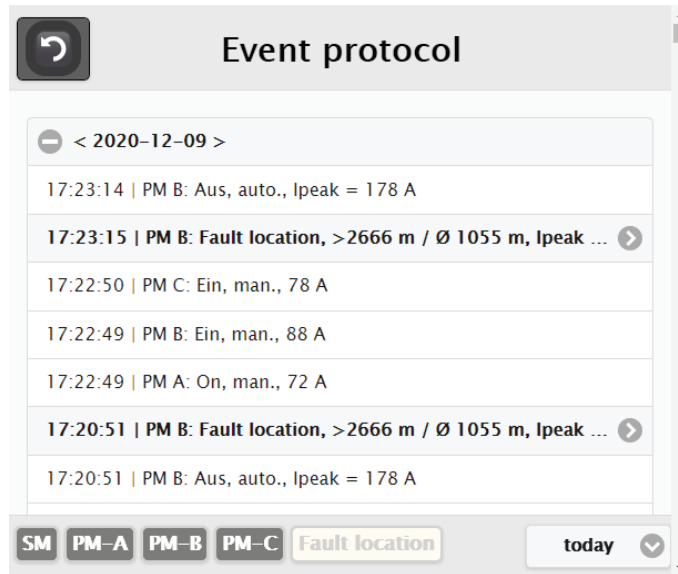
If multiple shutdowns and automatic reclose operations have already taken place in the past, the displayed current and distance values always refer to the last shutdown. The values of the earlier shutdowns can be found in the event log (see below).

For systems without the "fault location" option, these images are not displayed. The color of the power symbol and the number of performed reclose operations indicate, however, whether automatic shutdown/reclosing operations have taken place.

	PM-C	
80 A	Fuse	80 A
0/10	Reclose	4/10
3x16	Cable type	3x
25 V	U:	???
83 A	I:	
31 A	Break	

Performed reclose operations /
Maximum number of reclose operations

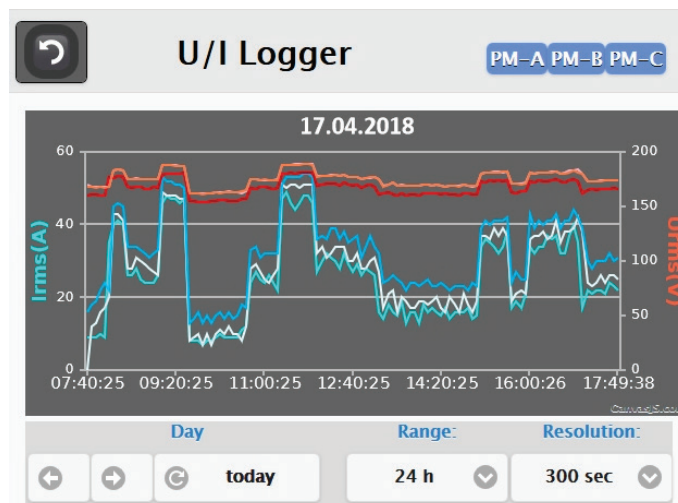
Event Log Since the main screen always only provides information on the last events that have occurred and some events (for example, warning threshold overruns) are displayed only briefly, all events that have occurred since the installation can be found in the event protocol (☰ → **Event protocol**).




The entries in this log are arranged chronologically and provide all relevant information about the time, phase, type and parameters of the event. The fault location results are only displayed in the log if the "fault location" option on the supply module is enabled (see page 43).

The buttons at the bottom of the screen can be used to filter the entries by specific power modules, the supply module (**SM**) and the time of occurrence. Enabling the **Fault location** filter restricts the view to the actual fault events.

Analysis of current and voltage measurements The ☰ → **U/I loggers** menu item can be used to view the recorded current and voltage waveforms and check for abnormalities.




The current and voltage values are stored in 1-second intervals and held for 30 days before they are deleted from the internal memory.

The buttons on the bottom of the diagram can be used to toggle between the previous days. The button  serves to jump back to the current day. In addition to the date, the displayed time range (**Range**) and the gap between the individual measuring points (**Resolution**) can also be adjusted via the drop-down menu.

The buttons on the upper right edge of the display can be used to show or hide the curves of individual the power modules.

In order to display a specific voltage or current value, just click/tap on that point on the curve.

If required, the measured values can also be exported as CSV files and thus conveniently analyzed on a workstation PC in a suitable application (for example, Microsoft Excel). Follow these steps to export the files:



Step	Action				
1	Insert the USB stick into the USB port 5 of the supply module.				
2	Open the menu  → Settings → Fault location .				
3	Call up the menu item Data export .				
4	Export the desired data: <table border="1" data-bbox="507 907 1461 1288"> <tbody> <tr> <td>U/I measured data</td> <td> CSV files with timeline of the following current and voltage values (in separate columns): <ul style="list-style-type: none"> • Average of the last 5 periods • Average of the last 150 periods • Average of the last 10 minutes • Average of the last 2 hours A separate file is created for each day since commissioning. </td> </tr> <tr> <td>Fault location data</td> <td>Log files in XML format which are primarily used by the technical support of Megger for purposes of analysis.</td> </tr> </tbody> </table>	U/I measured data	CSV files with timeline of the following current and voltage values (in separate columns): <ul style="list-style-type: none"> • Average of the last 5 periods • Average of the last 150 periods • Average of the last 10 minutes • Average of the last 2 hours A separate file is created for each day since commissioning.	Fault location data	Log files in XML format which are primarily used by the technical support of Megger for purposes of analysis.
U/I measured data	CSV files with timeline of the following current and voltage values (in separate columns): <ul style="list-style-type: none"> • Average of the last 5 periods • Average of the last 150 periods • Average of the last 10 minutes • Average of the last 2 hours A separate file is created for each day since commissioning.				
Fault location data	Log files in XML format which are primarily used by the technical support of Megger for purposes of analysis.				
5	If preferred, call up menu item Delete data? to delete the downloaded files from the internal memory once download is successfully completed (so that they do not need to be downloaded again the next time).				
6	Call up the menu item Remove USB Stick and then pull out the USB flash drive.				

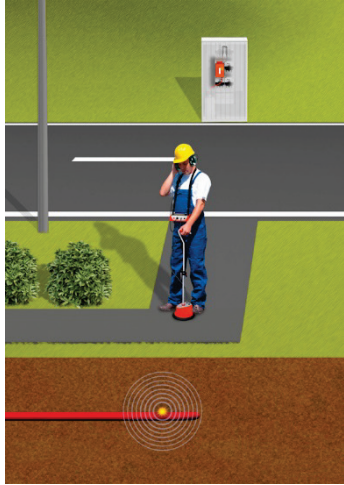





7.2 Fault pinpointing

Fault pinpointing principle If repeated failures/shutdowns indicate a cable fault, the SFC250 provides a number of options for localizing the fault without having to disconnect the consumer from the grid. In some cases, the fault distance determined by the location algorithm (see page 57) may already provide sufficiently accurate conclusions about the fault location. A measuring device that is connected in parallel to the line and triggered by the supply module can also be used for exact fault location. Assuming that the fault reliably ignites shortly after switching on the fuse, the position can be tracked down to the meter with the aid of a suitable ground microphone (for example, digiPHONE+) or the fault sniffer system. For this purpose, automatic reactivation of the relevant power module should be enabled (see page 41) so that the power switch is switched on again automatically when the fault is triggered. In the case of faults that can be triggered reliably, this results in a kind of periodic fault triggering that makes it possible to pinpoint the suspected fault location. If, in case of an intermittent fault, direct tripping does not occur, the power switch remains closed and the consumers continue to be supplied with power.


Procedure Proceed as follows to pinpoint the fault:

Step	Action
1	Take the necessary measuring equipment with you and go to the area where you suspect the cable fault is. The power switch of the relevant power module should be switched off during this period to avoid an unnecessarily high amount of triggering events.
2	Log on with a mobile device on the corresponding SFC250. If a data connection to the device cannot be established, the necessary switching operations can also be carried out by a second person near the device (via local operation, remote control or Wi-Fi connection).
3	Activate the Expert mode (see page 45).
4	For the affected power module, enable automatic reclose and set the slider specifying the maximum number of reclose operations (see page 41) all the way to the right (200) to allow sufficient time to pinpoint the fault and to disable fault detection during this process.

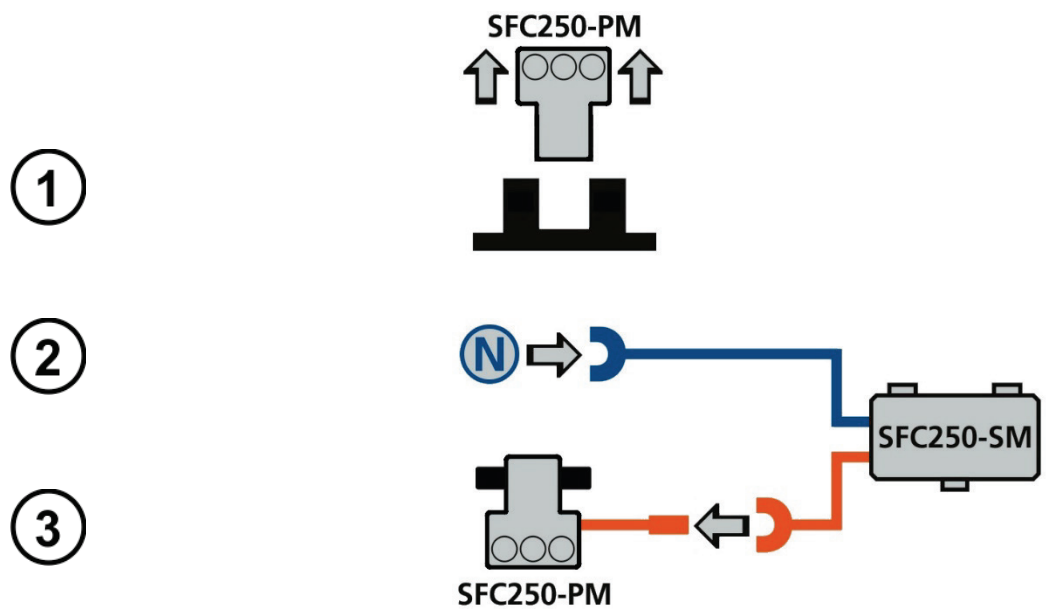
Step	Action																																		
5	<p data-bbox="512 293 1430 389">On the main screen, press one of the  buttons in the header to call up the switch-on dialogue and switch on the power switch of the affected power module via Switch on now?.</p> <div data-bbox="676 421 1287 824" style="border: 1px solid #ccc; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; color: red; margin: 0;">Power Module ×</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2" style="color: green;">PM - A</th> <th colspan="2" style="color: green;">PM - B</th> <th colspan="2" style="color: green;">PM - C</th> </tr> </thead> <tbody> <tr> <td>Fuse</td> <td>80 A</td> <td>Fuse</td> <td>80 A</td> <td>Fuse</td> <td>80 A</td> </tr> <tr> <td>Reclose</td> <td style="color: yellow;">0/200</td> <td>Reclose</td> <td style="color: yellow;">0/200</td> <td>Reclose</td> <td style="color: yellow;">0/200</td> </tr> <tr> <td colspan="2" style="background-color: red; color: white;">Switch on now?</td> <td colspan="2" style="background-color: red; color: white;">Switch on now?</td> <td colspan="2" style="background-color: red; color: white;">Switch on now?</td> </tr> </tbody> </table> <p style="text-align: center; color: yellow; margin: 5px 0;">Pre-location deactivated</p> <div style="text-align: center; margin: 5px 0;"> *switch all on *switch all off Cancel </div> </div> <p data-bbox="512 860 1453 992">Alternatively, you can switch on the power switch using the  button on the remote control. Please note, however, that in multi-phase installations, only the power switch of the PM-A power module can be switched on or off using the remote control.</p> <p data-bbox="512 1010 1441 1104">Result: Assuming that the fault can be triggered reliably, the fuse will trip repeatedly as a result, after which the power switch will immediately switch on again automatically.</p> <p data-bbox="512 1115 1453 1209">The height of the respective surge current is indicated by the LED bar 18 (in multi-phase installations it indicates the surge current of the PM-A power module only). The following scaling applies:</p> <table data-bbox="679 1227 976 1442" style="margin-left: 40px; border: none;"> <tr> <td>1 LED</td> <td>>= 5 A</td> </tr> <tr> <td>2 LEDs</td> <td>>= 150 A</td> </tr> <tr> <td>3 LEDs</td> <td>>= 500 A</td> </tr> <tr> <td>4 LEDs</td> <td>>= 1000 A</td> </tr> <tr> <td>5 LEDs</td> <td>>= 3000 A</td> </tr> </table>	PM - A		PM - B		PM - C		Fuse	80 A	Fuse	80 A	Fuse	80 A	Reclose	0/200	Reclose	0/200	Reclose	0/200	Switch on now?		Switch on now?		Switch on now?		1 LED	>= 5 A	2 LEDs	>= 150 A	3 LEDs	>= 500 A	4 LEDs	>= 1000 A	5 LEDs	>= 3000 A
PM - A		PM - B		PM - C																															
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2 LEDs	>= 150 A																																		
3 LEDs	>= 500 A																																		
4 LEDs	>= 1000 A																																		
5 LEDs	>= 3000 A																																		

Step	Action
<p>6</p>	<p>Locate the exact position of the fault using one of the following methods:</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>The acoustic and electromagnetic waves that propagate with each flash-over can be located using a surge wave receiver (for example, digiPHONE+).</p>  </div> <div style="width: 45%;"> <p>Repeated closing of the breaker causes burn-up of the insulation at the fault location. The resulting gases can be located with the Fault Sniffer system.</p>  </div> </div> <p> For information on operation of the surge wave receiver or the Fault Sniffer system, refer to the associated operating manual.</p>
<p>7</p>	<p>Stop automatic re-activation after successful fault location by pressing the button  in the main menu or the button  on the remote control (only necessary in automatic mode).</p>
<p>8</p>	<p>If required, disable automatic re-activation in the device settings as well ( → Settings → Fuse → Reclose).</p>

8 Deinstallation

	<p>WARNING Danger to life due to arcing</p> <ul style="list-style-type: none"> • Make sure that the power switches in all installed power modules are switched off and the status indicators 13 light up green. • Removal from the fuse holder may only be performed by qualified electricians. • During removal, the prescribed personal protective equipment (PPE) must be used for this type of work.
---	--

Deinstallation must be performed in the following order:






9 Maintenance and care

	<p>WARNING Risk of electric shock</p> <ul style="list-style-type: none"> All service and maintenance work on power modules may only be performed in an off and deinstalled condition.
--	---

9.1 Updating the firmware



Update supply module and power module

Proceed as follows to update the software:

Step	Action
1	Register as a user on the Megger homepage and download the current software version as zip archive from the section "Software and firmware".
2	<p>Create a folder named FIRMWARE on an empty USB flash drive.</p> <div style="text-align: center;">  USB drive  FIRMWARE </div>
3	Extract the content of the zip archive into the directory you just created on the USB flash drive.
4	Insert the USB flash drive into the USB port 5 of the off supply module.
5	Connect all power modules belonging to the system to the supply module (using the SFC 250-CA adapter if necessary).
6	<p>Switch the supply module on using the supplied power supply unit.</p> <p>Result: When a valid software version is found on the USB flash drive, the installation starts directly after the boot procedure. Otherwise, the system starts normally. The installation may take several minutes.</p> <p>During the update, the system may restart a number of times and can also appear "idle" for short phases. Only if the system has not returned to the start screen for more than 5 minutes should it be assumed that the update has failed. In this case, the procedure should be repeated.</p> <hr/> <div style="border: 1px solid black; padding: 5px;">  The installation may take several minutes. Do not disconnect the supply module from the supply voltage or the power module during installation! </div> <hr/>

Step	Action
7	<p>Once the supply module has started up again and the home screen has appeared, wait for the connected power modules to finish updating too. The progress of the update is indicated by the following symbol on the screen.</p> <div data-bbox="791 409 1177 609" data-label="Image"> </div> <p>Once the update process is complete, the LEDs on all connected power modules should be lit green.</p> <p>If this does not happen even after a long wait, try deenergising the supply module for at least one minute and then restarting it. If the connected power modules are still not updated automatically, performing the update manually (see page 29) may help.</p>
8	<p>If additional power modules need to be updated, these can now be connected to the supply module. These will also be updated to the new software version after the supply module is restarted.</p>
9	<p>Check whether an update is also available for the remote control and install this (see next page).</p>


Updating the remote control The firmware updates for supply module and power module may also contain necessary updates for the remote control. Accordingly, after every firmware update, you need to check whether the remote control firmware also needs to be updated. Proceed as follows:

Step	Action
1	Make sure that the remote control is activated (see page 47) and switched on.
2	Open the user interface locally at the supply module.
3	Open the page  → SFC250-RC and, if not already done, conduct the coupling (see page 39).
4	Check whether the Status line shows the message “ SFC250-RC found. Please update firmware! ” If the message is displayed, proceed with the next step to install the update. If however no update of the remote control is required, you can ignore the following steps.
5	Open the menu item Firmware Update on the user interface.
6	Move at least 2 metres away from the supply module and press the button  on the remote control. Result: The update starts and the progress is shown on the user interface. After the update is successfully completed, the message SFC250-RC active is shown in the Status line. The remote control now once again has a firmware that is compatible with the supply module.

9.2 Cleaning the vents of the power modules

After longer use, the power module vents can get dirty. In extreme cases, this can block the fans. Even if the device itself is protected from overheating by internal protection and monitoring functions, the blocked fans can cause performance degradation.

It is thus highly recommended that the vents inspected visually regularly, in particular before commissioning, and cleaned when necessary.



	<p>NOTE</p> <ul style="list-style-type: none">• To prevent damage to the interior of the device, special care must be used when cleaning the vents.• The housing must not be opened.• No liquids may be used.• When cleaning with compressed air or ventilation, the fan wheels must be held in place. If the fans rotate too rapidly, the control electronics can be damaged.
---	--

A coarse cleaning operation should be performed with a soft brush. A small piece of wooden (for example, a toothpick) can then be pushed through the openings and used to carefully loosen dirt in the interior. The dirt can then be shaken out. The openings should then be carefully cleaned with a vacuum cleaner or blower.

9.3 Replacing fuses in power modules

If the status LED **13** on the power module does not go on, even though the module has been correctly inserted into a live low-voltage circuit and connected with the supply module, the fuses F1 (800 A) and F2 (1.25 A) must be checked.

Proceed as follows to check fuse F1 (800 A) and to replace it if necessary:

Step	Action
1	Remove the covers <u>on both sides</u> . <div style="text-align: center;">  </div>
2	Loosen the hexagon socket screws <u>on both sides</u> . <div style="text-align: center;">  </div>
3	Remove the fuse and check it for integrity.
4	Insert a fuse, or if necessary, a replacement fuse sold as a special accessory (see page 10), with the same characteristics.
5	Use a torque spanner to secure the fuse, using the two hexagon socket screws. Tighten the screws with <u>a torque of 20 Nm</u> .
6	Put the covers back on.

Proceed as follows to check fuse F2 (1.25 A) and to replace it if necessary:

Step	Action
1	Loosen the screw from the cover. <div data-bbox="804 389 1163 808" style="text-align: center;"> </div>
2	Remove the fuse and check it for integrity.
3	Insert the fuse or, if necessary, an included replacement fuse with the same characteristics (1.25 A/500 V H type, fast-blow; 6.3 x 32 mm)
4	Secure the cover again with the corresponding screw.

If the fuses trip again, please contact an authorised service shop to fix the problem.

9.4 Calibrating the touch screen of the supply module

The touch screen of the supply module is calibrated at the factory prior to delivery.

If however there are increasing problems with stylus operation when activating buttons or if the touch point for activating a button is clearly miscalibrated, a new calibration of the touch screen can provide a remedy.



If during calibration, an incorrect area of the screen is touched, the result may be that the supply module can then no longer be operated with the stylus.

In such a case, a network connection (for example, via WLAN) must be established (see page 21) with the supply module and the procedure for touch screen calibration started again.

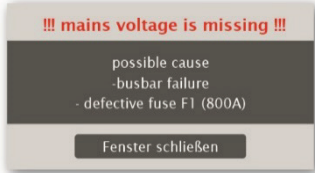


Proceed as follows to calibrate the touch screen:

Step	Action
1	<p>Start the procedure for touch screen calibration (see page 29) and confirm the following prompt with OK.</p> <p>Result: The utility for touch screen calibration is started. A crosshair appears on the screen.</p> <div data-bbox="651 972 1358 1447" data-label="Image"> </div>
2	<p>Touch the center of the crosshairs as accurately as possible with the stylus and keep contact with the display for about 1 second.</p> <p>Result: After being touched, the crosshair jumps to the next position after about one second.</p>

Step	Action	
3	<p>Tap on the following 4 crosshairs with the stylus.</p> <p>Result: After all 5 positions have been measured, you are prompted to touch the screen within 5 seconds to save the new calibration data.</p> <div data-bbox="647 421 1358 891" style="text-align: center; border: 1px solid gray; padding: 10px; margin: 10px auto; width: fit-content;"> <pre>TSLIB calibration utility Touch crosshair to calibrate Press the screen to apply calibration.</pre> </div>	
4	<p><u>If the calibration was successful ...</u></p>	<p><u>If you were not satisfied with the accuracy of the calibration ...</u></p>
	<p>... within 5 seconds, use the stylus to touch the screen at any point.</p>	<p>... wait 5 seconds without touching the screen with the stylus.</p>
	<p>Result: The new calibration data is saved. The software returns to the normal user interface.</p>	<p>Result: The new calibration data is discarded and the previous calibration data is loaded. After the software returns to the normal user interface, the calibration can be restarted.</p>

10 Troubleshooting

Independent fault clearance If problems occur, these can – under certain circumstances – be diagnosed and solved using the following table:

Problem / error message	Possible cause / remedy
<p>The status indicator 13 on the power module does not go on after insertion.</p> <p>The following message is displayed on the user interface:</p> 	<p>Check whether the following conditions are fulfilled:</p> <ul style="list-style-type: none"> • Was the power module connected to the supply module and inserted in the correct orientation (see page 51)? • Is low voltage currently being supplied to the distribution cabinet? Is there a busbar failure or another problem in the power supply? • Are the fuses (F1 and F2) in the power module intact (see page 71)?
<p>After insertion, the status indicator 13 on the power module does not switch from white to green even after a long wait.</p> <p>The following symbol appears on the display:</p> 	<p>This could indicate that the software version of the power module and the supply module do not match. Start a manual software update of the power module (see page 29), thus ensuring that both the control and the power module are running the same software version.</p>
<p>The status indicator 13 on the power module or the main screen does not respond to switching commands.</p>	<p>Restart the power module and, if necessary, the entire system (see page 29).</p>
<p>The power module ID is displayed in the header of the main screen in cyan.</p> 	<p>Due to the outdated hardware status of the power module, no phase control pre-measurement can be performed with the power module.</p> <p>Either work with the function disabled or return the power module to an authorised service workshop for a hardware upgrade.</p>

Problem / error message	Possible cause / remedy
Buttons on the touch screen are difficult to activate with the stylus or cannot be activated at all.	Perform a recalibration of the touch screen (see page 73). If the procedure cannot be started directly at the supply module due to the imprecise touch screen, you must access the user interface via remote accessing.
The user interface cannot be opened on the smartphone / tablet despite an existing WLAN connection.	Check that the mobile data connection on the smartphone / tablet has been deactivated. Otherwise, the device attempts to access the entered IP via this Internet connection.

Behaviour at persistent malfunction When irregularities or malfunctions appear that cannot be solved consulting this manual, the device / system must immediately be put out of operation and marked as not functional. In this case inform the person in charge who should inform the Megger service to resolve the problem. The device / system may only be operated when the malfunction is resolved.



Tento symbol indikuje, že výrobek nesoucí takovéto označení nelze likvidovat společně s běžným domovním odpadem. Jelikož se jedná o produkt obchodovaný mezi podnikatelskými subjekty (B2B), nelze jej likvidovat ani ve veřejných sběrných dvorech. Pokud se potřebujete tohoto výrobku zbavit, obraťte se na organizaci specializující se na likvidaci starých elektrických spotřebičů v blízkosti svého působiště.



Dit symbool duidt aan dat het product met dit symbool niet verwijderd mag worden als gewoon huishoudelijk afval. Dit is een product voor industrieel gebruik, wat betekent dat het ook niet afgeleverd mag worden aan afvalcentra voor huishoudelijk afval. Als u dit product wilt verwijderen, gelieve dit op de juiste manier te doen en het naar een nabij gelegen organisatie te brengen gespecialiseerd in de verwijdering van oud elektrisch materiaal.



This symbol indicates that the product which is marked in this way should not be disposed of as normal household waste. As it is a B2B product, it may also not be disposed of at civic disposal centres. If you wish to dispose of this product, please do so properly by taking it to an organisation specialising in the disposal of old electrical equipment near you.



Този знак означава, че продуктът, обозначен по този начин, не трябва да се изхвърля като битов отпадък. Тъй като е B2B продукт, не бива да се изхвърля и в градски пунктове за отпадъци. Ако желаете да изхвърлите продукта, го занесете в пункт, специализиран в изхвърлянето на старо електрическо оборудване.



Dette symbol viser, at det produkt, der er markeret på denne måde, ikke må kasseres som almindeligt husholdningsaffald. Eftersom det er et B2B produkt, må det heller ikke bortskaffes på offentlige genbrugsstationer. Skal dette produkt kasseres, skal det gøres ordentligt ved at bringe det til en nærliggende organisation, der er specialiseret i at bortskaffe gammelt el-udstyr.



Sellise sümboliga tähistatud toodet ei tohi käidelda tavalise olmejäätmena. Kuna tegemist on B2B-klassi kuuluva tootega, siis ei tohi seda viia kohalikku jäätmekäitluspunkti. Kui soovite selle toote ära visata, siis viige see lähimasse vanade elektriseadmete käitlemisele spetsialiseerunud ettevõttesse.



Tällä merkinnällä ilmoitetaan, että kyseisellä merkinnällä varustettua tuotetta ei saa hävittää tavallisen kotitalousjätteen seassa. Koska kyseessä on yritysten välisen kaupan tuote, sitä ei saa myöskään viedä kuluttajien käyttöön tarkoitettuihin keräyspisteisiin. Jos haluatte hävittää tämän tuotteen, ottakaa yhteys lähimpään vanhojen sähkölaitteiden hävittämiseen erikoistuneeseen organisaatioon.



Ce symbole indique que le produit sur lequel il figure ne peut pas être éliminé comme un déchet ménager ordinaire. Comme il s'agit d'un produit B2B, il ne peut pas non plus être déposé dans une déchetterie municipale. Pour éliminer ce produit, amenez-le à l'organisation spécialisée dans l'élimination d'anciens équipements électriques la plus proche de chez vous.



Cuireann an siombail seo in iúl nár cheart an táirgeadh atá marcáilte sa tsíol seo a dhiúscairt sa chóras fuoil teaghlaigh. Os rud é gur táirgeadh ghnó le gnó (B2B) é, ní féidir é a dhiúscairt ach oiread in ionaid dhiúscairthe phobail. Más mian leat an táirgeadh seo a dhiúscairt, déan é a thógáil ag eagraíocht gar duit a sainfheidhmíonn i ndiúscairt seanfhearas leictrigh.



Dieses Symbol zeigt an, dass das damit gekennzeichnete Produkt nicht als normaler Haushaltsabfall entsorgt werden soll. Da es sich um ein B2B-Gerät handelt, darf es auch nicht bei kommunalen Wertstoffhöfen abgegeben werden. Wenn Sie dieses Gerät entsorgen möchten, bringen Sie es bitte sachgemäß zu einem Entsorger für Elektroaltergeräte in Ihrer Nähe.



Αυτό το σύμβολο υποδεικνύει ότι το προϊόν που φέρει τη σήμανση αυτή δεν πρέπει να απορρίπτεται μαζί με τα οικιακά απορρίματα. Καθώς πρόκειται για προϊόν B2B, δεν πρέπει να απορρίπτεται σε δημοτικά σημεία απόρριψης. Εάν θέλετε να απορρίψετε το προϊόν αυτό, παρακαλούμε όπως να το παραδώσετε σε μία υπηρεσία συλλογής ηλεκτρικού εξοπλισμού της περιοχής σας.



Ez a jelzés azt jelenti, hogy az ilyen jelzéssel ellátott terméket tilos a háztartási hulladékokkal együtt kidobni. Mivel ez vállalati felhasználású termék, tilos a lakosság számára fenntartott hulladékgyűjtőbe dobni. Ha a terméket ki szeretné dobni, akkor vigye azt el a lakóhelyéhez közel működő, elhasznált elektromos berendezések begyűjtésével foglalkozó hulladékezelő központhoz.



Questo simbolo indica che il prodotto non deve essere smaltito come un normale rifiuto domestico. In quanto prodotto B2B, può anche non essere smaltito in centri di smaltimento cittadino. Se si desidera smaltire il prodotto, consegnarlo a un organismo specializzato in smaltimento di apparecchiature elettriche vecchie.



Šī zīme norāda, ka izstrādājumu, uz kura tā atrodas, nedrīkst izmest kopā ar parastiem mājsaimniecības atkritumiem. Tā kā tas ir izstrādājums, ko cits citam pārdod un lieto tikai uzņēmumi, tad to nedrīkst arī izmest atkritumos tādās izgāztuvēs un atkritumu savāktuvēs, kas paredzētas vietējiem iedzīvotājiem. Ja būs vajadzīgs šo izstrādājumu izmest atkritumos, tad rīkojieties pēc noteikumiem un nogādājiet to tuvākajā vietā, kur īpaši nodarbojas ar vecu elektrisku ierīču savākšanu.



Šis simbolis rodo, kad juo paženklīto gaminjo negalima īsmesti kaip paprastų buitinių atliekų. Kadangi tai B2B (verslas verslui) produktas, jo negalima atiduoti ir buitinių atliekų tvarkymo įmonėms. Jei norite išmesti šį gaminį, atlikite tai tinkamai, atiduodami jį arti įsų esančiai specializuotai senos elektrinės įrangos utilizavimo organizacijai.



Dan is-simbolu jindika li l-prodott li huwa mmakat b'dan il-mod m'ghandux jintrema bħal skart normali tad-djar. Minhabba li huwa prodott B2B , ma jistax jintrema wkoll f'centri civici għar-rimi ta' l-iskart. Jekk tkun tixtieq tarmi dan il-prodott, jekk joghħbok għamel dan kif suppost billi tieħdu għand organizzazzjoni fil-qrib li tispjalizza fir-rimi ta' tagħmir qadim ta' l-eletriku.



Dette symbolet indikerer at produktet som er merket på denne måten ikke skal kastes som vanlig husholdningsavfall. Siden dette er et bedriftsprodukt, kan det heller ikke kastes ved en vanlig miljøstasjon. Hvis du ønsker å kaste dette produktet, er den riktige måten å gi det til en organisasjon i nærheten som spesialiserer seg på kassering av gammelt elektrisk utstyr.



Ten symbol oznacza, że produktu nim opatrzonego nie należy usuwać z typowymi odpadami z gospodarstwa domowego. Jest to produkt typu B2B, nie należy go więc przekazywać na komunalne składowiska odpadów. Aby we właściwy sposób usunąć ten produkt, należy przekazać go do najbliższej placówki specjalizującej się w usuwaniu starych urządzeń elektrycznych.



Este símbolo indica que o produto com esta marcação não deve ser deixado fora juntamente com o lixo doméstico normal. Como se trata de um produto B2B, também não pode ser deixado fora em centros cívicos de recolha de lixo. Se quiser desfazer-se deste produto, faça-o correctamente entregando-o a uma organização especializada na eliminação de equipamento eléctrico antigo, próxima de si.



Acest simbol indică faptul că produsul marcat în acest fel nu trebuie aruncat ca și un gunoi menajer obișnuit. Deoarece acesta este un produs B2B, el nu trebuie aruncat nici la centrele de colectare urbane. Dacă vreți să aruncați acest produs, vă rugăm s-o faceți într-un mod adecvat, ducând-ul la cea mai apropiată firmă specializată în colectarea echipamentelor electrice uzate.



Tento symbol znamená, že takto označený výrobek sa nesmie likvidovať ako bežný komunálny odpad. Keďže sa jedná o výrobok triedy B2B, nesmie sa likvidovať ani na mestských skládkach odpadu. Ak chcete tento výrobok likvidovať, odneste ho do najbližšej organizácie, ktorá sa špecializuje na likvidáciu starých elektrických zariadení.



Ta simbol pomeni, da izdelka, ki je z njim označen, ne smete zavreči kot običajne gospodinjske odpadke. Ker je to izdelek, namenjen za druge proizvajalce, ga ni dovoljeno odlagati v centrih za civilno odlaganje odpadkov. Če želite izdelek zavreči, prosimo, da to storite v skladu s predpisi, tako da ga odpeljete v bližnjo organizacijo, ki je specializirana za odlaganje stare električne opreme.



Este símbolo indica que el producto así señalizado no debe desecharse como los residuos domésticos normales. Dado que es un producto de consumo profesional, tampoco debe llevarse a centros de recogida selectiva municipales. Si desea desechar este producto, hágalo debidamente acudiendo a una organización de su zona que esté especializada en el tratamiento de residuos de aparatos eléctricos usados.



Den här symbolen indikerar att produkten inte får blandas med normalt hushållsavfall då den är förbrukad. Eftersom produkten är en så kallad B2B-produkt är den inte avsedd för privata konsumenter, den får således inte avfallshanteras på allmänna miljö- eller återvinningsstationer då den är förbrukad. Om ni vill avfallshandera den här produkten på rätt sätt, ska ni lämna den till myndighet eller företag, specialiserad på avfallshandering av förbrukad elektrisk utrustning i ert närområde.