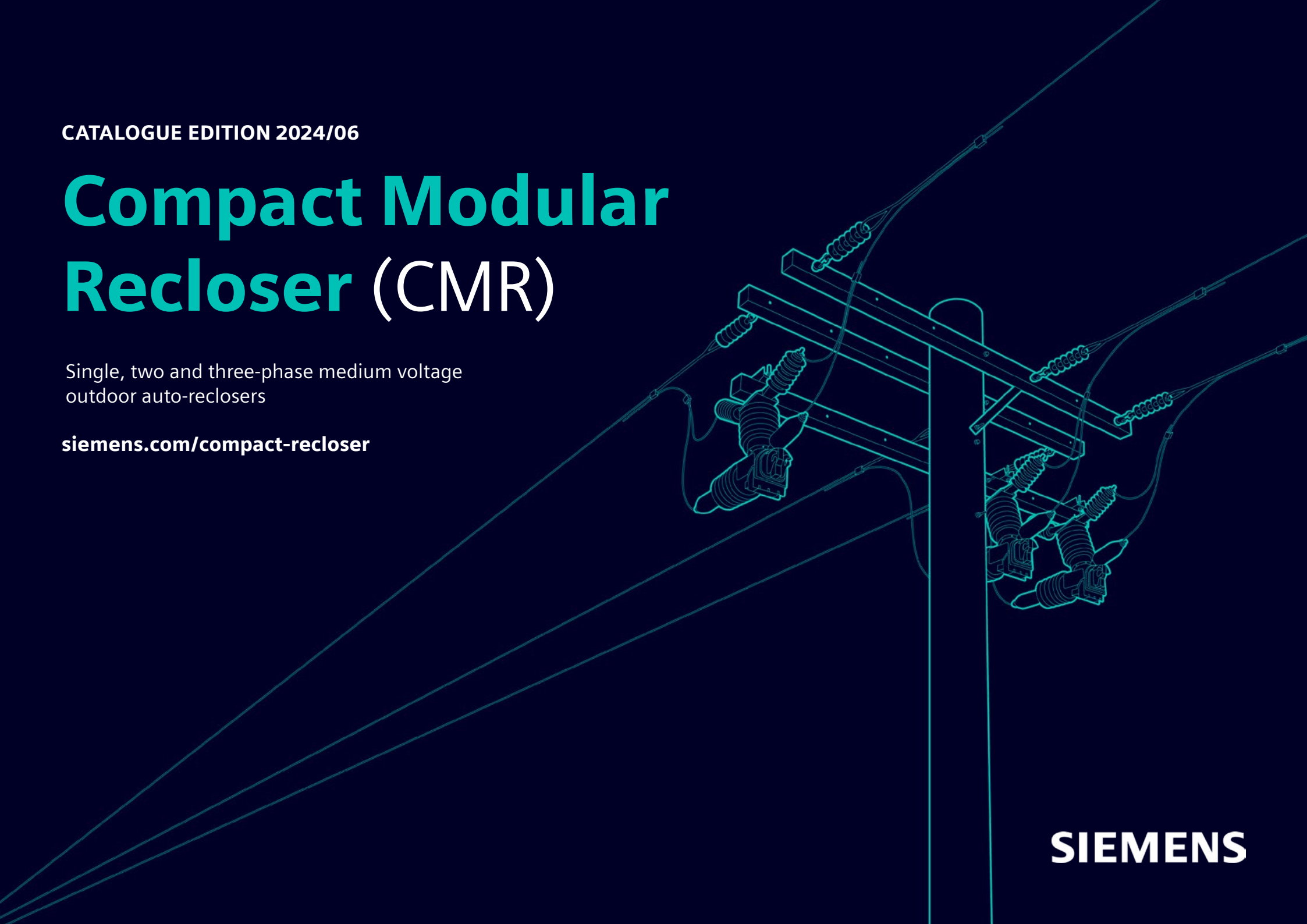
CATALOGUE EDITION 2024/06

Compact Modular Recloser (CMR)

Single, two and three-phase medium voltage outdoor auto-reclosers

siemens.com/compact-recloser



SIEMENS

COMPACT MODULAR RECLOSER

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Compact Modular Recloser

Intelligent. Compact. Self-powered by voltage.

Distribution utilities have been trapped between the high capital cost of modern electronically controlled reclosers and the high operating cost of obsolete hydraulic reclosers.

The Compact Modular Recloser (CMR) provides a new approach without the high cost of pole mounted control cubicles and auxiliary supplies of the modern recloser and without the protection limitations and maintenance costs of hydraulic reclosers.

The CMR is a new class of intelligent auto-recloser with unique self-powering from line voltage with a fully-insulated housing.

As a world-first innovation, the CMR self-powers using the line-to-ground potential via a fully integrated resistor-capacitor chain power supply. Back-up energy is stored in a detachable battery module with long-life, rechargeable battery cells.

This voltage based self-powering ensures reliable operation on all networks. It enables significantly higher load and fault-current ratings to be achieved in a smaller footprint and lower cost.

The fully-insulated design improves safety and network reliability by ensuring no live components of the CMR are contactable by operators or wildlife.

With embedded microprocessor control in the switch unit with wireless connectivity, the CMR has advanced protection and measurement capabilities, event logging, and load profiling.

Lightweight and simple mounting options mean the CMR is fast and easy to install. The latest improvement introduce independent protection, commonly known as triple-single, to three-phase CMR. It also includes Role-Based Access Control (RBAC), safeguarding networks in accordance with IEEE Standard 1686-2022.

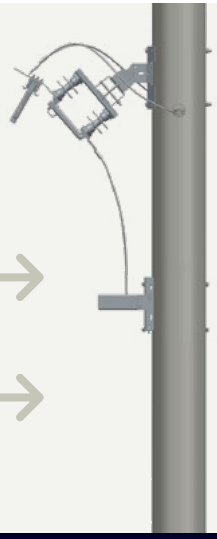
The CMR represents a quantum step in technology for cost-effectively improving the reliability of overhead medium-voltage networks.

Hydraulic recloser replacement

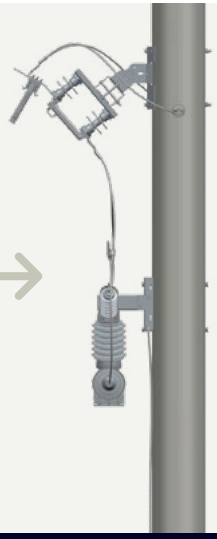
Step one: Disconnect and remove hydraulic recloser

Step two: Install pole mounting bracket

Step three: Mount CMR on pole bracket



Step four: Connect cables and energise



Benefits

The CMR approaches overhead distribution protection in a new way. Its unique system design provides fundamental protection and monitoring capabilities for single and multi-phase recloser applications in urban and rural networks. This clever, completely integrated system is suitable for all sites, even those with inconsistent or no line current.

By eliminating the need for regular maintenance[1] and utilising line voltage as power supply, this new generation auto-recloser addresses all common problems of obsolete hydraulic reclosers. For greater flexibility, utilities can choose between pre-configured options as a drop-in alternative to a traditional hydraulic recloser or to self-configure the devices to take advantage of advanced protection, measurement and logging features.

Introducing auto-reclosers and sectionalizers into the distribution network, utilities can increase reliability, represented in indexes such as SAIDI & SAIFI, and reduce interruptions to their customers.

[1] Excludes routine battery replacements every eight years.

Improved network reliability

Higher customer satisfaction

Fast and easy installation

Operational flexibility

Fast return on investment, lower operating costs, reduced SAIDI & SAIFI

Improved operator safety

I want to buy a modern electronically controlled recloser but don't need complicated protection, automation and SCADA features. I want to avoid the design, construction and equipment cost of a solution with a separate switch unit, control cubicle, auxiliary supply and connection cable.

Fully integrated

The recloser is a fully integrated device of switch unit, controller and power supply.

All the user need do is:

- Mount the recloser on the pole
- Connect the earth lead
- Connect the line and load side cable tails

Simple user interfaces are provided by external handles for linesman operation with hook-stick. Wireless connection enables configuration, operation and event retrieval via intuitive PC applications.

I want a replacement for my existing hydraulic recloser without having to perform protection studies or train technicians in how to configure a new device. I want to gain the benefit of reduced maintenance, simple installation, and knowing I can access advanced features in the future without needing to change out the recloser physically.

Factory configured

The factory configures the protection settings to mimic any model of legacy single-phase hydraulic recloser.

The user advises Siemens of the model code of the legacy hydraulic recloser, and the factory applies and tests protection settings to generate equivalent performance.

The CMR is flexible for the future as the user can wirelessly change the protection settings or enable other functions as their requirements evolve.

I want to upgrade my network and replace my obsolete hydraulic reclosers with an advanced alternative that immediately gives me access to additional protection options, provides network data, and eliminates the need to remove the recloser from service to perform routine maintenance processes.

User configured

The user configures the recloser wirelessly to access comprehensive protection, measurement, and logging features.

The user immediately has access to:

- Fully configurable protection curves
- Five protection groups
- Current and voltage measurement
- GPS time-stamped event log

When compared with hydraulic reclosers, CMR's superior ratings allows it to be applied to the majority of overhead line locations where load and fault conditions associated with network growth require higher performances.

In residential areas where most electrical loads are single-phase, it is advantageous when a fault occurs on one phase, allowing the other phases to stay operational. This independent phase protection minimises customer disruption by enabling other network parts to continue functioning, enhancing service reliability.

For utilities, configuring single-phase equipment to work within a three-phase installation reduces inventory requirements and introduces different operational modes. This flexibility allows utilities to adapt more efficiently to varying needs with simpler inventory management, ensuring they can respond quickly and effectively to any issues.

The CMR creates value by:

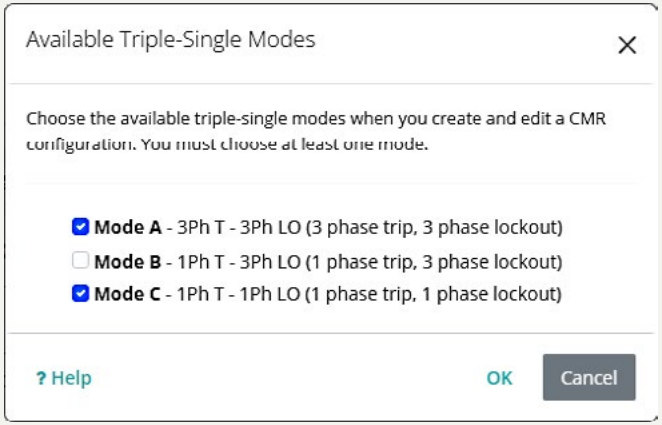
1. Reducing the total cost of installation (TCI) through pole construction simplification, lightweight device construction, and compact design.
2. Being an optimised reliability improvement platform with an upgrade path to SCADA connectivity to facilitate remote control and monitoring.
3. Providing accurate and stable protection characteristics for dependable coordination.
4. Being a single device with configurable protection pick-ups that can be applied to different applications, optimising total cost of ownership (TCO).
5. Providing flexibility for inventory management by allowing utilities switch between different operating modes.

Operation Modes

There are three modes of operation for three-phase CMRs:

- Three-phase trip, three-phase lockout - (Mode A)
- Single-phase trip, three-phase lockout - (Mode B)
- Single-phase trip, single-phase lockout - (Mode C)

Independent phase protection, commonly known as triple-single, is enabled in the Siemens cloud tool (SOSDMC).



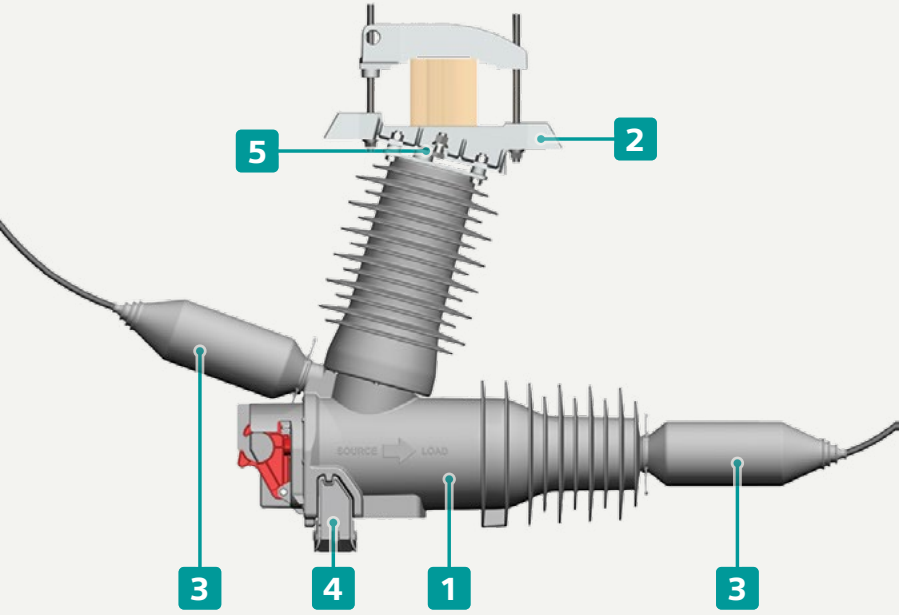
The CMR provides simple operation mode configuration and can be changed either remotely or locally without the need for physical reconfiguration.

Components

Developed as part of an integrated system of tools and accessories, CMR is an essential element in a system of components that work together to deliver ease of installation, rapid commissioning, and reliable operation in all conditions.

A typical CMR installation includes:

1 The CMR switch unit
2 Crossarm clamp or pole-mounted assembly
3 Wildlife guards
4 Battery module
5 Ground connection



Switch unit design

The CMR is a fully integrated unit consisting of a vacuum interrupter driven by a magnetic actuator. Onboard current and voltage sensors provide measurement inputs into the built-in electronic controller and protection modules.

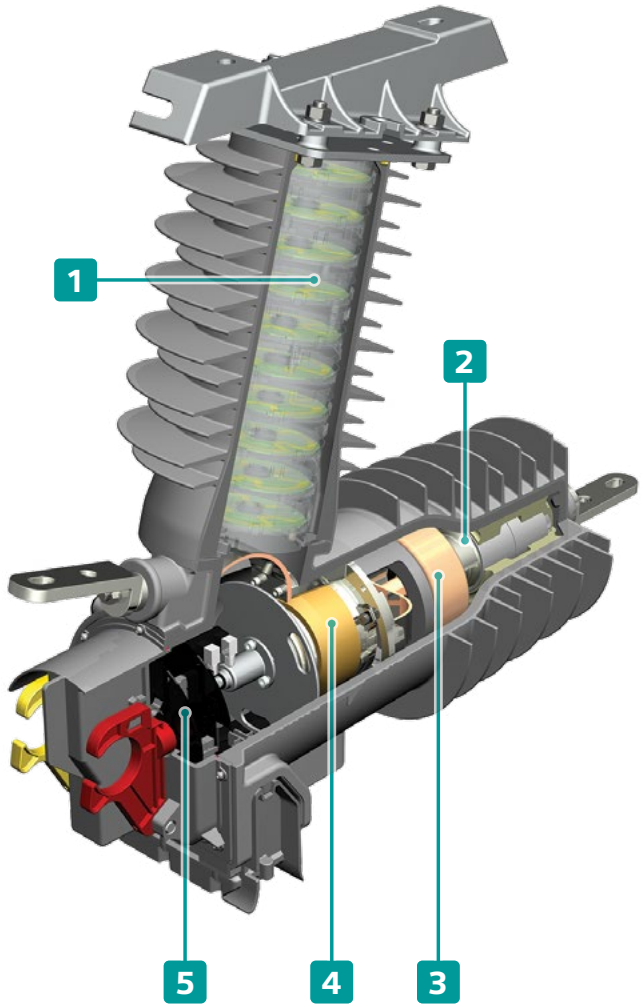
As an insulated system utilising high-grade, silicone insulation, the CMR delivers improved operator safety and superior outdoor life.

Line voltage self-powering

Incorporating a breakthrough innovation in harvesting power from the line voltage, the CMR uses the line-to-ground system voltage to deliver a small leakage current flowing through a resistor-capacitor network to generate power for the electronic controller and to recharge the battery module. This eliminates the need of an external auxiliary power supply, increasing reliability and reducing cost of the overall solution.

1 Voltage power system
2 Vacuum interrupter
3 Current transformer
4 Magnetic actuator
5 Electronic controller

Switch and voltage stack side view

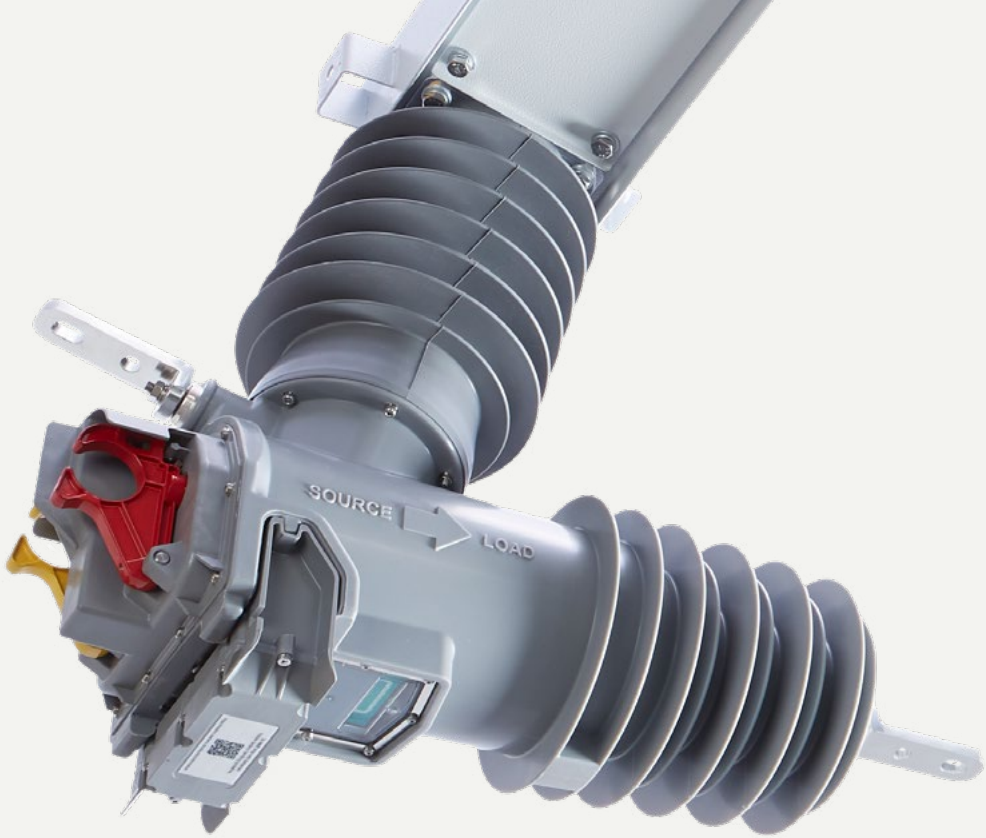


Vacuum interrupter

The CMR utilises state-of-the-art and well-established Siemens vacuum interrupter.

Magnetic actuator

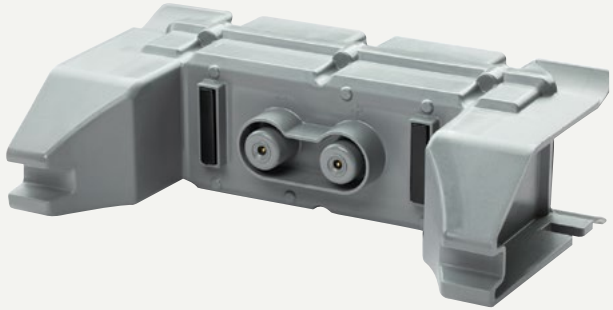
The magnetic actuator has been specifically designed for precise control of operation to enable point on-wave switching to optimise arc clearing of the vacuum interrupter.



Battery module

Rechargeable from the line voltage, the battery module plugs into the CMR and provides back-up power in the event the line is deenergised.

Energy stored in the battery module is used to power the CMR during infrequent periods when no line voltage is available and to recharge the trip and close capacitors during a reclose sequence.



High-intensity FPI LED

Adjacent to the position indicator is a high-intensity LED that when illuminated is visible from the ground in daylight. The primary function of the LED is for fault passage indication. It is also used to assist the operator during commissioning and when manually interacting with the recloser.

Position indicator

The magnetic actuator is directly coupled to the position indicator, which is visible from ground level. The indicator has red/green colours with I/O labels to indicate closed/open state. The colour assignment can be changed upon customer request.

Operations counter

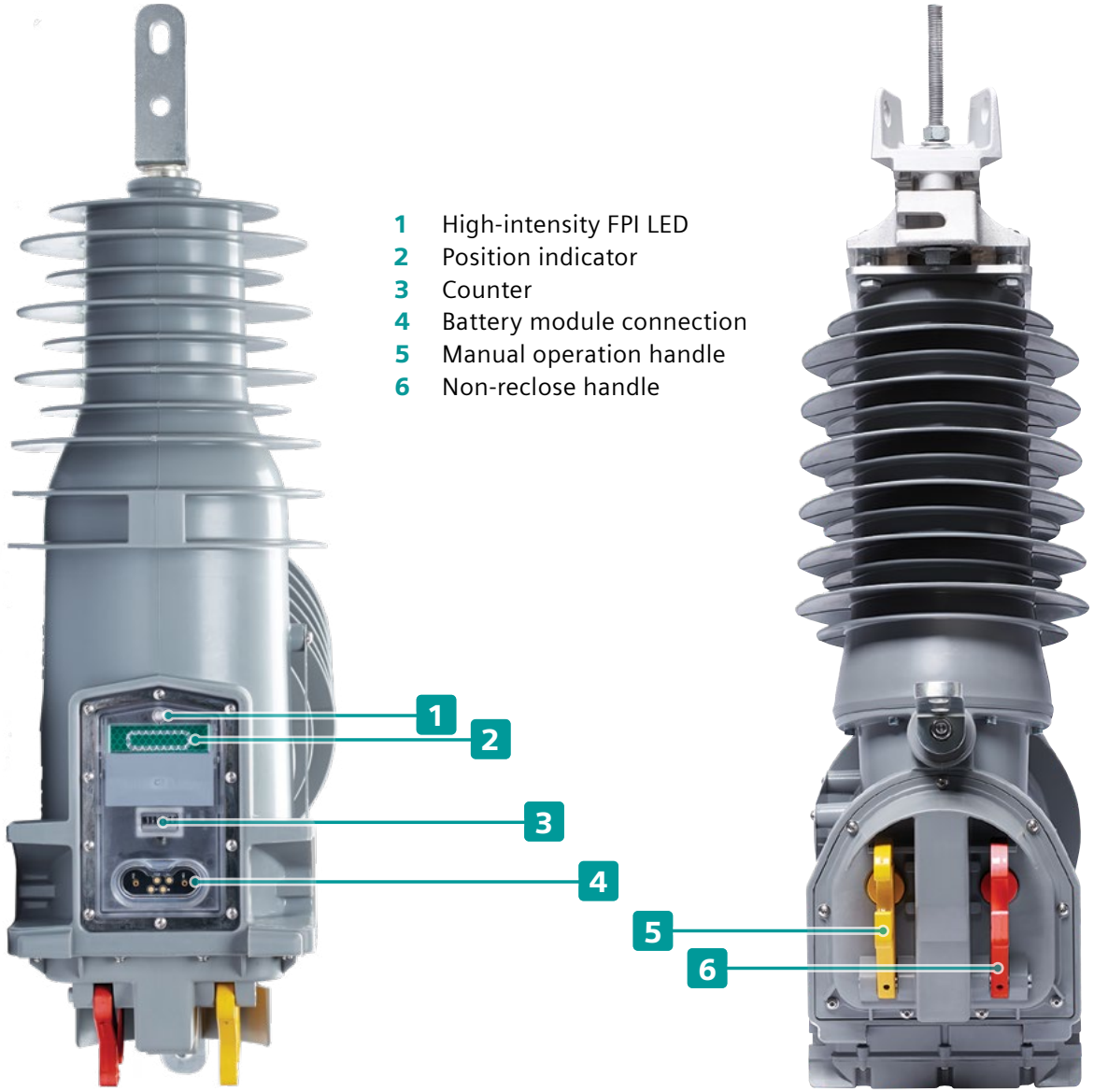
On the underside of the device adjacent to the position indicator is an electromechanical operation counter.

Non-reclose handle

The red, non-reclosing handle is used by a local operator to change the protection function of the recloser. When pulled down, the recloser changes protection groups; typically to a group configured for a single protection trip to lockout.

Manual operation handle

The recloser is fitted with a yellow, mechanical, manual-operation handle that is directly connected to the magnetic actuator. Pull the handle down to mechanically trip and lockout the recloser. Return the handle to the up position to electrically close the recloser using the energy stored in the battery module.



1 High-intensity FPI LED
2 Position indicator
3 Counter
4 Battery module connection
5 Manual operation handle
6 Non-reclose handle

Mounting - Single-phase unit

Crossarm mounting

The preferred method of mounting is to a crossarm using the integrated crossarm clamp assembly. The design of this clamp facilitates simple lifting, mounting, and securing of the recloser to the crossarm.

Integrated surge arrester mounting

The crossarm-mounting bracket provides integrated locations for installation of surge arresters[2] on both the line and load sides. We recommend the use of distribution class surge arresters.

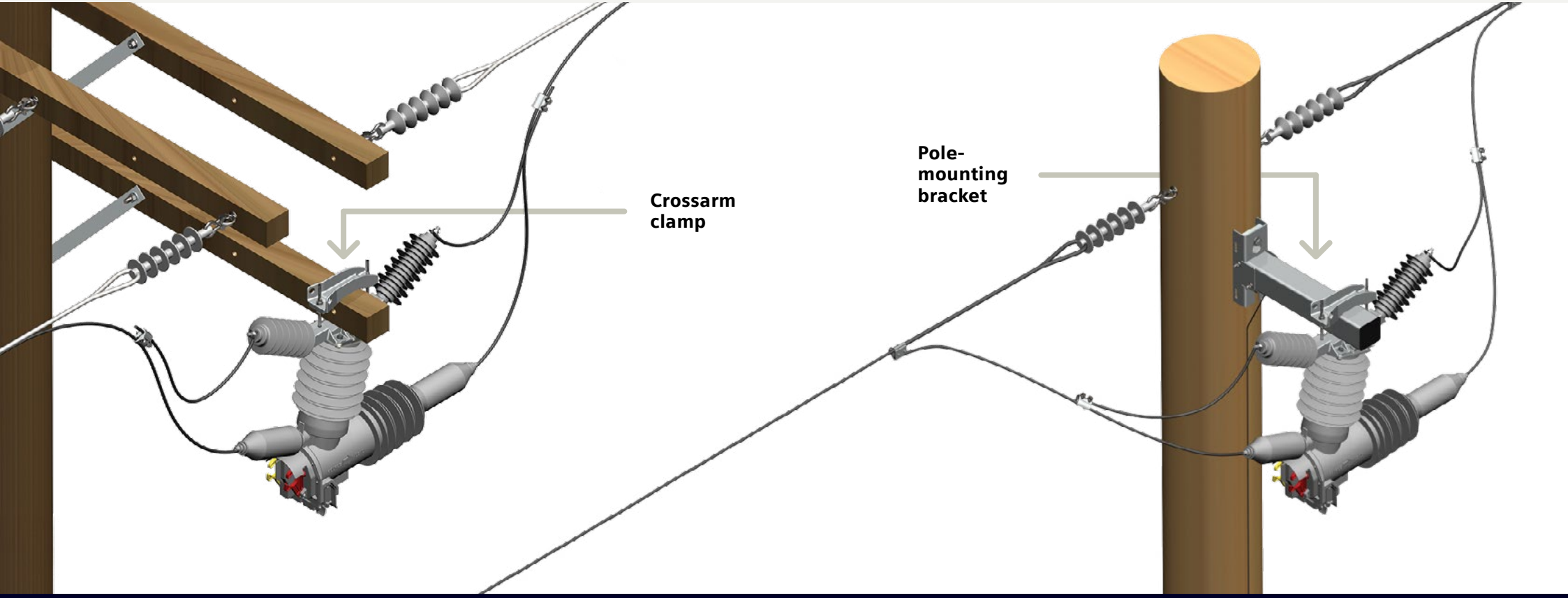
Grounding connection

A ground connection is required for the voltage power supply and voltage measurement function to have a 0 V reference point. The crossarm-mounting bracket has an integrated ground wire-connection stud.

Pole-mounting bracket

For poles with no pre-existing crossarm, a pole-mounting bracket is available that the crossarm clamp can be fitted to.

[2] Surge arresters are not provided and must be ordered separately.



Mounting - Modular multi-phase system

Multiple CMR's can be connected together via an optic fibre loom to build an extensible and modular multi-phase recloser system.

Mounting frame

Each CMR is connected to a powder-coated 304 grade stainless steel frame with integrated surge arrestor and pole mounting brackets. Frame options are available for two-phase and three-phase installations.

At time of order, the arrangement of the CMR's on the frame are specified as to the number of phases on the left and right hand side of the pole.

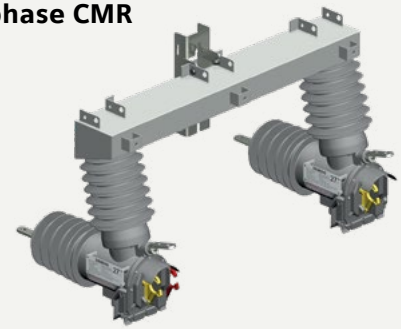
Primary phase

In a multi-phase system the left hand pole is the primary unit and has the red non-reclose handle, GPS chip and wireless radio. It processes all signals and makes protection decisions. The secondary phases are simply providing data to and acting on commands from the primary phase.

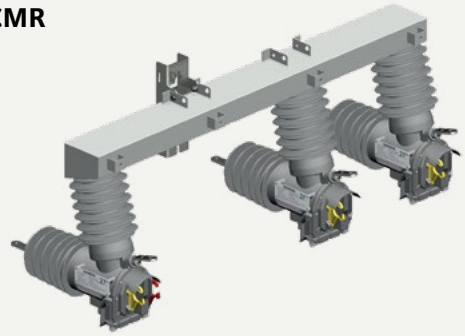
Optic fibre

The CMR units making up each phase of the system are connected via optic fibre mounted inside the frame. Current, voltage and status data is shared over the optic fibre and consolidated in the primary phase. The primary phase does all protection functions and sends controls to the secondary phases for when to operate.

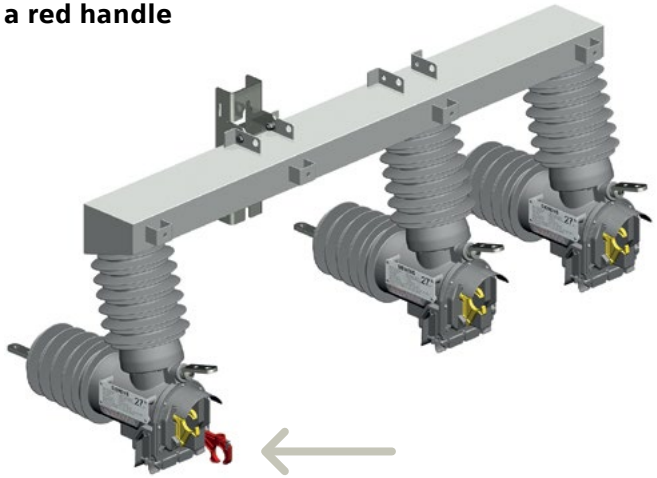
Two-phase CMR



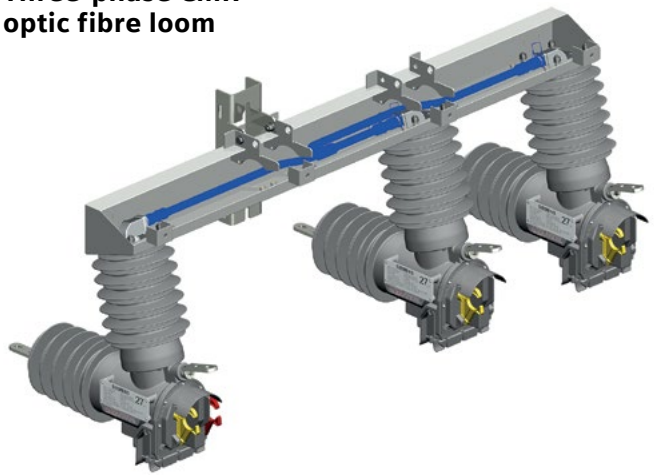
Three-phase CMR



Primary phase has a red handle



Three-phase CMR optic fibre loom



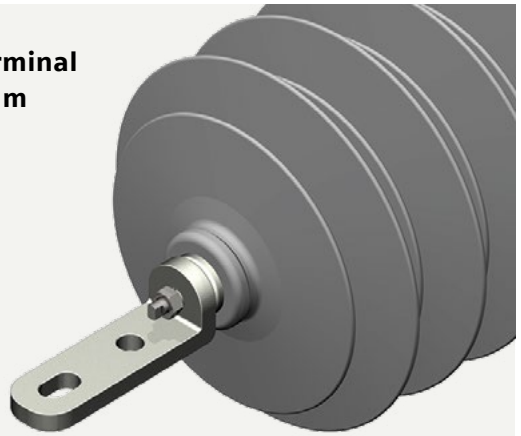
Mounting - Terminals

The CMR can be ordered with multiple styles of terminal depending upon current-carrying capacity and preferred installation methods:

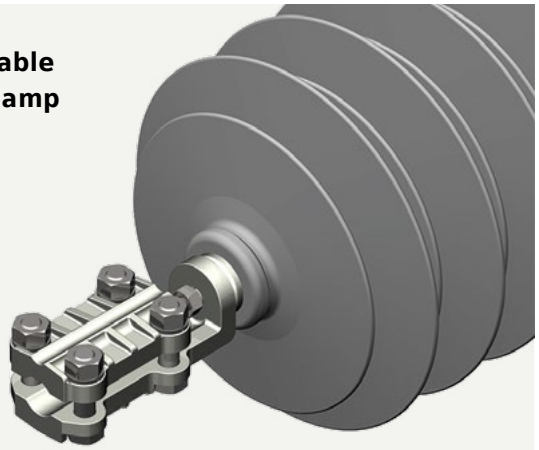
- 800 A: two-hole NEMA palm (silver-plated copper)
- 630 A: two-hole NEMA palm (tin-plated aluminium)
- 400 A: cable clamp (tin-plated aluminium)

Other options are available by specific customer request.

Terminal palm

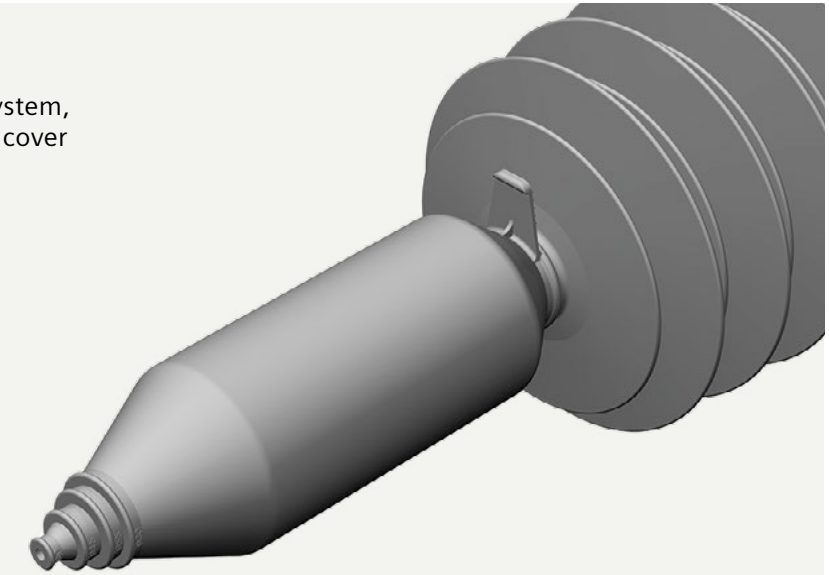


Cable clamp



Wildlife guard

To maintain a fully-insulated system, wildlife guards are available to cover the recloser terminals.



Hydraulic recloser protection

A traditional hydraulic recloser requires the correct hydraulic valves and series-trip coils to be fitted at the time of manufacture to deliver specific protection functionality.

The hydraulic recloser order code defines all of these manufacturing options.

Recloser model and type

The hydraulic recloser model type defines the shape of the fundamental time-current curve of the protection and the dead time between operations in the reclose sequence.

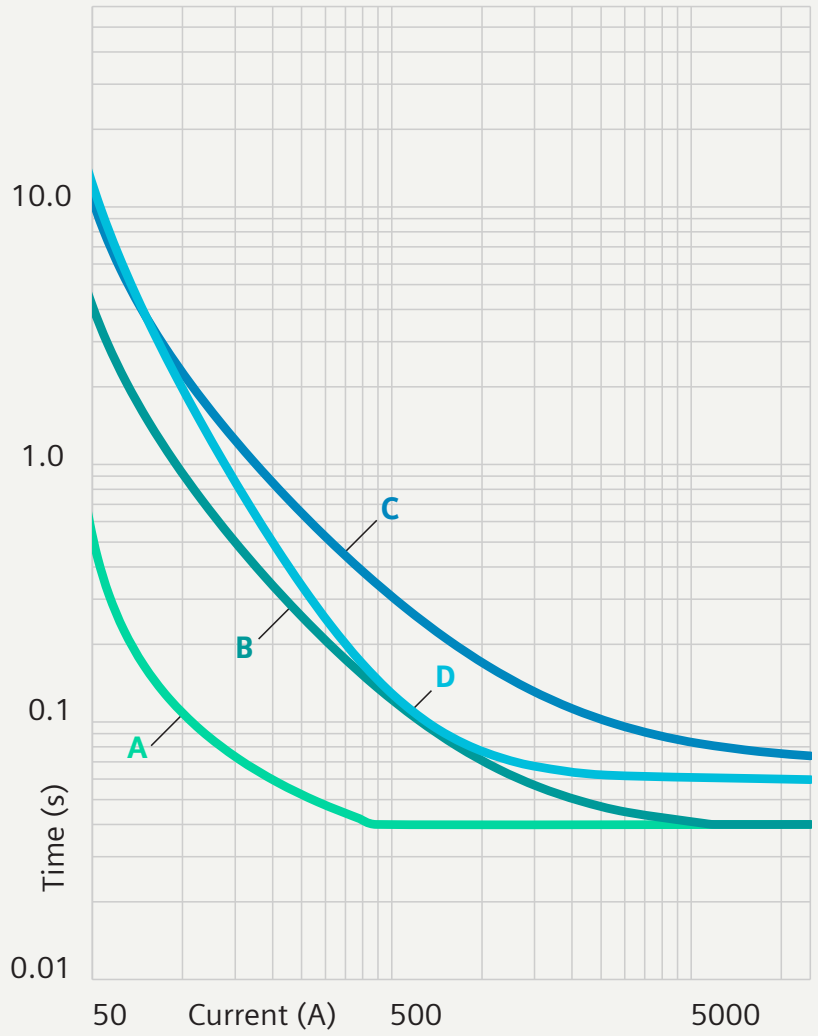
The recloser then supports two curves, a “fast” and a “delayed” curve option:

- The fast curve is the A-curve
- Select the delayed curve from the B, C or D-curve options.

Series trip coil rating

The hydraulic recloser is then fitted with a series coil that sets the protection pickup at x2 the coil continuous-current capability.

Type L time-current curves 25 A series coil



Operating sequence

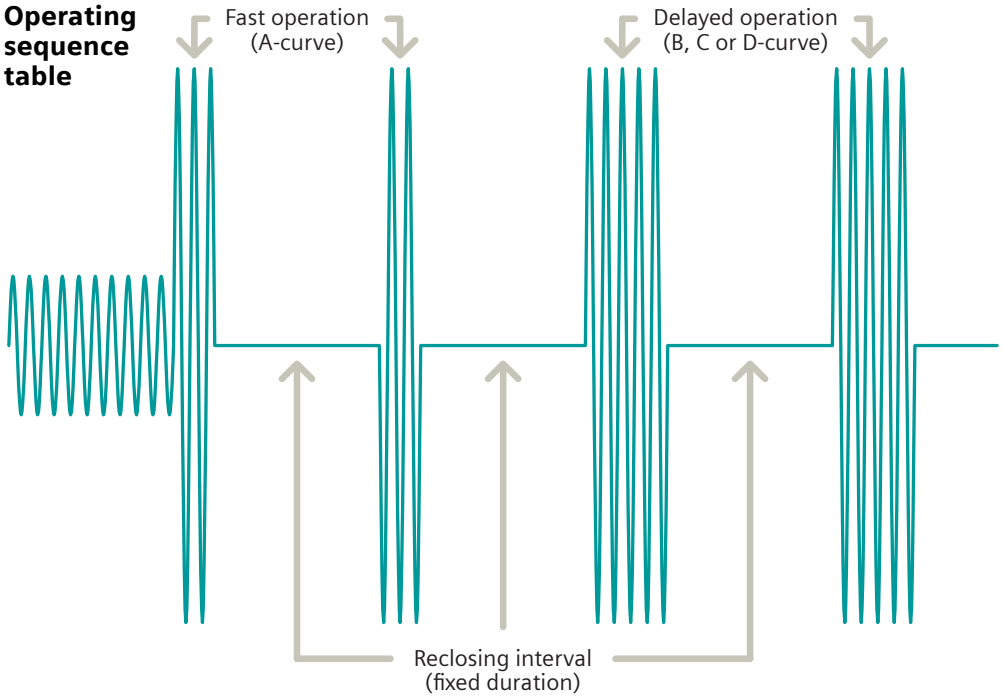
During the manufacturing process, the hydraulic recloser mechanism is adjusted to determine the operating sequence of the recloser, including the following parameters:

- Number of fast-curve operations (0-4)
- Number of delayed-curve operations (0-4).

Note that the total number of operations cannot exceed four and that the fast operations must occur before the delayed operations in the reclose sequence.

To have a factory pre-configured CMR to closely mimic the operating characteristics of the hydraulic recloser to be replaced, please provide the model code of that recloser to us at time of order or complete the order code on page 24 of this catalogue.

Operating sequence table



How to select hydraulic recloser

Hydraulic recloser configuration options	Value
Recloser group and type	Type V4L
Continuous current rating of series-trip coil	200
Delayed time-current curve	D
Number of fast A-curve operations	3
Number of delayed operations	1
Hydraulic recloser order code	**KL V4 200 D 3 1**

Ratings	Unit	Description
15.5	kV	Maximum system voltage
110	kV	Impulse withstand
6000	A	Interrupting current
200	A	Continuous current
Operating sequence	**Unit**	**Description**
A		Trip curve 1
2	s	Reclose interval 1
A		Trip curve 2
2	s	Reclose interval 2
A		Trip curve 3
2	s	Reclose interval 3
D		Trip curve 4

Configurable protection

The CMR is a microprocessor-controlled vacuum auto-recloser and, therefore, its protection capabilities are not limited by hydraulic valves and series-trip coil selections.

A configuration file is created offline and then sent to the CMR wirelessly using the CMR Connect PC tool.

Time-current curve configuration

The CMR uses a point-mapping approach to curve creation and supports all existing hydraulic-recloser curves, fuse curves, IEC or ANSI curves, and user-definable curves.

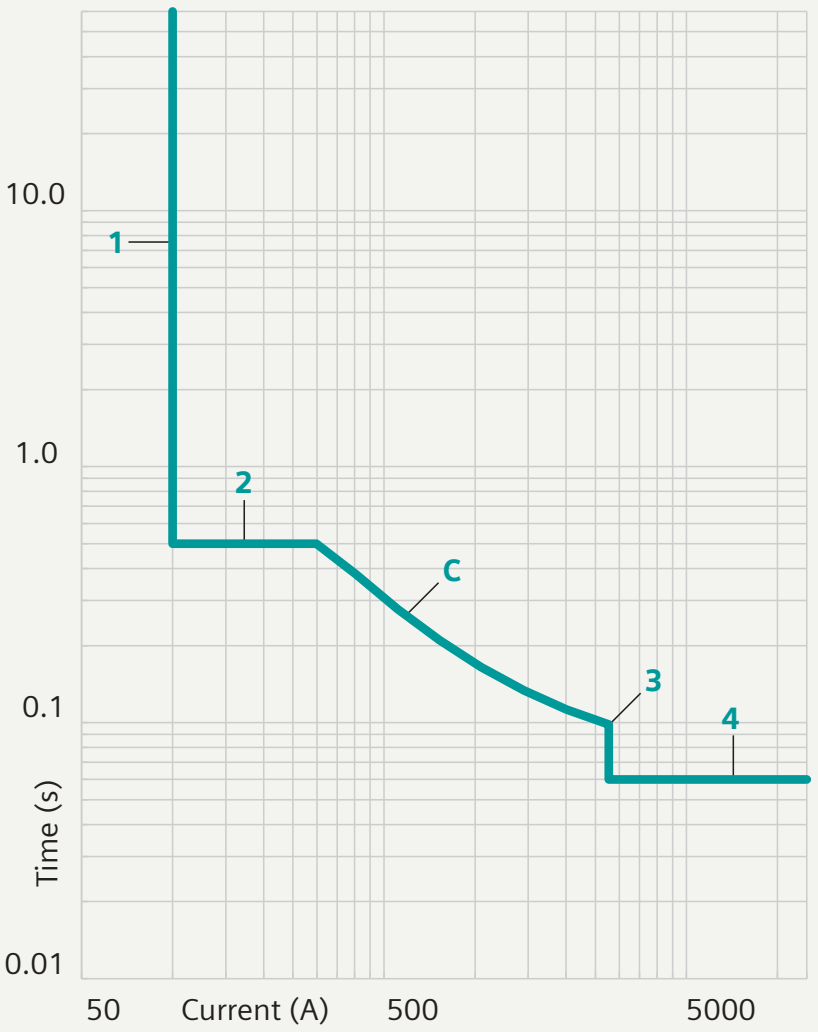
Each base curve has a range of modifiers that can be applied, including:

1. Minimum current pickup
2. Maximum trip-time element
3. Instantaneous current element
4. Minimum time element

A total of 30 independent curves can be created and used per recloser. The active time-current curve can be modified by the controller to apply:

- Inrush restraint
- Cold-load restraint

Configurable time-current curve elements



Earth fault protection

In multi-phase CMR systems it is possible to calculate a residual earth fault current and have protection operate upon this input.

The same time current curve options available in overcurrent protection can be applied to earth faults.

Sensitive earth fault protection

The CMR can also have a definite time sensitive earth fault element for detecting high impedance faults.

Reclose-sequence configuration

A reclose sequence can be configured by assigning the total number of operations in the sequence, the reclose interval between each operation, and the time-current curve applicable to each operation. A high-current lockout can also be set.

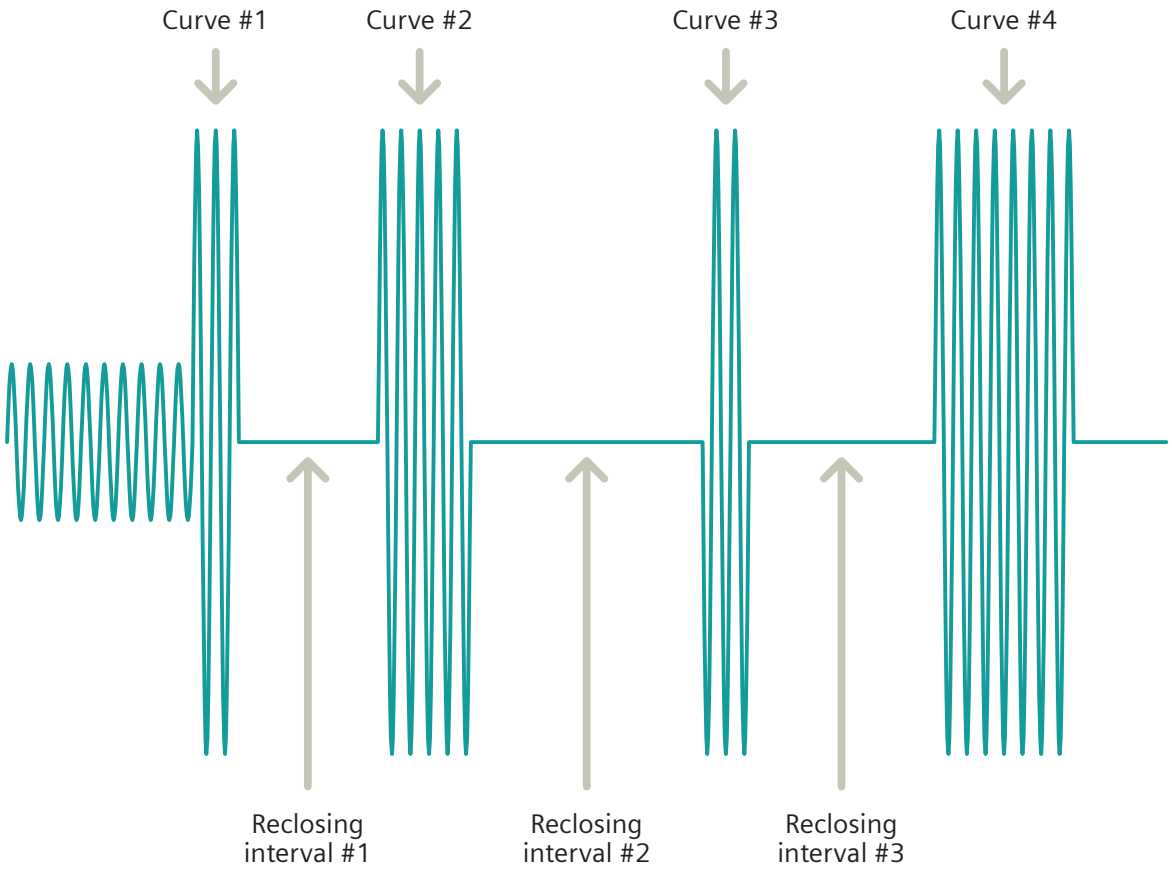
Protection groups

The CMR allows the user to store up to five different protection groups in the device and assign these to certain conditions, for example:

- Group 0 is normal
- Group 1 is red handle down
- Group 2 is set for extreme fire risk days (via SCADA as a future feature).

Each protection group allows the configuration of overcurrent, earth fault and sensitive earth fault elements.

Configurable operating sequence



Communications and data

Wireless communications

The CMR includes an intelligent, short-range wireless transceiver, which enables encrypted communications on the public 2.4 GHz band and has an effective range of up to 20 m/60 ft.

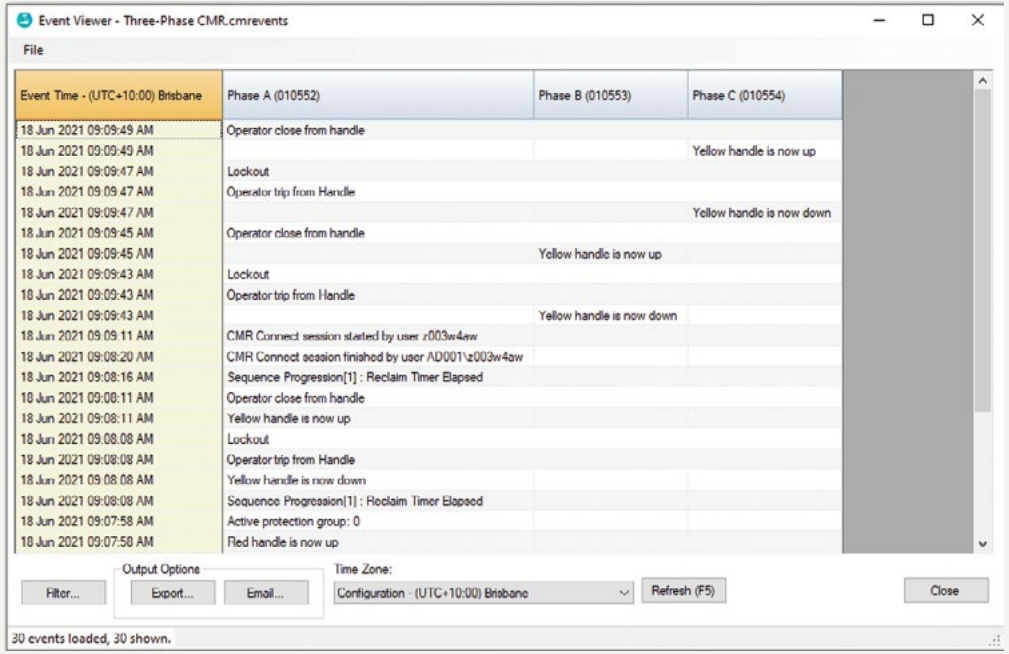
GPS chip for event data

For applications requiring accurate time-stamped event data, the CMR is available with a GPS chip.

Events include protection operations, fault data, manual operations, and configuration changes.

Events can be viewed using the CMR Connect PC application.

Event log



PC and CMR

Fault-passage indication

The CMR can be configured to flash the LED as a fault beacon when certain protection events occur (e.g., a permanent fault and the recloser has tripped to lockout).

PC communications kit

With the PC communications kit and the CMR Connect software, a local user can use a PC to connect with the CMR over the wireless link to:

- Send a new configuration to the recloser
- Retrieve event data from the recloser
- Open or close the switch
- Update the firmware

Ratings

Standards

The CMR conforms to the relevant sections of the following standards: IEC 62271-111 (2012)/IEEE C37.60.

Model selection for system voltage

The CMR self powers by harvesting energy from the line using an inbuilt, high-impedance chain connected from line voltage to ground (earth) point. Leakage current in the range of 4 mA flows through this chain and provides power to the recloser electronic controller.

Successful deployment of the CMR requires that the correct model is selected to match the available line voltage of the network. If the available voltage is too low, then the batteries cannot be recharged.

[3] Correct model must be selected for the application system voltage (27 kV model cannot be used on a 12 kV network)

Switch Unit Parameters	Unit	Rating	
Rated voltage	kV	up to 27	38
Rated frequency fr	Hz	50/60	50/60
Rated continuous current Ir	A	800 @ 40 °C 630 @ 55 °C	800 @ 40 °C 630 @ 55 °C
Rated short-time withstand current Ik	kA	12.5	6.3
Rated peak-withstand current Ip	kA	32.5	16.4
Rated duration of short circuit tk	s	3	3
Rated symmetrical interrupting current ISC	kA	12.5	6.3
Rated symmetrical fault-making current	kA	12.5	6.3
Rated operating sequence		O - 0.3 s - CO - 2 s - CO - 2s - CO	O - 0.3 s - CO - 2 s - CO - 2s - CO
Opening/closing times	ms	< 20	< 20
Clearing time	ms	< 50	< 50
Rated line-charging interrupting current	A	5	5
Rated cable-charging interrupting current	A	25	40
Minimum number of operations at rated short-circuit current		70	240
Minimum number of load-break operations at rated current/mechanical operations		10,000	10,000
IP rating		67	67
Creepage distance	mm	> 1,185	> 1,185

Ratings Desciption	Unit	Model[3]					
Rated maximum voltage (P-P) U_r	kV	4.5	12	17.5	27	27	38
Rated maximum voltage (P-G) U_r	kV	2.5	6.9	10.1	15.5	15.5	21.9
Rated power-frequency withstand - dry U_d	kV	10	28	50	60	60	70
Rated impulse-withstand voltage R_p	kV	110	95	110	125	150	170
Minimum system voltage for operation (P-P)	kV	2.1	7	10	15.5	15.5	20
Minimum system voltage for operation (P-G)	kV	1.3	4.1	5.8	9	9	11.6

Altitude correction factor

The dielectric strength of air insulation decreases with increasing altitude due to low air density. The rated withstand voltage values specified in the above apply to a site altitude of 1,000 m above sea level. For altitudes above 1,000 m, the insulation level must be corrected according to IEC 62271-1.

The correction applies to the rated power-frequency withstand voltage and the rated impulse-withstand voltage.

To select the devices, the following applies:

$U \geq U_o \times K_a$

U = Rated withstand voltage at reference atmosphere

U_o = Rated withstand voltage requested for place of installation

K_a = Altitude correction factor from the diagram

Ambient conditions

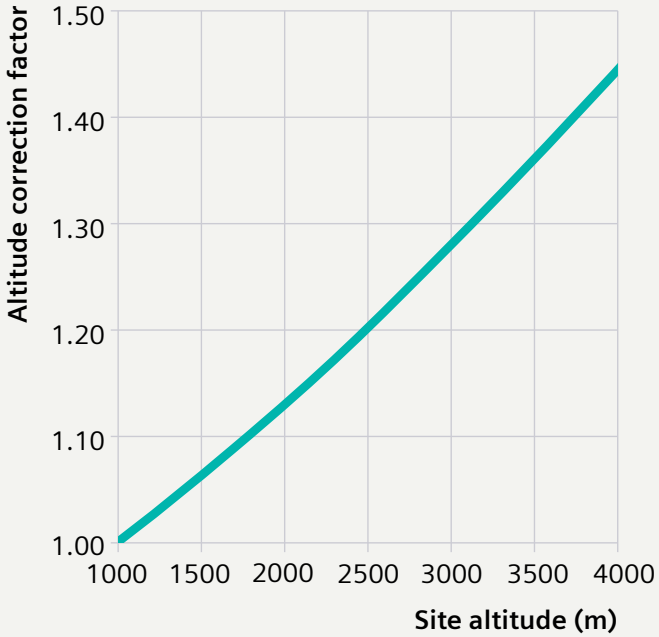
The CMR is suitable for use in outdoor service environments as follows:

Service Environment	Rating
Operating temperature range	-40 to +55 °C[4]
Humidity	0 to 100%
Maximum altitude	4,000 m[5]
Pollution class	Very Heavy

[4] Reclose intervals must be extended at temperatures below -35 °C

[5] De-rating required above 1,000 m

Altitude correction factor



Battery module performance

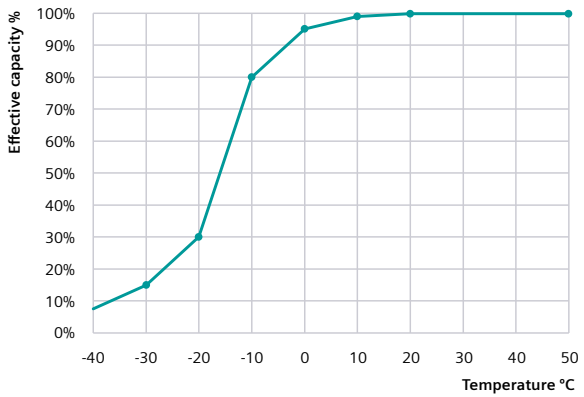
The battery module[6] is fitted with four high-grade 3.6 V Li-ion battery cells of the 18650 size and capacity of 2,000 mAh providing the following system performance:

Description	Value
Hold-up time with no line voltage	72 hours
Number of trip/closer cycles	300
Typical time to recharge batteries	72 hours

The battery capacity is reduced at low temperature per the adjacent chart. For expected performance at low temperature, multiply the percentage from the chart by the expected hold-up time or number of trip/close operations in the above table.

As the battery cells age and near end-of-life, the available capacity reduces and the rated performance may not be achieved.

Battery capacity

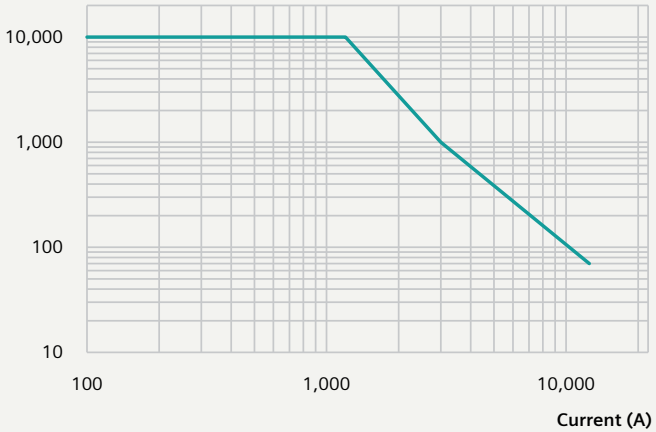


Electrical life

The electrical life of the CMR is limited to the fault-interruption capacity of the vacuum interrupter. The electronic controller tracks the number and magnitude of interruptions and estimates when the vacuum interrupter is worn out.

For example, the vacuum interrupter would be worn out after completing 5,000 load-current interruptions at 630 A using 50 per cent of the available life and 50 fault-current interruptions at 10,000 A using the other 50 per cent of life.

Vacuum interrupter electrical life



Nameplate

Note: For any request regarding spare parts, subsequent deliveries, etc., the following details are necessary:

- Type designation
- Serial No.
- Year of manufacture

[6] New, fully-charged battery module at standard temperature and pressure.

Remote Control Unit

Gateway to remote access. Unlock efficiency.

The Remote Control Unit (RCU) is an optional addition to the CMR system used to connect the CMR to a utility's SCADA system. The RCU is a pole-mounted enclosure containing a microprocessor, a short-range (approximately 20 m) radio used to communicate with the CMR. The utility fits a long-range radio (or modem) to communicate with the SCADA centre.

RCU principle

The RCU acts as an interface between a CMR on the power line and a utility SCADA system. To do this, the RCU uses its configuration to find, and access installed and running CMR. It communicates with the CMR using its built-in short-range radio.

In operation, the RCU acquires data from the CMR and saves it in its database. Data is transmitted to the utility SCADA system master station over a long-range radio (or modem) using the DNP3 protocol. The long-range radio is provided and mounted in the radio tray by the utility and is powered by the RCU. Data in the RCU database includes information about the CMR and the RCU itself. Usually, a subset of this data is mapped into the protocol used by the SCADA system.

RCU system

To minimise installation and operating costs, the Siemens RCU was developed as part of an integrated system of tools and accessories. All system components work together, which permits easy installation, fast commissioning, and reliable operation in all conditions.

A typical CMR and RCU installation includes the following items for each phase:

1. CMR's with communication modules installed permanently
2. RCU
3. Power supply for RCU.

Configuration of the RCU is achieved through a wireless connection to a PC application called RCU Connect.

Communications interface

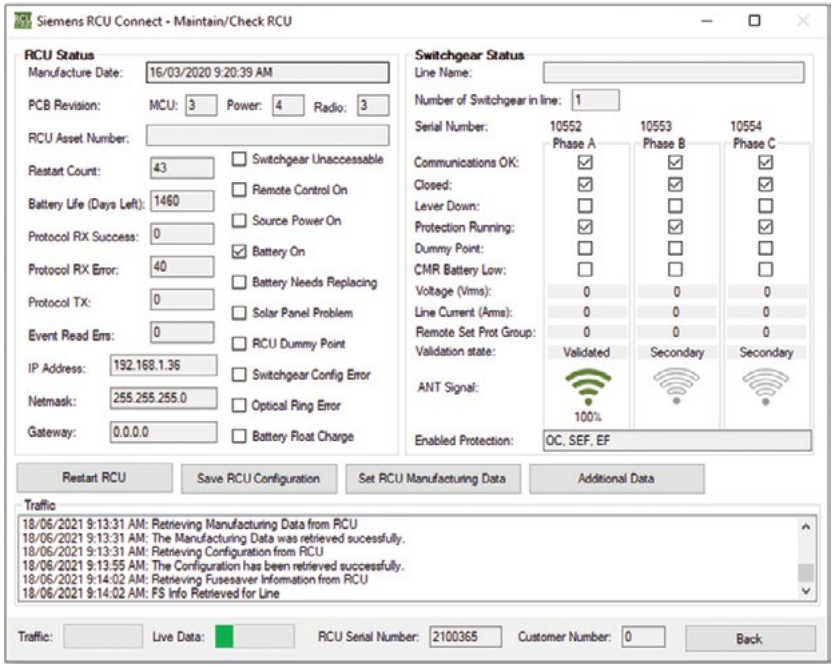
To communicate with the SCADA system control centre station, a long-haul radio or modem is required. The RCU electronics provide a serial, asynchronous data interface (RS232) and an Ethernet port (RJ45) for this purpose.

A purpose-built cable connects the radio/modem to the RCU interface. The design and construction of this cable may be carried out by the customer or as a value-added service provided by Siemens.

Communications protocol

The RCU supports DNP 3.0 and IEC60870-5-104 over both serial link and IP protocol. The RCU has over 200 digital points and more than 40 analogue points providing status information on the CMRs and RCU. The RCU can also receive a wide variety of controls from the SCADA system control centre.

RCU for SCADA connectivity



RCU configuration

The RCU is configured wirelessly over the short-range radio using the RCU Connect PC application.

Standards

The design and testing of the RCU are according to the relevant parts of IEC 60950-1: 2005 Information technology equipment – Safety.

Ambient conditions

The RCU is suitable for use in outdoor environments with ambient temperatures in the range of -40 °C to +45 °C and relative humidity in the range of 5 % to 95 %. For temperatures below -15 °C, the low-temperature version is required.

RCU cubicle

The RCU enclosure is mounted to the pole using the pole-mounting bracket and is manufactured from powder-coated stainless steel for long service life. Material options are available at time of ordering including 304 (standard) and 316 grade stainless steel.

The RCU enclosure has a handle with an internal three-point locking mechanism. An external padlock can be fitted to restrict access.

On the top of the RCU enclosure is a high-grade, UV-stabilised plastic shade hood. This shade hood is to reduce solar heating and to provide an aperture for the short-range radio.

At the rear of the RCU enclosure, there is a ground stud and a number of openings fitted with cable glands to allow external wiring to access the internals of the RCU.

Electronics housing

The electronics housing contains the microprocessor, battery, power connection terminals, data connection points, and the user interface for the RCU. The RCU has a simple user interface for operations and maintenance purposes. The RCU front panel has a number of LED indicators.

The LEDs are normally off (to reduce power consumption) and turn on automatically while the door is open as controlled by the position of the door switch.

The electronics housing also holds the 12 V, 7.2 Ah lead-acid battery. The electronics housing is normally powered by a selectable 115/230 Vac low-voltage supply.

Radio panel

The radio panel is available for the installation of the utility-specific radio, modem, or other means to connect to the utility's SCADA system.

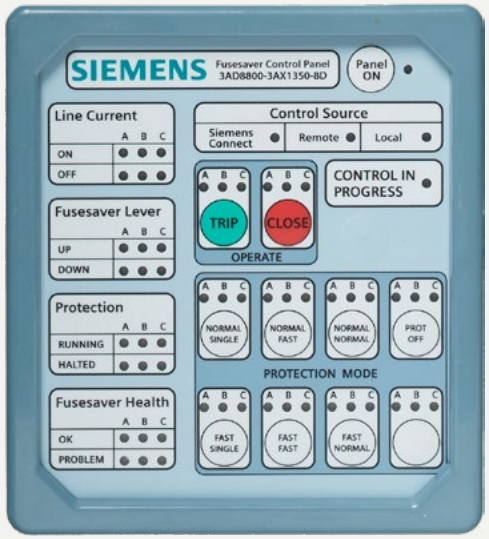
The radio panel hinges to the left and allows access to the radio behind. When closed, the panel provides a degree of protection from driving rain.

RCU accessories

Operator panel

The operator control panel is an optional accessory mounted on the front of the radio panel and plugs into the RCU's electronics compartment. The operator control panel allows a local user to trip and close the CMRs or to change the active protection mode in the CMRs and turn auto-reclose on and off. It also provides additional status information.

There are two operator panels available, one panel for use with CMRs installed as independent poles and another for when they are optically ganged.



Low-temperature option

The low-temperature option is positive temperature coefficient element, which acts as a thermostatic heater, keeping the battery and electronic compartment above -15 °C for ambient temperature as low as -40 °C. The element is hidden from view.

Solar panel

In environments where good sunlight is available all year, it is possible to power the RCU using a solar power kit option.

This includes the solar panel, mounting bracket, and cable. Solar powering of the RCU is also dependent upon power consumption of the utility's radio or modem being less than 100 mW on average.

The solar panel is connected into the terminal compartment to a dedicated set of terminals as an alternative to the mains supply.

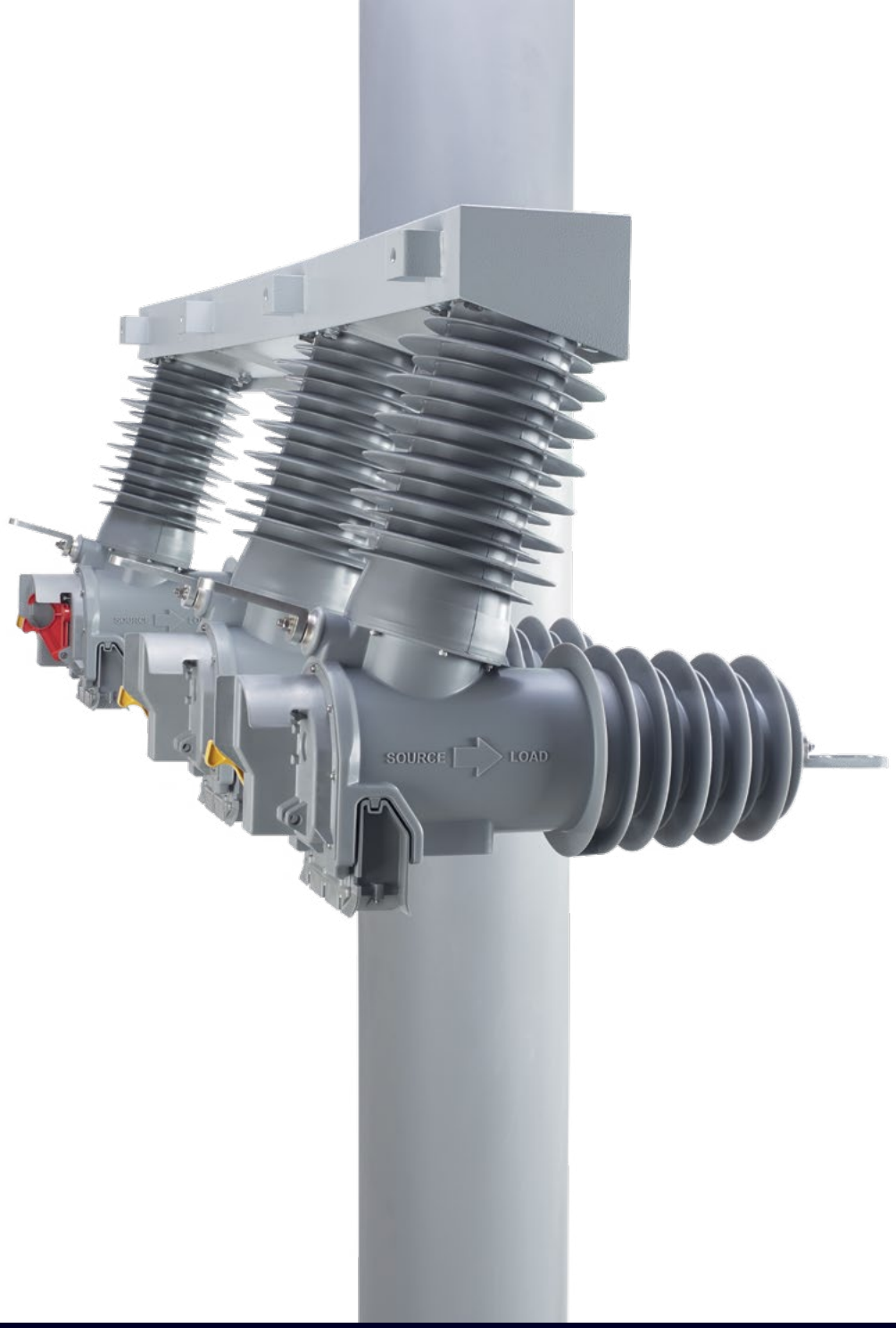
Voltage transformer

Where low-voltage mains is not available and solar powering is not practical, the RCU should be powered by a voltage transformer connected to the medium-voltage line on which the CMR is installed.

Solar ratings	Value
Power ratings	65 W
Nominal voltage	18 V
Cell type	Polycrystalline

Product selection

How to choose the right product for your needs.



Order number structure

The 16-digit order number fully configures a CMR. The primary part covers the main electrical data. The second part covers terminals, mounting, and other mechanical options. The third part defines any requirements for factory loading of hydraulic recloser mimicking protection settings.

The CMR can be ordered either unconfigured if the user wants to do their protection settings, or pre-configured if the user wants it configured by the factory to match the performance of a traditional hydraulic recloser. The user can change the configuration as required.

To order an unconfigured CMR, please choose a digit for the first 12 positions of the part number followed by 0AA0 for positions 13-16. Example below.

1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	Z			
3	A	D	7	1	5	2	–	2	C	A	1	0	–	0	A	A	0	–	Z	●	●	●

To order a pre-configured CMR to provide the equivalent protection function of a legacy hydraulic recloser, all of the digits from 13-16 must have a valid selection. Example below. Note: only the digits 13-16 show altered from the previous example.

1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	Z			
3	A	D	7	1	5	2	–	2	C	A	1	0	–	1	C	C	1	–	Z	●	●	●

Compact Modular Recloser (CMR) Configuration

1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	Z			
3	A	D	7	●	●	●	–	●	●	●	●	●	–	●	●	●	●	–	Z	●	●	●

5th position	1	**Phase type:** 1-phase
	2	**Phase type:** 2-phase
	3	**Phase type:** 3-phase
6th position	1	**Rating:** 4.5kV-12.5kA-630 (110kV BIL/2.5-4.5kV system voltages)
	3	**Rating:** 12kV-12.5kA-630/800A (95kV BIL/7-12kV system voltages)
	4	**Rating:** 17.5kV-12.5kA-630/800A (110kV BIL/10.0-17.5kV system voltages)
	5	**Rating:** 27kV-12.5kA-630/800A (125kV BIL/15.5-27kV system voltages)
	6	**Rating:** 27kV-12.5kA-630/800A (150kV BIL/15.5-27kV system voltages)
	7	**Rating:** 27kV-12.5kA-630/800A (170kV BIL/17.5-23kV SWER voltages)
	9	**Rating:** 38kV-6.3kA-630/800A (170kV BIL/20.0-38kV system voltages)
7th position	0	**Terminal:** Not specified
	1	**Terminal:** 630A Palm (2 hole – tin plated aluminium) – includes wildlife guard
	2	**Terminal:** 400A Cable clamp (imperial) (tin plate aluminium) – includes wildlife guard
	3	**Terminal:** 400A Cable clamp (metric) (tin plate aluminium) – includes wildlife guard
	4	**Terminal:** 800A Palm (2 hole – tin plated brass) – includes wildlife guard
Hyphen	–	**Space**
8th position	2	**Controller:** 1-phase: GPS (events and RCU connectable) (no optic fibre or SEF resistor)
	5	**Controller:** Multi-phase: (controller phase) (secondary phases have no GPS, ANT, mech counter or red lever fitted)
9th position	A	**Mounting:** No mounting bracket
	B	**Mounting:** 1-phase: cross-arm clamp, metric
	C	**Mounting:** 1-phase: cross-arm clamp, imperial
	D	**Mounting:** 1-phase: cross-arm clamp with pole bracket, metric
	E	**Mounting:** 1-phase: cross-arm clamp with pole bracket, imperial
	F	**Mounting:** 2-phase: integrated 1L-1R: metric
	G	**Mounting:** 2-phase: integrated 1L-1R: imperial
	H	**Mounting:** 2-phase: integrated 2L: metric
	J	**Mounting:** 2-phase: integrated 2L: imperial
	K	**Mounting:** 2-phase: integrated 2R: metric
	L	**Mounting:** 2-phase: integrated 2R: imperial
	M	**Mounting:** 3-phase: integrated 2L-1R: metric
	N	**Mounting:** 3-phase: integrated 2L-1R: imperial
	P	**Mounting:** 3-phase: integrated 1L-2R: metric
	Q	**Mounting:** 3-phase: integrated 1L-2R: imperial
10th position	A	**Optic fibre loom configuration:** 1-phase: no selection required
	B	**Optic fibre loom configuration:** Multi-phase: integrated in mounting bracket

Compact Modular Recloser (CMR) Configuration

1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	Z
3	A	D	7	●	●	●	–	●	●	●	●	●	–	●	●	●	●	–	Z	●	●	●

11th position

0	**Battery module:** None
1	**Battery module:** Standard

12th position

0	**Language:** English/indicator standard (green = open)
1	**Language:** English/indicator reversed (green = closed)

Hyphen

–	**Space**

13th position

0	**Unconfigured**
1	**Fast-curve:** Cooper type E
2	**Fast-curve:** Cooper type H
3	**Fast-curve:** Cooper type L
4	**Fast-curve:** Cooper type 4H, V4H
5	**Fast-curve:** Cooper type 4E
6	**Fast-curve:** Cooper type 6H, V6H
7	**Fast-curve:** Cooper type V4E
8	**Fast-curve:** Cooper type V4L
9	**Fast-curve:** Other combinations

14th position

A	**Unconfigured**
B	**Equivalent series trip coil rating:** 5A
C	**Equivalent series trip coil rating:** 10A
D	**Equivalent series trip coil rating:** 15A
E	**Equivalent series trip coil rating:** 25A
F	**Equivalent series trip coil rating:** 35A
G	**Equivalent series trip coil rating:** 50A
H	**Equivalent series trip coil rating:** 70A
J	**Equivalent series trip coil rating:** 100A
K	**Equivalent series trip coil rating:** 140A
L	**Equivalent series trip coil rating:** 200A
M	**Equivalent series trip coil rating:** 280A

1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	Z
3	A	D	7	●	●	●	–	●	●	●	●	●	–	●	●	●	●	–	Z	●	●	●

15th position

A	**Unconfigured**
B	**Number of fast curves and delayed curves:** 4 fast/0 delayed
C	**Number of fast curves and delayed curves:** 3 fast/0 delayed
D	**Number of fast curves and delayed curves:** 2 fast/0 delayed
E	**Number of fast curves and delayed curves:** 1 fast/0 delayed
F	**Number of fast curves and delayed curves:** 3 fast/1 delayed
G	**Number of fast curves and delayed curves:** 2 fast/1 delayed
H	**Number of fast curves and delayed curves:** 1 fast/1 delayed
J	**Number of fast curves and delayed curves:** 2 fast/2 delayed
K	**Number of fast curves and delayed curves:** 1 fast/2 delayed
L	**Number of fast curves and delayed curves:** 1 fast/3 delayed
M	**Number of fast curves and delayed curves:** 0 fast/4 delayed
N	**Number of fast curves and delayed curves:** 0 fast/1 delayed
P	**Number of fast curves and delayed curves:** 0 fast/2 delayed
Q	**Number of fast curves and delayed curves:** 0 fast/3 delayed

16th position

0	**Unconfigured**
1	**Slow-curve:** Cooper B
2	**Slow-curve:** Cooper C
3	**Slow-curve:** Cooper D

Remote Control Unit (RCU) Configuration

Position:	1	2	3	4	5	6	7		8	9	10	11	12		13	14	15	16			Order codes		
Order No:	3	A	D	8	8	0	0	–	0	B	●	●	●	–	●	●	●	●	–	Z	●	●	●
RCU Battery																							
7.2 Ah Lead acid											B												
11.4 Ah Lithium Battery (not for cold climate)											D												
No battery											N												
RCU Enclosure																							
316 stainless powdercoated												2											
304 stainless powdercoated (standard)												3											
RCU Mounting Assembly																							
No RCU Mounting Assembly													0										
Standard Pole Mounting Assembly													1										
Side Mounting Assembly													2										
Standard Pole Mounting Assembly (304 grade s/s)													3										
Standard Pole Mounting Assembly (316 grade s/s)													4										
Firmware application (switchgear-protocol)																							
Compact Recloser – DNP3 and IEC 104															2								
RCU Isolator and Heater																							
Mains miniature circuit breaker																B							
Battery heater and miniature circuit breaker																C							
Operator Panel																							
RCU Operator Panel – Compact Recloser (independent Poles)																	R						
RCU Operator Panel – Compact Recloser (optically ganged Poles)																	U						
RCU Operator Panel - Compact Recloser (triple-single)																	V						
Language of Operation Manual, Nameplate of RCU																							
English																		1					

RCU configuration example

	3	A	D	8	8	0	0	–	0	B	B	3	1	–	2	B	U	1					

RCU battery type: 7.2 Ah lead acid, RCU enclosure: 304 stainless steel powder-coated, standard pole mounting assembly, CMR firmware, external isolated mains input, optically ganged CMR RCU Operator Panel

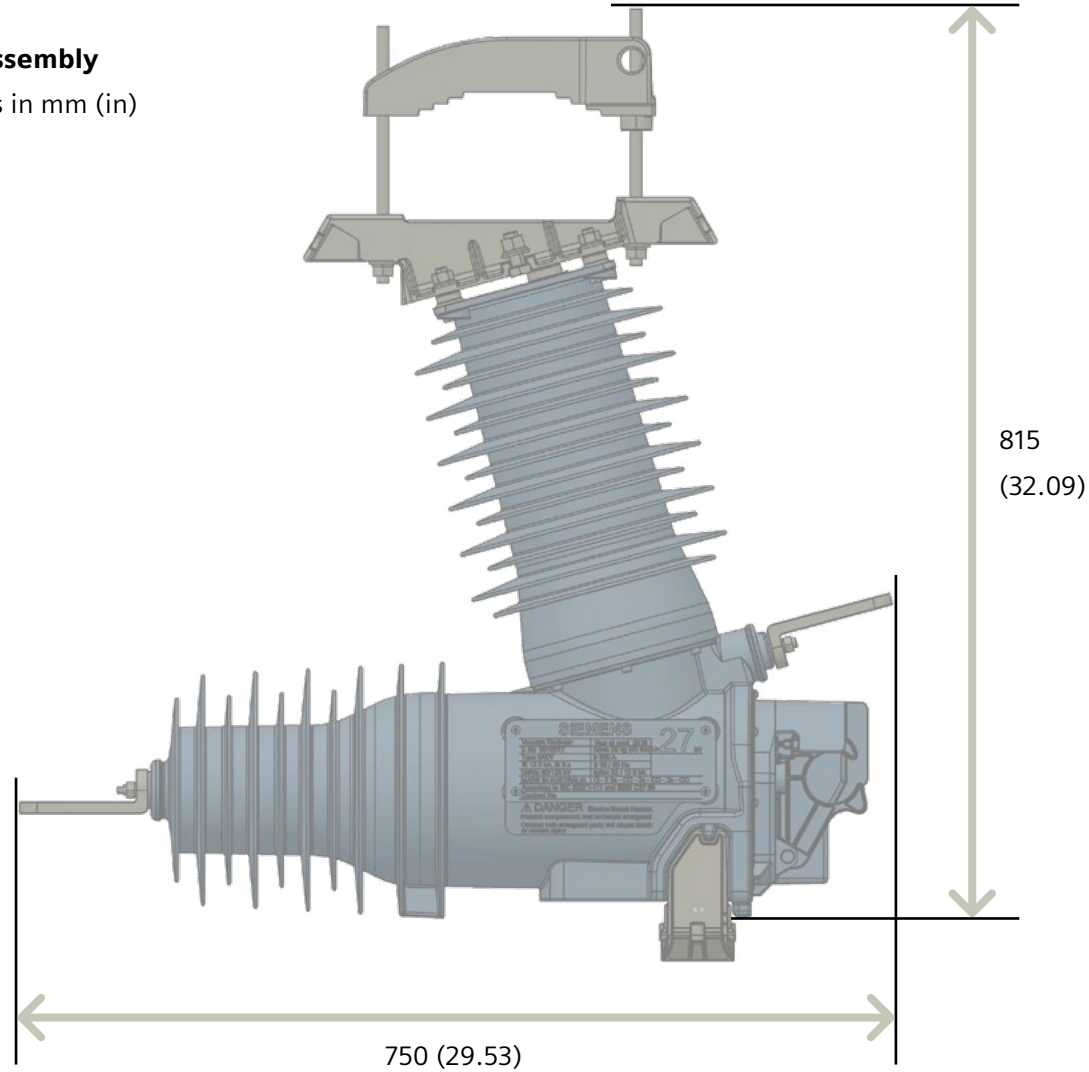
Remote Control Unit (RCU) Accessories/ spare parts

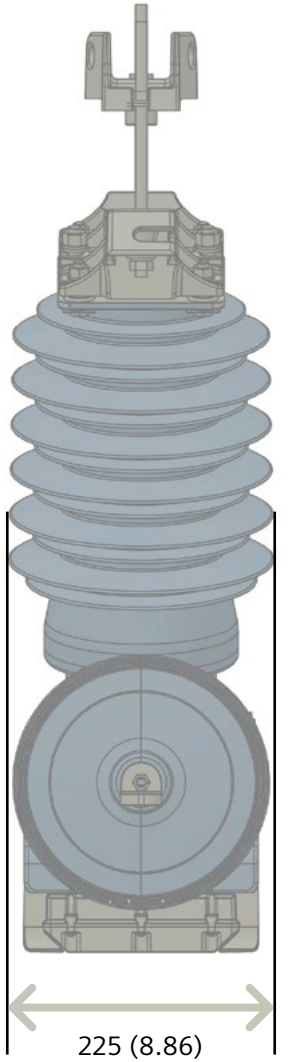
Position:	1	2	3	4	5		6	7	8	9	10	11	12	13	14		15	16			Order codes		
Order No:	●	●	●	●	●	–	●	●	●	●	●	●	●	●	●	–	●	●	–	Z	●	●	●
RCU battery 7.2 Ah Lead acid									3	A	X	1	3	5	0		6	A					
Solar panel kit 65W									3	A	X	1	3	5	0		6	B					
RCU Electronic Enclosure (excluding battery)									3	A	X	1	3	5	0		6	L					
RCU Power cable									3	A	X	1	3	5	0		6	M					
RCU Hood									3	A	X	1	3	5	0		6	N					
Serial Cable RS232 + Power									3	A	X	1	3	5	0		6	P					
Serial Cable RS232 + Power (bare ends)									3	A	X	1	3	5	0		6	Q					
RCU escutcheon and radio mounting plate (spare part)									3	A	X	1	3	5	0		6	S					
RCU Battery 11.4 Ah Lithium									3	A	X	1	3	5	0		6	T					
Ethernet Cable RJ45 + Power									3	A	X	1	3	5	0		6	U					
RCU Side Mounting Assembly									3	A	X	1	3	5	0		7	A					
RCU Standard Pole Mounting Assembly									3	A	X	1	3	5	0		7	B					
RCU Standard Pole Mounting Assembly (304 grade stainless)									3	A	X	1	3	5	0		7	C					
RCU Standard Pole Mounting Assembly (316 grade stainless)									3	A	X	1	3	5	0		7	D					
RCU Operator Panel – Compact Recloser (Independent Poles)									3	A	X	1	3	5	0		8	R					
RCU Operator Panel – Compact Recloser (Optically Ganged Poles)									3	A	X	1	3	5	0		8	U					
RCU Operator Panel - Compact Recloser (triple-single)									3	A	X	1	3	5	0		8	V					

Dimensions

Crossarm-mounted single-phase assembly

Weight < 25 kg (55.12 lbs), dimensions in mm (in)

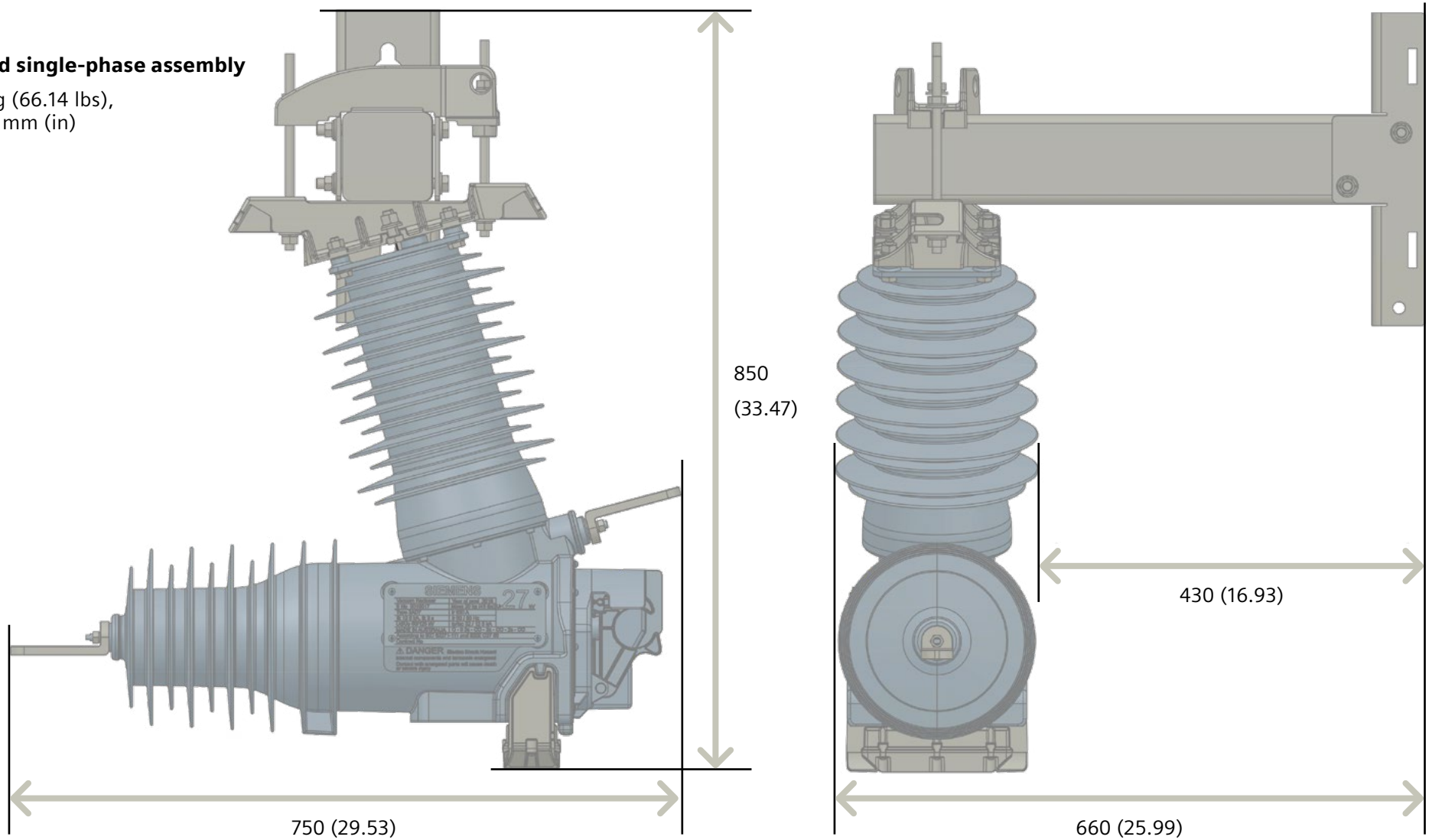




Dimensions

Pole-mounted single-phase assembly

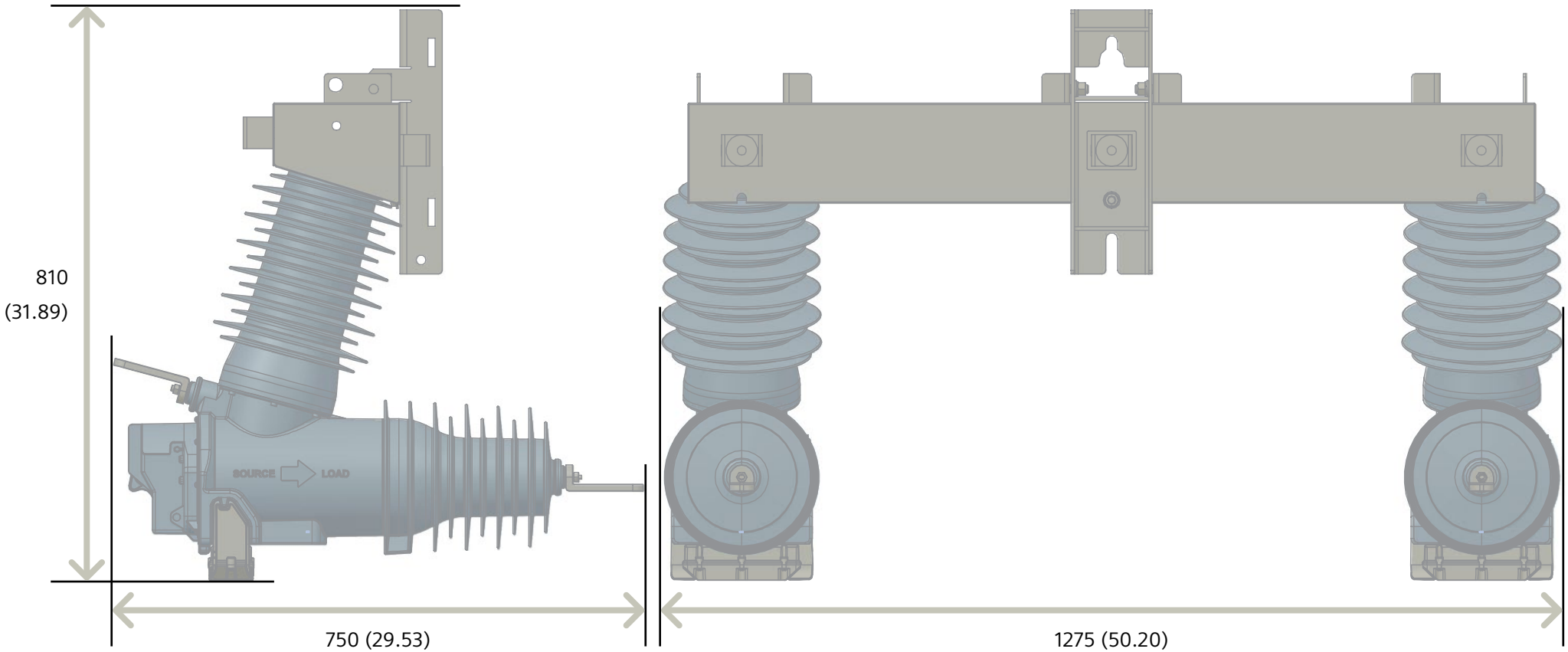
Weight < 30 kg (66.14 lbs),
dimensions in mm (in)



Dimensions

Pole-mounted two-phase assembly

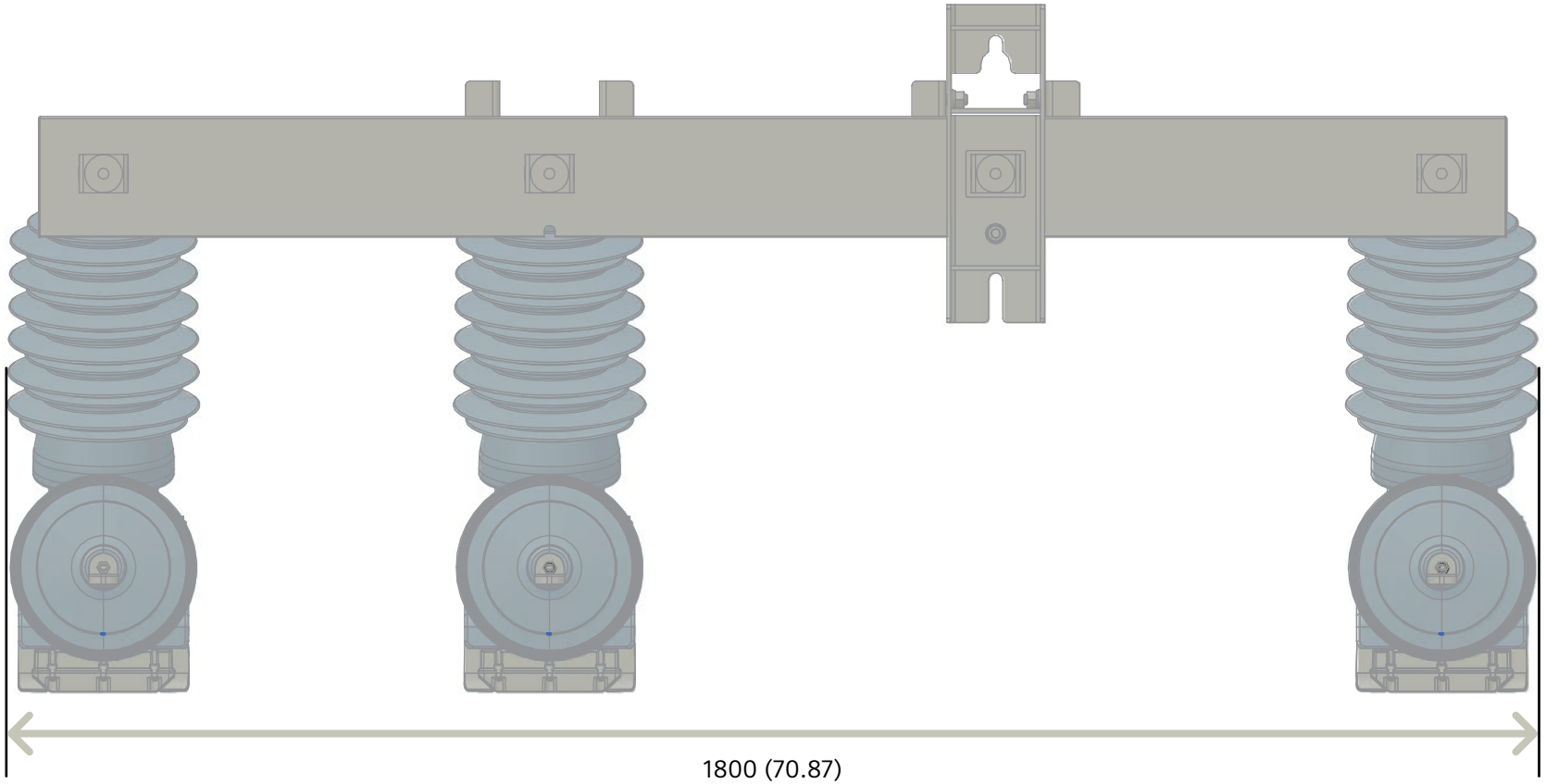
Weight 55 kg (121.26 lbs), dimensions in mm (in)



Dimensions

Pole-mounted three-phase assembly

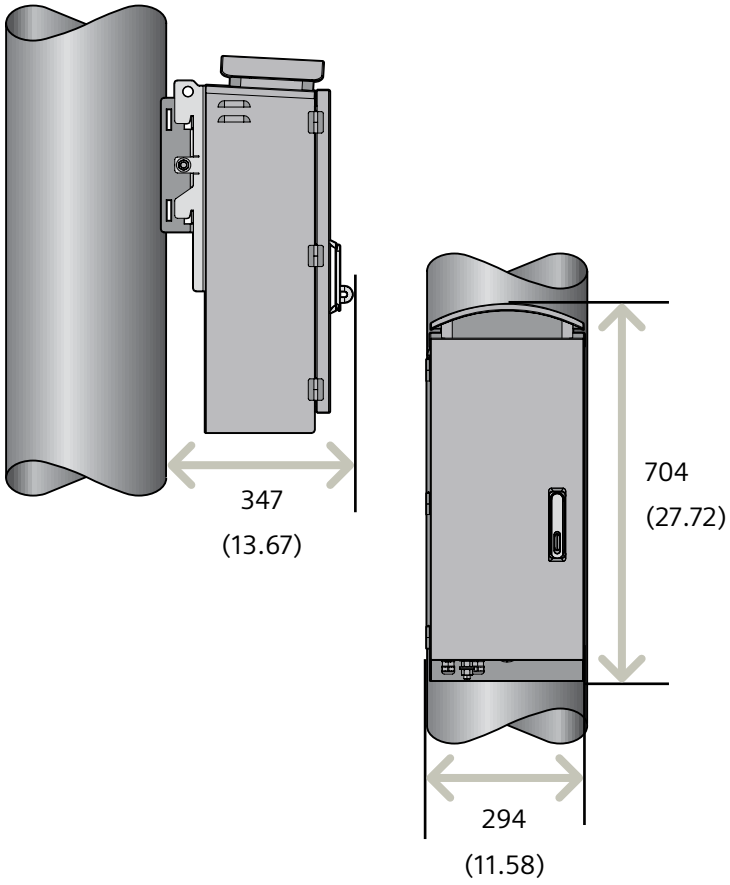
Weight 85 kg (187.40 lbs), dimensions in mm (in)



Dimensions

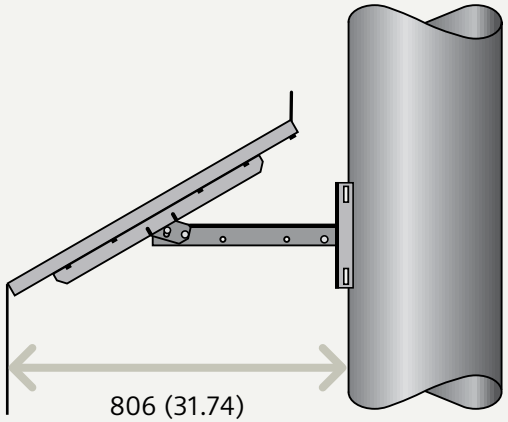
Remote Control Unit (RCU)

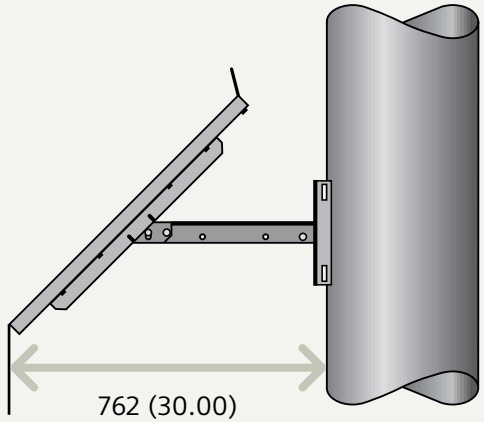
Dimensions in mm (in)

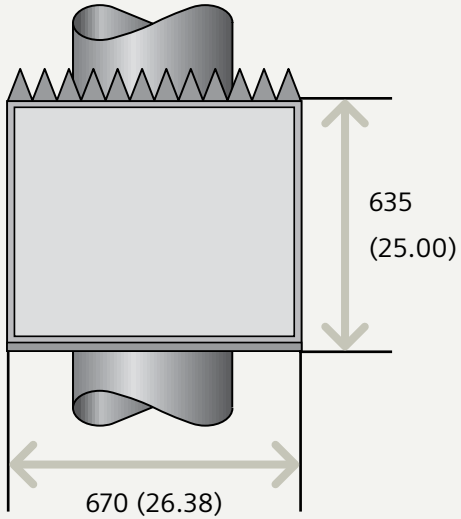


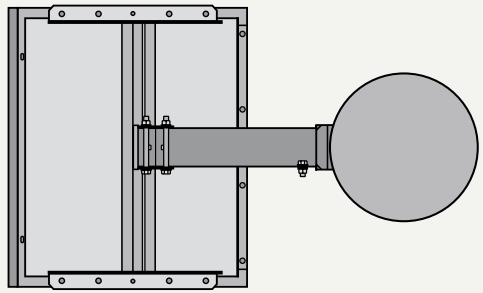
Solar panel (RCU powering option)

Dimensions in mm (in)



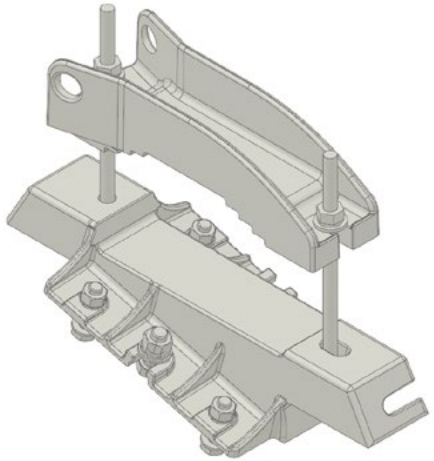




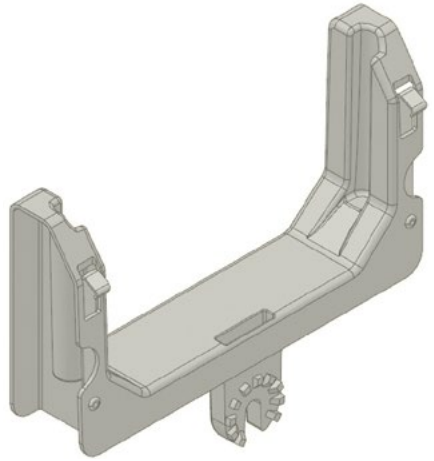


Accessories

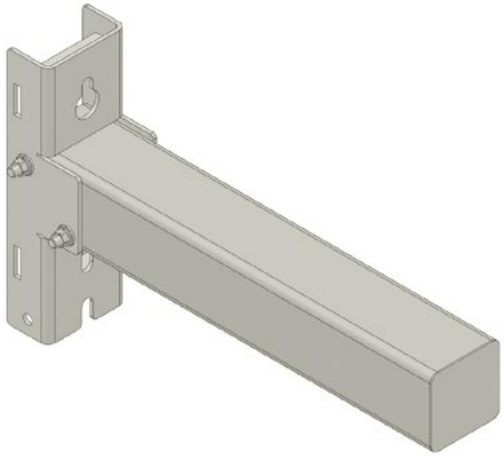
Current injection set



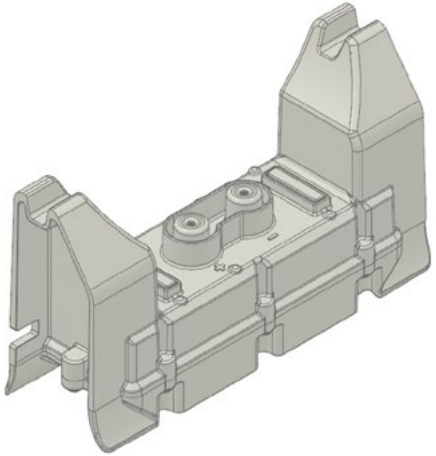
Crossarm clamp kit



Battery module attachment tool



Pole mounting bracket



Battery module

PC communications interface

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SIEMENS