Protect^{IT} Motor Protection Relay, REM 610

Buyer's Guide

Industrial^{IT} enabled

ABB

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Features

- Three-phase thermal overload protection
- Three-phase motor start-up supervision based on thermal stress calculation with speed switch blocking ability
- Three-phase overcurrent protection with definite-time characteristic and speed switch blocking ability
- Three-phase short-circuit protection with instantaneous or definite-time characteristic
- Three-phase undercurrent (loss of load) protection with definite-time characteristic
- Non-directional earth-fault protection with definite-time characteristic
- Three-phase unbalance protection based on the negative-phase-sequence current with inverse definite minimum time characteristic
- Phase reversal protection based on the negative-phase-sequence current
- Cumulative start-up time counter with restart inhibit function
- Circuit-breaker failure protection
- Temperature protection stages with definite-time characteristic
- Emergency start function
- Trip-circuit supervision
- Optional RTD module
  - with six measuring inputs
  - supports PTC thermistors and various RTD sensors
  - Three additional galvanically isolated digital inputs
- Four accurate current inputs
- User-selectable rated frequency 50/60 Hz
- Three normally open power output contacts
- Two change-over signal output contacts
- Output contact functions freely configurable for desired operation
- Two galvanically isolated digital inputs and three additional digital inputs on the optional RTD module
- Disturbance recorder
  - recording time up to 80 seconds
  - triggering by one or several internal or digital input signals
  - records four analogue channels and up to eight user-selectable digital channels
  - adjustable sampling rate
- Non-volatile memory for
  - up to 100 event codes with time stamp
  - setting values
  - disturbance recorder data
  - recorded data of the five last events with time stamp
  - number of starts for protection stages
  - operation indication messages and LEDs showing the status at the moment of power failure
- HMI with an alphanumeric LCD and manoeuvring buttons
  - eight programmable LEDs
- Operation indication messages displayed in either IEC or ANSI mode
- Multi-language support
- User-selectable password protection for the HMI
- Display of primary current values
- Demand values
- All settings can be modified with a PC
- Optical front communication connection: wirelessly or via cable
- Optional rear communication module with either plastic fibre-optic or RS-485 connection for system communication
- SPA bus, IEC 60870-5-103 and Modbus (RTU and ASCII) communication protocols
- Battery back-up for real-time clock
- Battery charge supervision
- Continuous self-supervision of electronics and software. At an internal relay fault, all protection stages and outputs will be blocked.
- Detachable plug-in unit

Application

REM 610 is a versatile multifunction protection relay mainly designed for protection of standard medium and large MV asynchronous motors in a wide range of motor applications. It handles fault conditions during motor start up, normal run, idling, and cooling down at standstill, e.g. in pump, fan, mill or crusher applications.

The large number of integrated protection functions makes REM 610 a complete protection against motor damage. The relay can be used with both circuit-breaker controlled and contactor controlled drives.

REM 610 can equally well be used to protect, for instance, feeder cables and power transformers which require thermal overload protection and, for instance, single-, two- or three-phase overcurrent or non-directional earth-fault protection.

Design

REM 610 is based on a microprocessor environment. A self-supervision system continuously monitors the operation of the relay.

The HMI includes a Liquid Crystal Display (LCD) which makes the local use of the relay safe and easy.

Local control of the relay via serial communication can be carried out with a computer connected to the front communication port. Remote control can be carried out via the rear connector connected to the control and monitoring system through the serial communication bus.

Technical data

Table 1: Dimensions

Width	frame 177 mm, case 164 mm
Height	frame 177 mm (4U), case 160 mm
Depth	case 149.3 mm
Weight of the relay	~3.5 kg

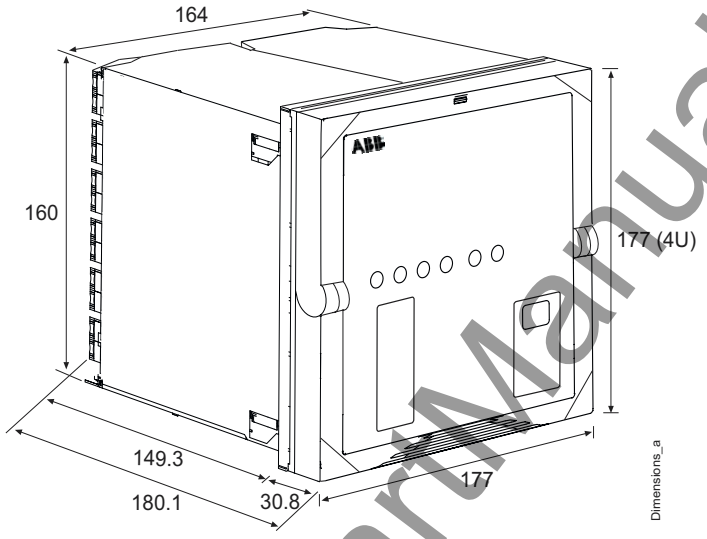

Fig. 1 Dimensions of the relay

Table 2: Power supply

U_{aux} rated	Ur=100/110/120/220/240 V ac Ur=110/125/220/250 V dc
U_{aux} variation (temporary)	85...110% x U_r (ac) 80...120% x U_r (dc)
Burden of auxiliary voltage supply under quiescent (P_q)/operating condition	<9 W/13 W
Ripple in the dc auxiliary voltage	Max 12% of the dc value
Interruption time in the auxiliary dc voltage without resetting the relay	<50 ms at U_{aux} rated
Time to trip from switching on the auxiliary voltage	<350 ms
Internal over temperature limit	+100°C
Fuse type	T2A/250 V

Table 3: Energizing inputs

Rated frequency	50/60 Hz ± 5 Hz	
Rated current, I_n	1 A	5 A
Thermal withstand capability • continuously • for 1 s • for 10 s	 4 A 100 A 25 A	 20 A 500 A 100 A
Dynamic current withstand • half-wave value	 250 A	 1250 A
Input impedance	<100 mΩ	<20 mΩ

Technical data (cont´d)

Table 4: Measuring range

Measured currents on phases I_{L1}, I_{L2} and I_{L3} as multiples of the rated currents of the energizing inputs	0...50 x I_n
Earth-fault current as a multiple of the rated current of the energizing input	0...8 x I_n

Table 5: Digital inputs

Operating range	±20% of the rated voltage
Rated voltage • DI1...DI2 • DI3...DI5 (optional)	 110/125/220/250 V dc 24/48/60/110/125/220/250 V dc
Current drain	2...18 mA
Power consumption/input	<0.9 W

Table 6: Signal outputs SO1

Rated voltage	250 V ac/dc
Continuous carry	5 A
Make and carry for 3.0 s	15 A
Make and carry for 0.5 s	30 A
Breaking capacity when the control-circuit time constant L/R <40 ms, at 48/110/220 V dc	1 A/0.25 A/0.15 A
Minimum contact load	100 mA at 24 V ac/dc

Table 7: Signal outputs SO2 and self-supervision (IRF) output

Rated voltage	250 V ac/dc
Continuous carry	5 A
Make and carry for 3.0 s	10 A
Make and carry for 0.5 s	15 A
Breaking capacity when the control-circuit time constant L/R <40 ms, at 48/110/220 V dc	1 A/0.25 A/0.15 A
Minimum contact load	100 mA at 24 V ac/dc

Table 8: Power outputs (PO1, PO2, PO3)

Rated voltage	250 V ac/dc
Continuous carry	5 A
Make and carry for 3.0 s	15 A
Make and carry for 0.5 s	30 A
Breaking capacity when the control-circuit time constant L/R <40 ms, at 48/110/220 V dc (PO1 with both contacts connected in series)	5 A/3 A/1 A
Minimum contact load	100 mA at 24 V ac/dc
TCS • Control voltage range • Current drain through the supervision circuit • Minimum voltage over a contact	 20...265 V ac/dc ~1.5 mA 20 V ac/dc (15...20 V)

Table 9: Enclosure class of the flush-mounted relay

Front side	IP 54
Rear side, top of the relay	IP 40
Rear side, connection terminals	IP 20

Technical data (cont´d)

Table 10: RTD/analogue inputs

Supported RTD sensors	100 Ω platinum	TCR0.00385 (DIN 43760)
	250 Ω platinum	TCR 0.00385
	1000 Ω platinum	TCR 0.00385
	100 Ω nickel	TCR 0.00618 (DIN 43760)
	120 Ω nickel	TCR 0.00618
	120 Ω nickel (US)	TCR 0.00672
	10 Ω copper	TCR 0.00427
Supported PTC thermistor range	0...20 kΩ	
Maximum lead resistance (three-wire measurement)	200 Ω per lead	
Isolation	2 kV (inputs to protective earth)	
Sampling frequency	5 Hz	
Response time	<8 s	
RTD/Resistance sensing current	Maximum 4.2 mA rms 6.2 mA rms for 10 Ω copper	

Table 11: Environmental tests and conditions

Recommended service temperature range (continuous)	-10...+55°C
Limit temperature range (short-term)	-40...+70°C
Transport and storage temperature range	-40...+85°C according to the IEC 60068-2-48
Dry heat test	According to the IEC 60068-2-2
Dry cold test	According to the IEC 60068-2-1
Damp heat test, cyclic	According to the IEC 60068-2-30

Table 12: Electromagnetic compatibility tests

EMC immunity test level meets the requirements listed below	
1 MHz burst disturbance test, class III	According to the IEC 60255-22-1
• Common mode	2.5 kV
• Differential mode	1.0 kV
Electrostatic discharge test, class IV	According to the IEC 61000-4-2, IEC 60255-22-2 and ANSI C37.90.3-2001
• For contact discharge	8 kV
• For air discharge	15 kV
Radio frequency interference tests	
• Conducted, common mode	According to the IEC 61000-4-6 and IEC 60255-22-6 (2000) 10 V (rms), f=150 kHz...80 MHz
• Radiated, amplitude-modulated	According to the IEC 61000-4-3 and IEC 60255-22-3 (2000) 10 V/m (rms), f=80...1000 MHz
• Radiated, pulse-modulated	According to the ENV 50204 and IEC 60255-22-3 (2000) 10 V/m, f=900 MHz
Fast transient disturbance tests	According to the IEC 60255-22-4, IEC 61000-4-4 and ANSI C37.90.1-2002
• All terminals	4 kV

Technical data (cont´d)

Table 12: Electromagnetic compatibility tests

Surge immunity test	According to the IEC 61000-4-5
• Power outputs, energizing inputs	4 kV, line-to-earth
	2 kV, line-to-line
• Power supply	2 kV, line-to-earth
	2 kV, line-to-line
• I/O ports	2 kV, line-to-earth
	1 kV, line-to-line
Power frequency (50 Hz) magnetic field IEC 61000-4-8	300 A/m continuous
Voltage dips and short interruptions	According to the IEC 61000-4-11 30%/10 ms 60%/100 ms 60%/1000 ms >95%/5000 ms
Electromagnetic emission tests	According to the EN 55011
• Conducted, RF-emission (Mains terminal)	EN 55011, class A, IEC 60255-25
• Radiated RF-emission	EN 55011, class A, IEC 60255-25
CE approval	Complies with the EMC directive 89/336/EEC and the LV directive 73/23/EEC

Table 13: Standard tests

Insulation tests	
Dielectric tests	According to the IEC 60255-5
• Test voltage	2 kV, 50 Hz, 1 min
Impulse voltage test	According to the IEC 60255-5
• Test voltage	5 kV, unipolar impulses, waveform 1.2/50 μs, source energy 0.5 J
Insulation resistance measurements	According to the IEC 60255-5
• Isolation resistance	>100 MΩ, 500 V dc
Mechanical tests	
Vibration tests (sinusoidal)	According to the IEC 60255-21-1, class I
Shock and bump test	According to the IEC 60255-21-2, class I

Table 14: Data communication

Rear interface, connector X5.3 or X5.5
• Fibre-optic or RS-485 connection
• SPA bus, IEC 60870-5-103 or Modbus protocol
• 9.6 or 4.8 kbps (additionally 2.4, 1.2 or 0.3 kbps for Modbus)
Front interface
• Optical connection (infrared): wirelessly or via the front communication cable (1MRS050698)
• SPA bus protocol
• 9.6 or 4.8 kbps (9.6 kbps with front communication cable)

Connection diagrams

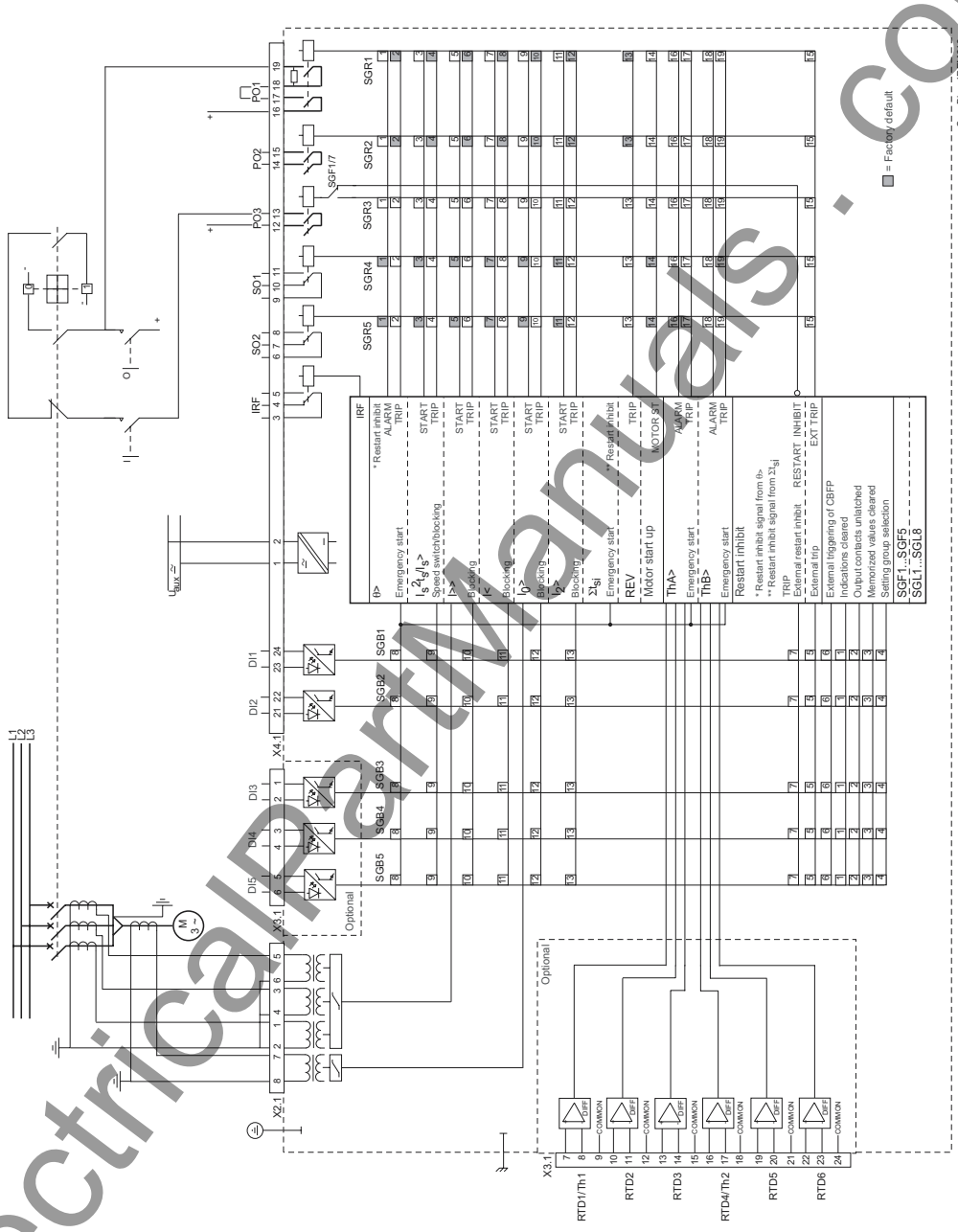

Fig. 1 Residual current is measured via a core-balanced current transformer.

Connection diagrams
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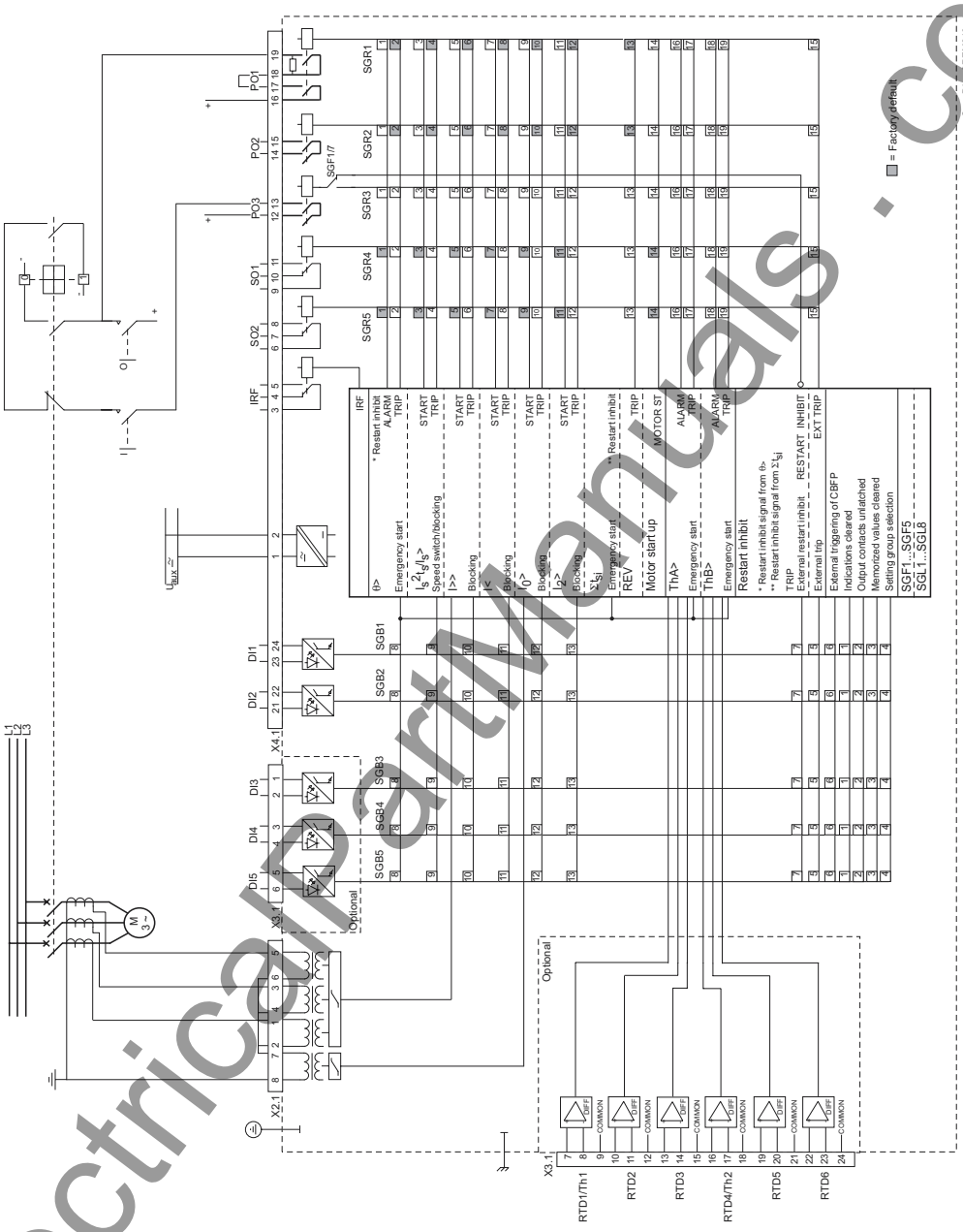

Fig. 2 Residual current is measured via a summation connection of the phase current transformers.

Connection diagrams
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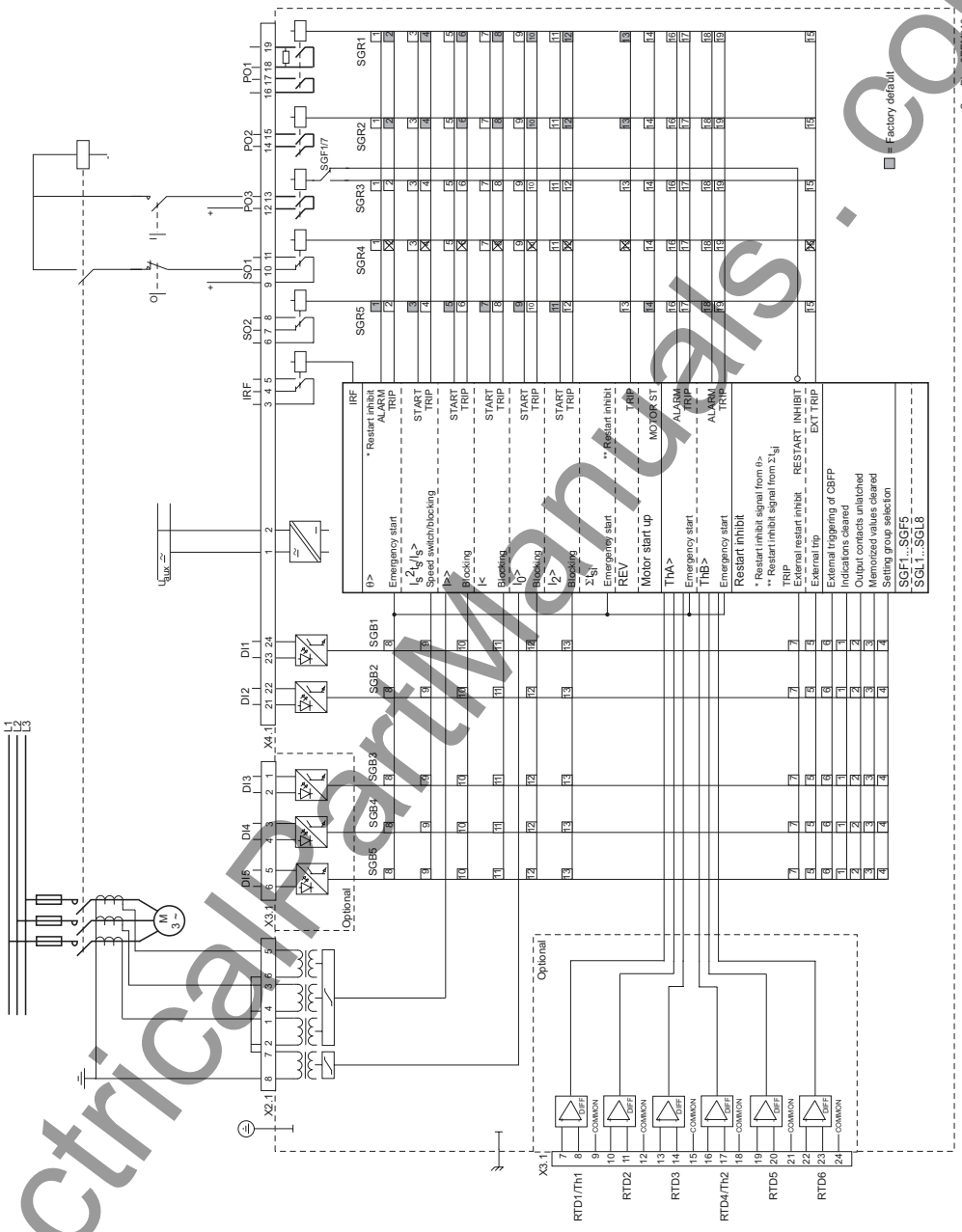

Fig. 3 REM 610 connected to a contactor controlled motor with the trips routed to trip the contactor.

Ordering information

When ordering REM 610 protection relays and/or accessories, please specify the following:

- Order number
- Quantity

The order number identifies the protection relay type and hardware as described in Fig. 4 and is labelled on the marking strip under the lower handle of the relay. Use the ordering key below to generate the order number when ordering protection relays.

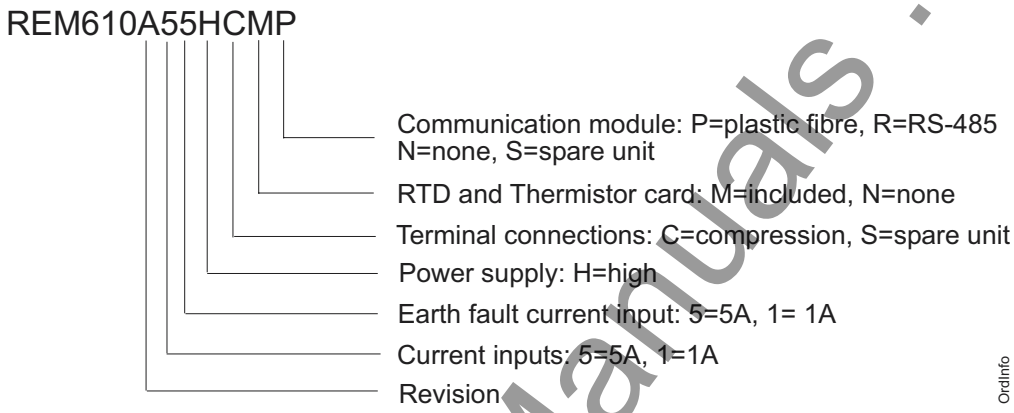

Fig. 4 Ordering key

Note!

The spare unit is a plain plug-in unit without enclosure, terminal connections and the optional communication module.

Note!

To order a spare unit, select it twice when generating the order number.

The following accessories are available:

Item	Order number
Semi-flush mounting kit	1MRS050696
Wall mounting kit	1MRS050697
Side-by-side mounting kit	1MRS050695
19" Rack mounting kit	1MRS050694
Front communication cable	1MRS050698

Configuration, setting and SA system tools

The following tool versions are needed to support the new functions and features of REM 610 release A:

CAP 501 Relay Setting Tool	CAP 501 v. 2.2.0-1 or later
CAP 505 Relay Setting Tool	CAP 505 v. 2.2.0-1 or later
SMS 510 Substation Monitoring System	SMS 510 v. 1.1.0 or later
LIB 510 Library for MicroSCADA v. 8.4.4	LIB 510 v. 4.0.4-2 or later

References

Available manuals:

Item	Order number
Technical Reference Manual	1MRS752263-MUM
Operator's Manual	1MRS752264-MUM
Installation Manual	1MRS752265-MUM

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