RELION® 610 SERIES

Motor Protection REM610

Product Guide

Contents

1. Description

REM610 is a motor protection relay for the protection and supervision of medium sized and large asynchronous LV motors and small and medium-sized asynchronous HV motors in manufacturing and process industry. REM610 is a member of ABB's Relion® protection and control product family and part of its 610 product series. The 610 series includes protection relays for feeders, motors and for general system voltage supervision. The plug-in design of the 610 series protection relays facilitates the commissioning of the switchgear and enables fast and safe insertion and withdrawal of relay plug-in units.

The protection relay is primarily targeted at protecting large asynchronous low-voltage motors and small and medium-sized high-voltage asynchronous motors. REM610 handles electrical fault conditions during motor start up, normal operation, idling, and cooling down at standstill, e.g. in pump, fan, mill or crusher applications. The protection relay can be used with both circuit-breaker controlled and contactor-controlled drives. REM610 can also be used for the protection of cables' feeders and distribution transformers that require thermal overload protection besides overcurrent, earth-fault and phase unbalance protection. Further, the 610 series protection relays are suitable for employment in marine and offshore environments.

The numerical motor protection relays of the 610 series support a wide range of standard communication protocols, among them the IEC 61850, IEC 60870-5-103, Modbus, Profibus, LON and SPA communication protocols.

2. Functional overview

Table 1. Functionality

Description	
Protection	
Three-phase thermal overload for motors	●
Motor startup based on thermal stress calculation [1)]	●
Three-phase definite-time overcurrent, low-set stage [1)]	●
Three-phase overcurrent, high-set stage	●
Inverse-time unbalance protection based on negative phase sequence current	●
Phase reversal protection	●
Undercurrent (loss-of-load)	●
Non-directional earth fault, low-set stage	●
Cumulative startup time counter and restart inhibit function	●
Circuit-breaker failure	●
Temperature protection using RTD sensors or thermistors	o
Lockout relay function	●
Condition monitoring	
Trip circuit supervision	●
Restart inhibit function	●
Measurement	
Disturbance recorder	●
Residual current	●
Three-phase current	●
Thermal level	●
Negative phase-sequence current	●
Temperature measurements via RTD inputs	o

● = Included o = Optional

1) Mutually exlusive functions

3. Protection functions

The protection relay offers many integrated protection functions for the protection of motors. The thermal overload protection, cumulative motor start up supervision, running stall protection, earth-fault protection and loss-of-phase are the key functions of this protection relay. The coverage of the thermal overload protection can be further enhanced by means of an optional RTD module for direct temperature measurement.

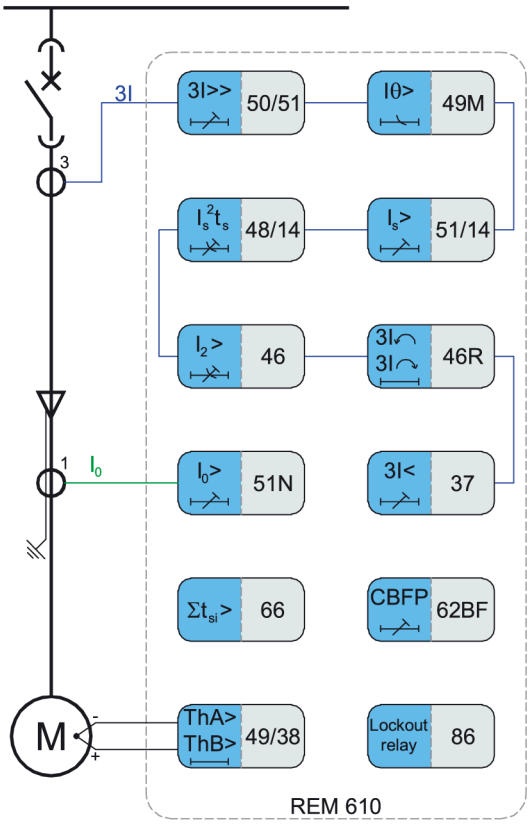


Figure 1. Protection function overview of REM610

4. Application

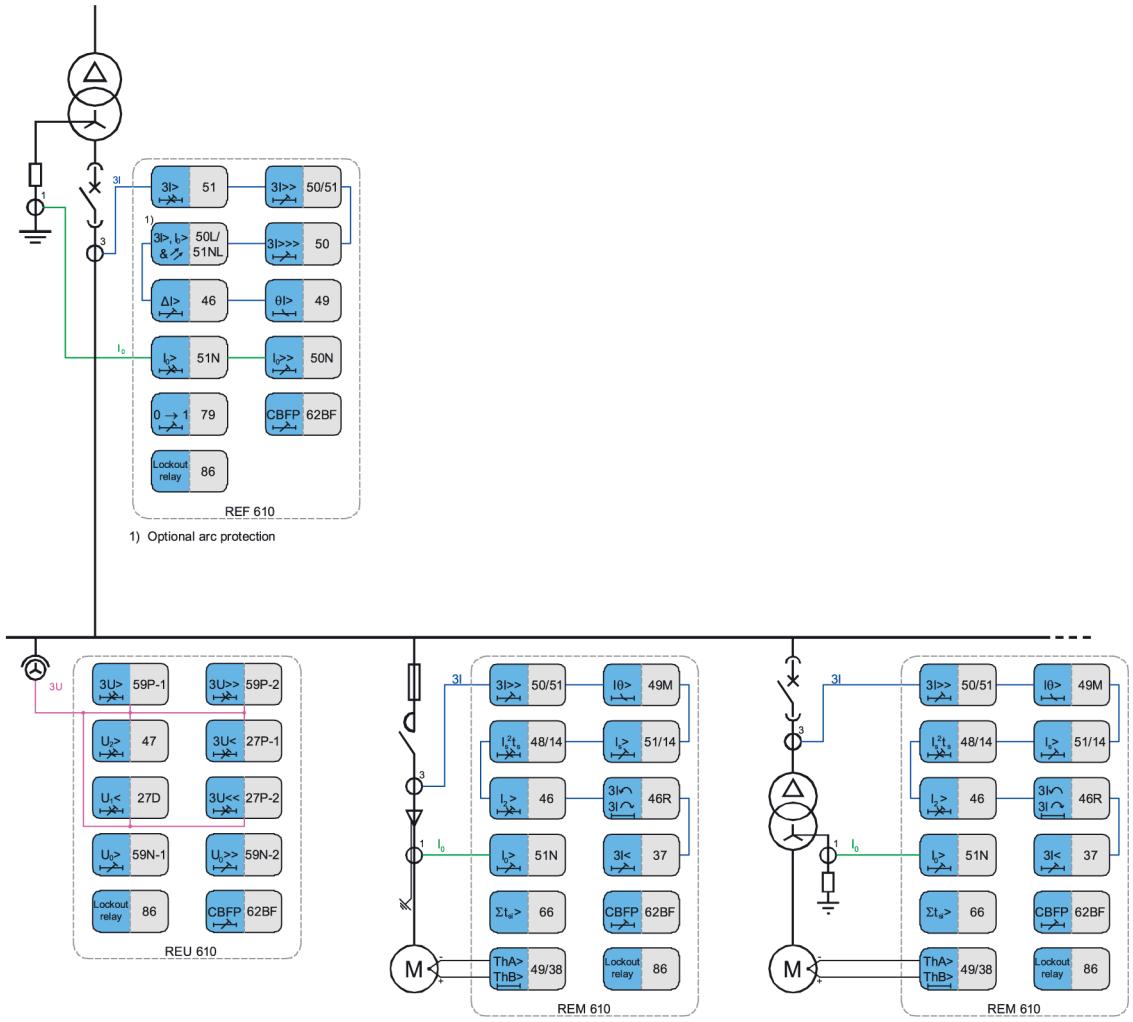


Figure 2. REM610 can be used for the protection of both circuit-breaker controlled and contactor controlled motor drives. In the contactor controlled motor drive application, the protection also covers the feeder cable and the cable box. The CB controlled application features a transformer and motor drive application. The load side of the transformer is earthed via a resistor, which enables current measuring earth-fault protection to be used. In both applications, the critical motor temperatures are supervised through direct temperature measurement via embedded sensors.

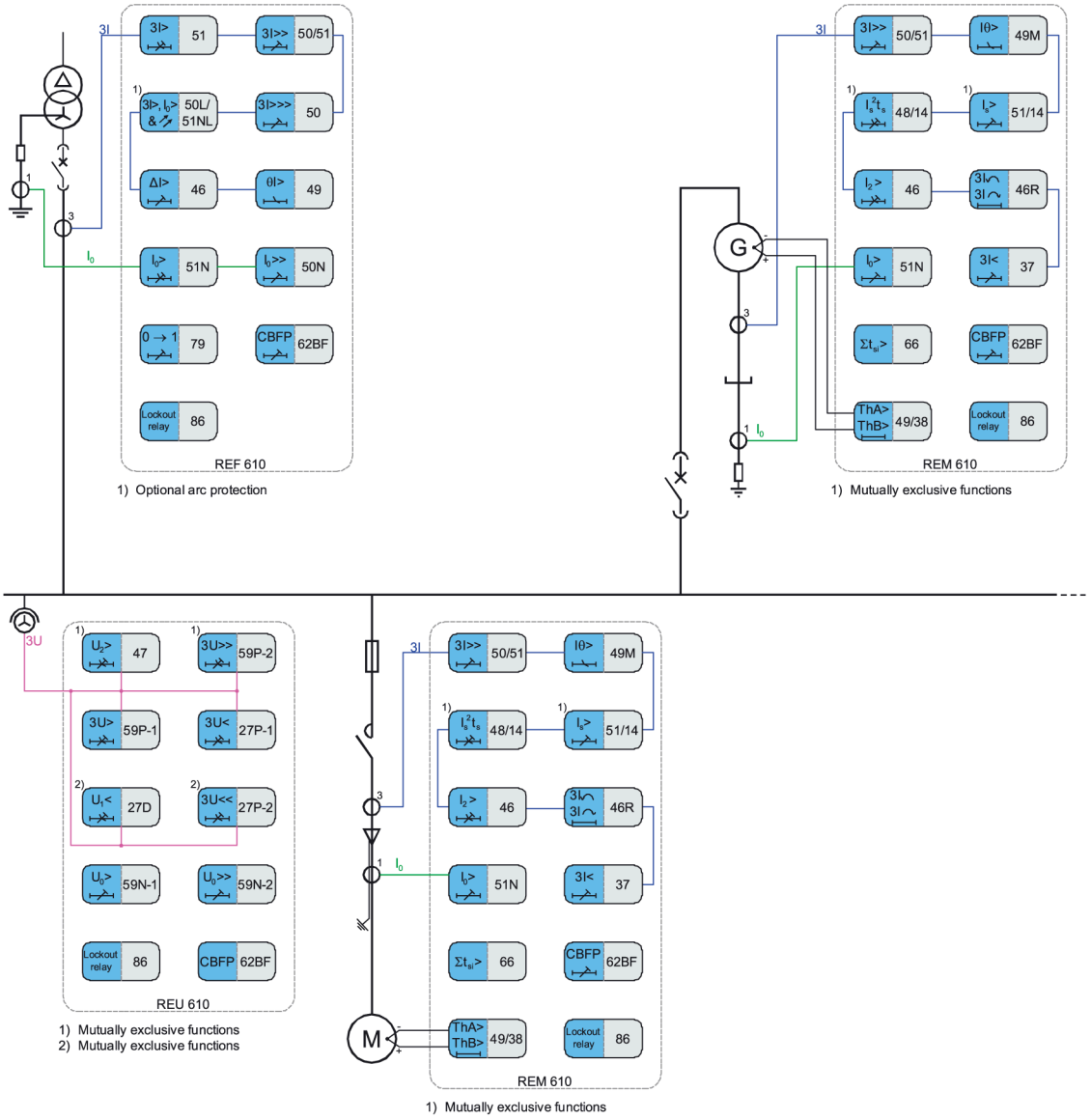


Figure 3. REM610 provides a full range of protection functions for the large low-voltage motors and from small to medium sized high-voltage motors. REM610 is also used for the protection of small asynchronous power generators, for which the protection relay offers short-circuit and time overcurrent protection, thermal overload protection, phase unbalance and stall protection, and stator earth-fault protection. Further, the protection relay features direct temperature measurement via embedded sensors in the generator winding or bearings.

5. Measurement

The protection relay physically measures the phase currents and the residual current. From the phase currents, the protection relay calculates the thermal overload and the negative-phase-sequence current of the protected motor or generator. REM610 also measures a number of characteristic currents of the protected object during startup and duty operation. Further, by means of an optional measurement card, the protection relay can directly measure up to eight temperatures via six RTD and two thermistor type sensors.

The values measured can be accessed locally via the user interface on the protection relay's front panel or remotely via the serial communication interface on the rear panel of the protection relay.

6. Disturbance recorder

The protection relay is provided with a built-in battery backed-up digital disturbance recorder for four analog signal channels and eight digital signal channels. The analog channels can be set to record the curve form of the currents measured. The digital channels can be set to record external or internal relay signals, for example the start or trip signals of protection relay's stages, external blocking or control signals. Any digital relay signal such as a protection start or trip signal, or an external relay control signal can be set to trigger the recording. The recordings are stored in a nonvolatile memory from which the data can be uploaded for subsequent fault analysis.

7. Event recorder

To provide network control and monitoring systems with bay level event logs, the protection relay incorporates a nonvolatile memory with capacity of storing 100 event codes including the time stamps.The nonvolatile memory retains its data also in case the protection relay temporarily loses its auxiliary supply.The event log facilitates detailed pre- and post-fault analyses of the faults and disturbances.

8. Trip-circuit supervision

The trip-circuit supervision continuously monitors the availability and operability of the trip circuit. It provides open-circuit monitoring both when the circuit breaker is in its closed and in its open position. It also detects loss of circuit-breaker control voltage.

9. Self-supervision

The relay’s built-in self-supervision system continuously monitors the state of the relay hardware and the operation of the relay software. Any fault or malfunction detected is used for alerting the operator.

A permanent relay fault blocks the protection functions to prevent incorrect operation.

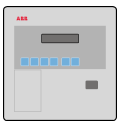
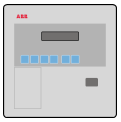
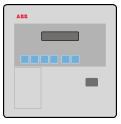
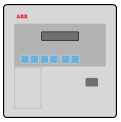
10. Inputs/Outputs

- Four current transformers
- Two digital inputs
- Three additional digital inputs on an optional RTD module
- Three normally open heavy duty output contacts
- Two change-over signal output contacts
- One dedicated IRF contact
- Input/output contacts freely configurable

11. Communication

The protection relays are connected to the fiber-optic communication bus directly or via bus connection modules and gateways. The bus connection module converts the protection relay's electrical signals to optical signals for the communication bus and, vice versa, the communication bus' optical signals to electrical signals for the protection relay.

Table 2. Optional communication modules and protocols

Protocol	Plastic fiber	Plastic/Glass fiber	RS-485	Bus connection modules and gateways
SPA	●	●	●	
IEC 60780-5-103	●	●	●	
Modbus (RTU and ASCII)	●	●	●	Protection relay
IEC 61850	●	●	-	  Protection relay + SPA-ZC 402
LON	-	-	●	  Protection relay + SPA-ZC 102
	●	●	-	   Protection relay + SPA-ZC 21 + SPA-ZC 102
Profibus	-	-	●	  Protection relay + SPA-ZC 302

12. Technical data

Table 3. Dimensions

Description	Value	
Width	Frame Case	177 mm 164 mm
Height	Frame Case	177 mm (4U) 160 mm
Depth	Case	149.3 mm
Weight	Protection relay Spare unit	3.5 kg 1.8 kg

Table 4. Power supply

Description	Value	
Type	REM610CxxHxxx	REM610xxLxxx
U_{aux}rated	U_r= 100/110/120/220/240 V AC U_r= 110/125/220/250 V DC	U_r= 24/48/60 V DC
U_{aux}variation (temporary)	85...110% of U_r (AC)	80...120% of U_r (DC)
	80...120% of 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 (at frequency ogf 100 Hz)	
Interruption time in the auxiliary DC voltage without resetting the protection relay	<50 ms at U_{aux} rated	
Time to trip from switching on the auxiliary voltage[1)]	<350 ms	
Internal over temperature limit	+100 ºC	
Fuse type	T2A/250 V	

1) Time to trip of stages I>>

Table 5. Energizing inputs

Description	Value	
Rated frequency	50/60 Hz ±5 Hz	
Rated current, I_n	1 A	5 A
Thermal withstand capability:		
• Continuously	4 A	20 A
• For 1 s	100 A	500 A
• For 10 s	25 A	100 A
Dynamic current withstand:		
• Half-wave value	250 A	1250 A
Input impedance	<100 mΩ	<20 mΩ

Table 6. Measuring range

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

Table 7. Digital inputs

Description	Value	
Rated voltage	DI1, DI2	DI3...DI5 (optional)
• REM610BxxHxxx Activating threshold • REM610BxxLxxx Activating threshold	110/125/220/250 V DC Max. 88 V DC (110 V DC -20%) 24/48/60/110/125/220/250 V DC Max. 19.2 V DC (24 V DC -20%)	
• REM610BxxxxMx Activating threshold		24/48/60/110/125/220/250 V DC Max. 19.2 V DC (24 V DC -20%)
Operating range	±20% of the rated voltage	
Current drain	2...18 mA	
Power consumption/input	<0.9 W	

Table 8. Signal output SO1

Description	Value
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 9. Signal output SO2 and IRF output

Description	Value
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	35 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 10. Power outputs PO1, PO2 and PO3

Description	Value
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
Trip-circuit supervision (TCS):	
• Control voltage range	20...265 V AC/DC
• Current drain through the supervision circuit	~1.5 mA
• Minimum voltage over a contact	20 V AC/DC (15...20 V)

Table 11. RTD/analog inputs

Description	Value	
Supported RTD sensors	100 Ω platinum	TCR 0.00385 (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 12. Data communication interfaces

Interface	Protocol	Cable	Data transfer rate
Front	SPA bus protocol	Optical connection (infrared) via the front communication cable (1MRS050698)	9.6 or 4.8 kbps (9.6 kbps with front communication cable)

Table 13. Enclosure class of the flush-mounted protection relay

Description	Value
Front side	IP 54 Category 2
Rear side, top of the protection relay	IP 40
Rear side, connection terminals	IP 20

Table 14. Environmental conditions

Description	Value
Recommended service temperature range (continuous)	-10...+55ºC
Humidity	<95% RH
Limit temperature range (short-term)	-40...+70ºC
Transport and storage temperature range	-40...+85ºC according to IEC 60068-2-48
Atmospheric pressure	86...106 kPa

Table 15. Environmental tests

Description	Reference
Dry heat test (humidity <50%)	According to IEC 60068-2-2
Dry cold test	According to IEC 60068-2-1
Damp heat test, cyclic (humidity >93%)	According to IEC 60068-2-30

Table 16. Electromagnetic compatibility tests

Description	Type test value	Reference
EMC immunity test level meets the requirements listed below		
1 MHz burst disturbance test, class III		IEC 60255-22-1, IEC 61000-4-18
• Common mode	2.5 kV	
• Differential mode	1.0 kV	
Electrostatic discharge test, class IV		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	10 V (rms), f = 150 kHz...80 MHz	IEC 61000-4-6 and IEC 60255-22-6
• Radiated, amplitude-modulated	10 V/m (rms), f = 80...2700 MHz	IEC 61000-4-3 and IEC 60255-22-3
• Radiated, pulse-modulated	10 V/m, f = 900 MHz	ENV 50204 and IEC 60255-22-3
Fast transient disturbance tests		IEC 60255-22-4 and IEC 61000-4-4
• Power outputs, energizing inputs, power supply	4 kV	
• I/O ports	2 kV	
Surge immunity test		IEC 61000-4-5 and IEC 60255-22-5
• Power outputs, energizing inputs, power supply	4 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	300 A/m continuous	IEC 6100-4-8
Power frequency immunity test:		IEC 60255-22-7 and IEC 61000-4-16
REM610CxxHxxx	Class A	
• Common mode • Differential mode	300 V rms 150 V rms	
REM610CxxLxxx and REM610CxxxxMx	Class B	
• Common mode • Differential mode	300 V rms 100 V rms	
Voltage dips and short interruptions	30%/10 ms 60%/100 ms 60%/1000 ms >95%/5000 ms	IEC 61000-4-11
Electromagnetic emission tests		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 compliance		Complies with the EMC directive 2009/108/EC and LV directive 2006/95/IEC

Table 17. Insulation tests

Description	Type test value	Reference
Dielectric tests • Test voltage	 2 kV, 50 Hz, 1 min	IEC 60255-5
Impulse voltage test • Test voltage	 5 kV, unipolar impulses, waveform 1.2/50 µs, source energy 0.5 J	IEC 60255-5
Insulation resistance measurements • Isolation resistance	 >100 MΩ, 500 V DC	IEC 60255-5

Table 18. Mechanical tests

Description	Reference	Requirement
Vibration tests (sinusoidal)	According to IEC 60255-21-1	Class I
Shock and bump test	According to IEC 60255-21-2	Class I

Protection functions

Table 19. Three-phase thermal overload protection (θ>)

Feature	Value
Set safe stall time, t_{6x}	2..0...120 s[1)]
Set ambient temperature, T_{amb}	0...70ºC
Set restart inhibit level, θ_i>	20...80%
Set prior alarm level, θ_a>	50...100%
Trip level, θ_t>	100%
Time constant multiplier, K_c	1...64
Weighting factor, p	20...100%
Operate time accuracy: • >1.2 x I_n	 ±5% of the set operate time or ±1 s

1) The setting step is 0.5.

Table 20. Three-phase definite time overcurrent protection (I_s>)

Feature [1)]	Value
Set start value, I_s>	
At definite-time characteristic	1.00...10.0 x I_n
Start time, typical	55 ms
Time/current characteristic • Definite-time operate time, t_s>	 0.30...80.0 s
Resetting time, typical/maximum	35/50 ms
Retardation time	30 ms
Drop-off/start ratio, typical	0.96
Operate time accuracy at definite time characteristic	±2% of the set operate time or ±25 ms
Operation accuracy	±3% of the start value

1) Stage $I_s^2 x\ t_s$ and stage I_s> cannot be used at the same time.

Table 21. Motor startup supervision based on thermal stress calculation ($I_s^2 x\ t_s$)

Feature [1]	Value
Set startup current motor, I_s>	1.00...10.0 x I_n
Start time, typical	
• At start criterion I_L>I_s	100 ms
Set startup time for motor, t_s>	0.30...80.0s
Resetting time, typical/maximum	180/250 ms
Drop-off/pick-up ratio, typical	
• At start criterion I_L>I_s	0.96
Operation accuracy	±10% of the calculated operate time ±0.2 s
Shortest possible operate time	300 ms

1) Stage I_s^2 x t_s and stage I_s> cannot be used at the same time.

Table 22. Three-phase instantaneous or definite time short circuit protection (I>>)

Feature	Value
Set start value, I>>	
• At definite-time characteristic	0.50...20.0 x I_n
Start time, typical	50 ms
Time/current characteristic	
• Definite time operate time, t>	0.05...30.0 s
Resetting time, typical/maximum	40/50 ms
Retardation time	30 ms
Drop-off/pick-up ratio, typical	0.96
Operate time accuracy at definite-time characteristic	±2% of the set operate time or ±25 ms
Operation accuracy	±3% of the set start value

Table 23. Definite-time undercurrent (loss-of-load) protection (I<)

Feature	Value
Set start value, I<	
• At definite-time characteristic	30...80% I_n
Start time, typical	300 ms
Time/current characteristic	
• Definite time operate time, t<	2...600 s
Resetting time, typical/maximum	300/350 ms
Drop-off/pick-up ratio, typical	1.1
Inhibitation of I<	<12% I_n
Operate time accuracy at	
• Definite-time characteristic	±3% of the set operate time or 100 ms
Operation accuracy	±3% of the set start value or +0.5% I_n

Table 24. Instantaneous or definite-time earth-fault protection (I_0>)

Feature	Value
Set start value, I_0>	
• At definite-time characteristic	1.0...100% I_n
Start time, typical	50 ms
Time/current characteristic	
• Definite time operate time, t_0>	0.05...300 s
Resetting time, typical/maximum	40/50 ms
Retardation time	30 ms
Drop-off/pick-up ratio, typical	0.96
Operate time accuracy at definite-time characteristic	±2% of the set operate time or ±25 ms
Operation accuracy	
• 1.0...10.0% I_n	±5% of the set start value
• 1.0...100% I_n	±3% of the set start value

Table 25. Inverse-time unbalance protection based on the negative phase sequence current (I_2>)

Feature	Value
Set start value, I_2>	
• At IDMT characteristic	0.10...0.50 x I_n
Start time, typical	100 ms
Time/current characteristic	
• IDMT time constant, K_2	5...100
Resetting time, typical/maximum	130/200 ms
Drop-off/pick-up ratio, typical	0.95
Operate time accuracy	
• I_2> + 0.065...4.0 x I_n	±5% of the calculated operate time or ±100 ms
Operation accuracy	±5% of the set start value
Inhibitation of I_2>	I < 0.12 x I_n or I > 4.0 x I_n

Table 26. Phase reversal protection (REV)

Feature	Value
Trip value	NPS ≥75% of the maximum phase current
Time/current characteristic	
• Definite time operate time	220 ms ±50 ms
Resetting time, typical	100...200 ms
Drop-off/pick-up ratio, typical	0.95

Table 27. Cumulative startup time counter and restart inhibit function (Σ_{tsi})

Feature	Value
Set restart inhibit value, Σ_{tsi}	5...500 s
Countdown rate of startup time counter, $\Delta \Sigma_{ts}/\Delta t$	2...250 s/h

Table 28. Temperature protection using RTD sensors or thermistors (ThA> and ThB>)

Feature	Value
Operate time accuracy at definite-time characteristic	±3% of the set operate time or 200 ms[1)]
RTD sensors	
Set alarm value, Ta1...6>	0...200ºC
Operate time, ta1...6>	1...100 s
Set trip value, Tp1...6>	0...200ºC
Operate time, tp1...6>	1...100 s
Hysteresis	5ºC
Operation accuracy	±1 ºC (±3ºC for Cu10)
Thermistors	
Set trip value, Thp1> and Thp2>	0.1...15.0 kΩ
Operate time	2 s
Operation accuracy	±1% of the setting range

1) Note the response time of the RTD card (<8 s).

Table 29. Circuit-breaker failure protection (CBFP)

Feature	Value
Set operate time	0.10...60.0 s
Phase-to phase voltage threshold for external triggering of the CBFP:	
• Pick-up/drop-off	0.13/0.11 x I_n

13. Mounting methods

Using the appropriate mounting accessories, the standard relay case for the 610 series relays can be flush mounted, semi-flush mounted or wall mounted. The flush mounted and wall mounted relay cases can also be mounted in a tilted position (25°) by using special accessories.

Further, the relays can be mounted in any standard 19” instrument cabinet by means of 19” mounting panels available with cut-outs for one or two relays.Alternatively, the relays can be mounted in 19” instrument cabinets by means of 4U Combiflex equipment frames.

For routine testing purposes, the relay cases can be equipped with test switches, type RTXP 18, which can be mounted side by side with the relay cases.

Mounting methods
- Flush mounting
- Semi-flush mounting
- Semi-flush mounting in a 25° angle
- Rack mounting
- Wall mounting
- Mounting to a 19" equipment frame
- Mounting with an RTXP 18 test switch to a 19" rack

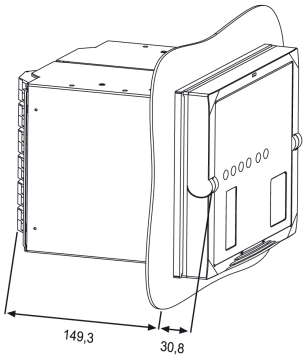


Figure 4. Flush mounting

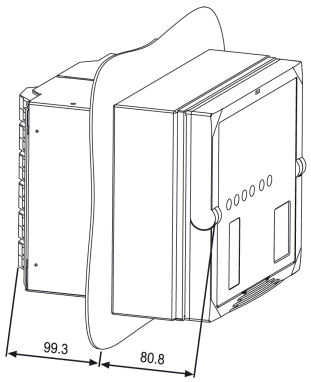


Figure 5. Semi-flush mounting

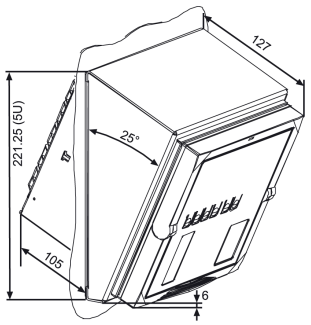


Figure 6. Semi-flush mounting in a 25º angle

14. Relay case and plug-in unit

As a safety measure, the relay cases for the current measuring protection relays are provided with automatically acting contacts for short-circuiting the CT secondaries, when a relay plug-in unit is withdrawn from the relay case. In addition, the relay case is provided with a mechanical coding system to prevent the current measuring relay plug-in units from being inserted into a case for a voltage protection relay unit and vice versa, that is the relay cases are associated to a certain type of relay plug-in unit.

There is, however, a universal relay case available, which is not associated to a certain plug-in unit type. When a relay plug-in unit is plugged into such a relay case for the first time, the relay case automatically adapts to that particular protection relay type, that is the short-circuiting contacts are activated as well as the mechanical blocking system. Hereafter, the relay case is permanently associated to a certain protection relay type.

15. Selection and ordering data

When ordering protection relays and/or accessories, please specify the following information: order number, HMI language set number and quantity. The order number identifies the protection relay type and hardware and is labelled on the marking strip under the lower handle of the protection relay.

Use the ordering key information in Figure 7 to generate the order number when ordering complete protection relays.

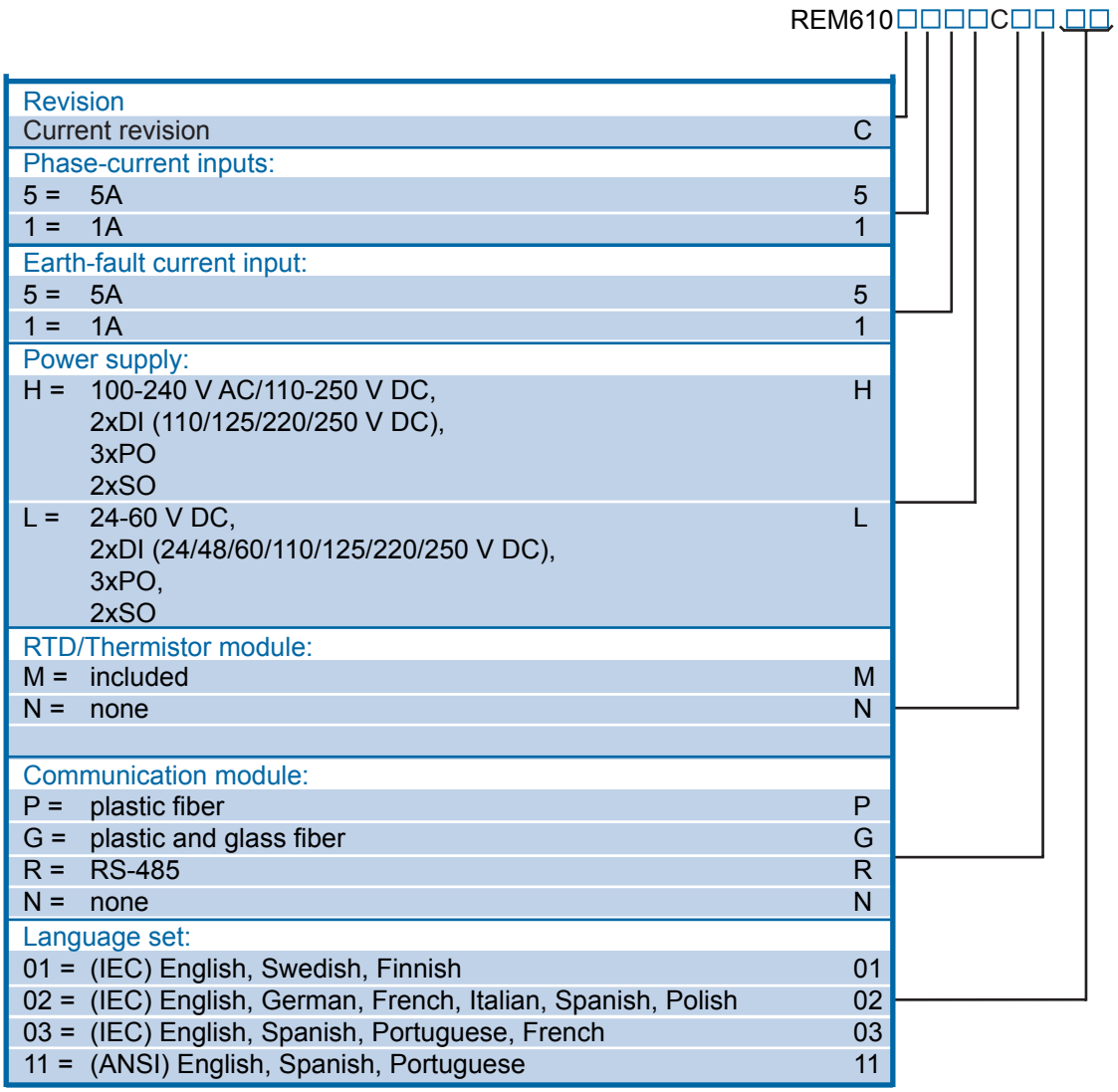


Figure 7. Ordering key for complete protection relays

Use the ordering key information in Figure 8 to generate the order number when ordering spare units.

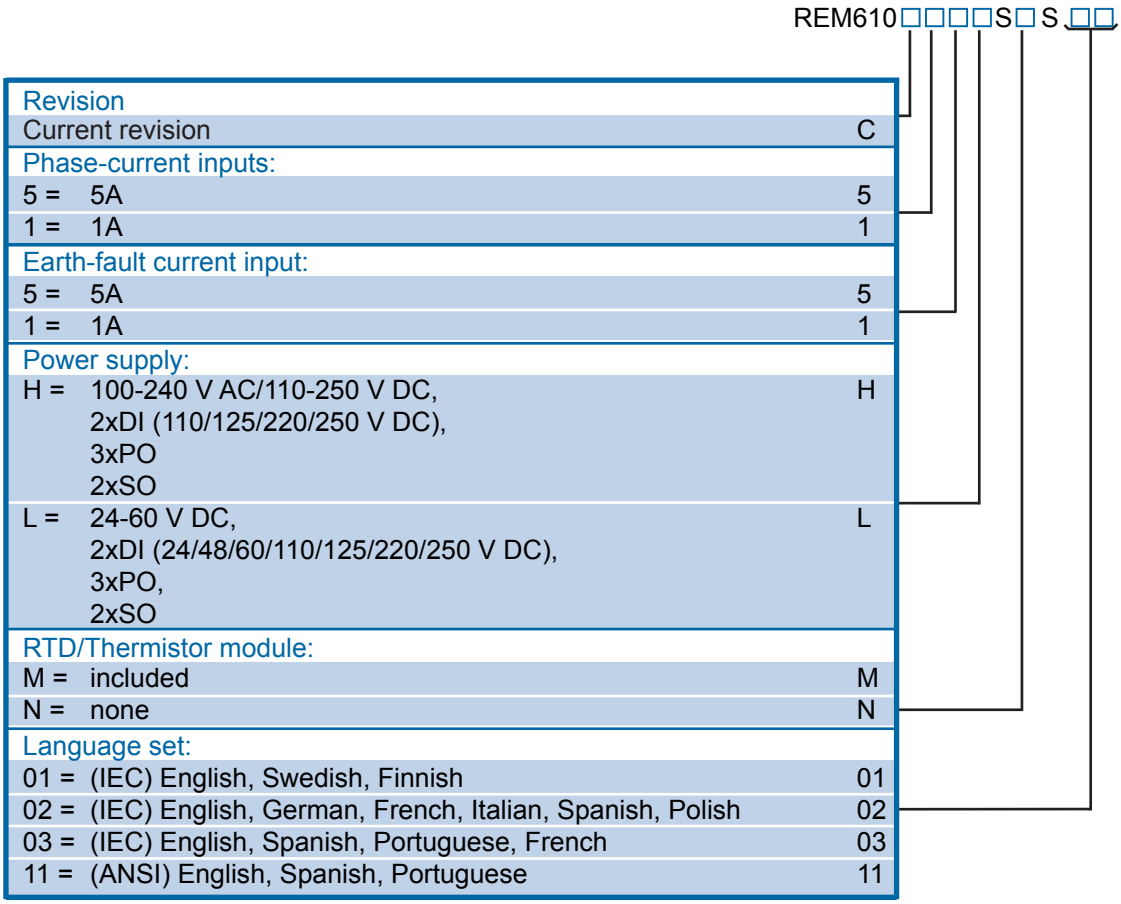


Figure 8. Ordering key for spare units

16. Accessories

Table 30. Cables

Item	Order number
Front communication cable	1MRS050698

Table 31. Mounting accessories

Item	Order number
Semi-flush mounting kit	1MRS050696
Inclined semi-flush mounting kit	1MRS050831
19” rack mounting kit with cutout for one protection relay	1MRS050694
19” rack mounting kit with cutout for two protection relays	1MRS050695
Surface mounting frame	1MRS050697
Mounting bracket for RTXP 18	1MRS061207
Mounting bracket for 4U high Combiflex equipment frame	1MRS061208

Table 32. Test switches

Item	Order number
Test switch RTXP 18	1MRS050783

Table 33. Optional communication cards

Item	Order number
Plastic fiber	1MRS050889
RS-485	1MRS050892
Plastic and glass fiber	1MRS050891

Table 34. 610 series universal cases

Item	Order number
Empty universal relay case for 610 series	1MRS050904

17. Tools

Table 35. Configuration and setting tools

Tool	Version
Protection and Control IED Manager PCM600	2.1 or later
REM610 Connectivity Package	2.1 or later
CAP 501 Relay Setting Tool CAP 50	2.4.0-1 or later
CAP 505 Relay Setting Tool CAP 505 v. 2.4.0-1 or later	2.4.0-1 or later
Communication Engineering Tool (CET) for SPA-ZC 40x	1.1.1
Lon Network Tool LNT 505	1.1.1 Add-on 1
Profibus-DPV1/SPA Configuration Tool (PCT)	

Table 36. Supported functions

Function	PCM600[1)]	CAP 501	CAP 505	CET for SPA-ZC 40x[1)]	LNT 505	PCT
Parameter setting	●	●	●	-	-	-
Disturbance handling	●	●	●	-	-	-
Signal monitoring	●	●	●	-	-	-
Disturbance record analysis	●	●	●	-	-	-
Relay configuration templates	●	●	●	-	-	-
Creating/handling projects	●	●	●	-	-	-
IEC 61850 communication configuration	-	-	-	●	-	-
LON communication configuration	-	-	-	-	●	-
Profibus communication configuration	-	-	-	-	-	●

● = Supported

1) Requires a connectivity package

18. Terminal diagram

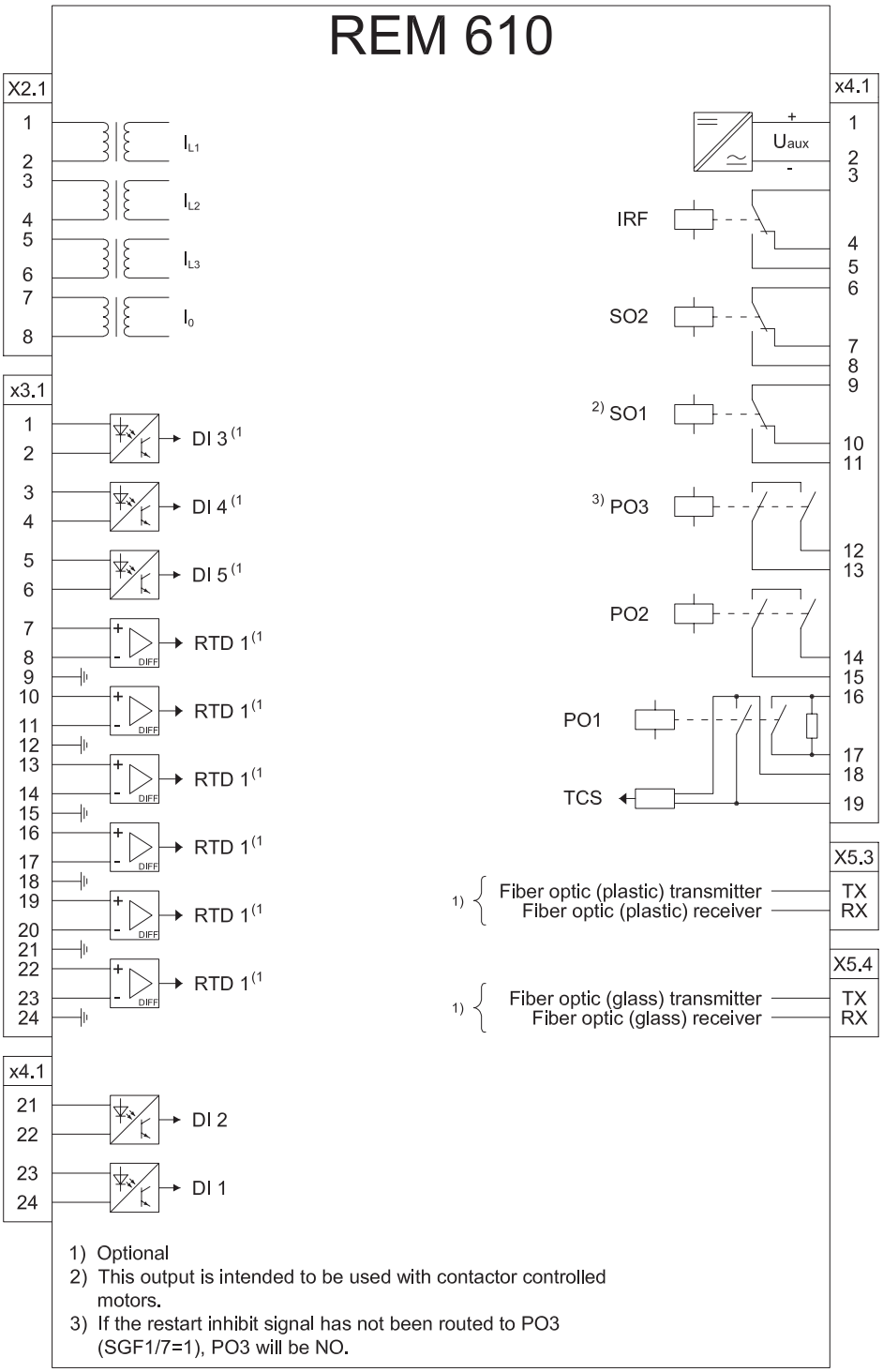


Figure 9. Terminal diagram of REM610

19. Certificates

KEMA has issued a Type test Certificate of Complete type test for the 610 series products. Certificate No. 08-1071, 08-1072 and 08-1073.

DNV (Det Norske Veritas) has issued a Type Approval Certificate for the 610 series protection relays. Certificate No. E-9945. The 610 series protection relays comply with Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards.

Korea Electrical Safety Corporation (KESCO) has issued a KAS V-Check Mark certificate for the 610 series products. Ref. Cert. No. KAS-KESCO-7018-02.

20. References

The www.abb.com/substationautomation portal provides information on the entire range of distribution automation products and services.

The latest relevant information on the REM610 protection relay is found on the product page. Scroll down the page to find and download the related documentation.

21. Functions, codes and symbols

Table 37. Functions included in REM610

Functionality	IEC 60617	IEC-ANSI
Protection		
Three-phase thermal overload for motors	θ>	49M
Motor startup based on thermal stress calculation	I_s^2 x t_s	48/14
Three-phase definite-time overcurrent, low-set stage	I_s>	51/14
Three-phase overcurrent, high-set stage	I>>	50/51
Inverse-time unbalance protection based on negative phase-sequence current	I_2>	46
Phase reversal protection	REV	46R
Undercurrent (loss-of-load)	I<	37
Non-directional earth fault, low-set stage	I_0>	51N
Cumulative startup time counter and restart inhibit function	Σtsi	66
Circuit-breaker failure	CBFP	62BF
Temperature protection using RTD sensors or thermistors	ThA>, ThB>	49/38
Lockout relay function		86
Condition monitoring		
Trip circuit supervision	TCS	TCS
Restart inhibit function	RESTART INHIBIT	RESTART DISABLE
Measurement		
Disturbance recorder		
Residual current	I_0	I_n
Three-phase current	L_1, L_2, L_3	I_a, I_b, I_c
Thermal level	θ	TH LEVEL
Negative phase-sequence current	I_2	I_2
Temperature measurements via RTD inputs	RTD1, RTD2, RTD3, RTD4, RTD5, RTD6	RTD1, RTD2, RTD3, RTD4, RTD5, RTD6

22. Document revision history

Document revision/date	Product version	History
A/2007-05-16	A	First release
B/2008-08-27	B	Content updated to correspond to the product version
C/2009-10-30	C	Content updated to correspond to the product version
D/2010-04-20	C	Order codes corrected
E/2011-11-18	C	Order codes corrected
F/2019-03-14	C	Content updated

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