

Feeder Protection Relay REF 610

Product Guide



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1. Description

The feeder protection relay REF 610 is part of the RE_ 610 series of numerical relays for the protection and supervision of utility substations and industrial switchgear.

The feeder protection relay REF 610 is primarily targeted at the protection of incoming and outgoing feeders in distribution substations. REF 610 is also used as back-up protection for motors, transformers and generators in utility and industry applications.

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

2. Protection functions

The relay offers overcurrent and thermal overload protection, earth-fault and phase discontinuity protection for cable feeders, and three-pole, multi-shot auto-reclose functions for overhead line feeders.

Enhanced with optional hardware the relay also features two light detection channels enabling arc fault protection of the switchgear, busbar system and cable terminals.

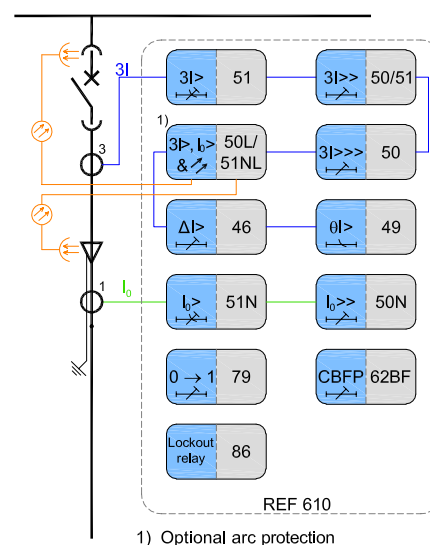


Fig. 1 Protection function overview of REF 610

Protection functions of REF 610

Function / Description	IEC	ANSI
Three-phase overcurrent protection, low-set stage	3I>	51
Three-phase overcurrent protection, high-set stage	3I>>	50/51
Three-phase overcurrent protection, instantaneous stage	3I>>>	50
Phase discontinuity protection	ΔI>	46
Three-phase thermal overload protection for cables	ΘI>	49
Non-directional earth-fault protection, low-set stage	I ₀ >	51N
Non-directional earth-fault protection, high-set stage	I ₀ >>	51N/50N
Arc protection ¹⁾	ARC	50L/51NL
Circuit-breaker failure protection	CBFP	62BF
Automatic reclosing	0 -> 1	79
Lockout relay		86

¹⁾ with optional hardware module

3. Measurement

The relay continuously measures the phase currents and the residual current. Further the relay calculates the thermal overload of the protected object, the phase unbalance value, the one-minute demand value, the demand value for a specified time frame and the maximum one-minute demand value over a specified time frame.

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

4. Disturbance recorder

The 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 and the digital channels can be set to record external or internal relay signals, e.g. start or trip signals of relay stages or 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 non-volatile memory from which data can be uploaded for subsequent fault analysis.

5. Event recorder

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

6. Circuit-breaker monitoring

The relay constantly monitors the tear and wear of the circuit breaker of the protected feeder by means of a set of built-in condition monitoring counters. The monitoring counters provide the circuit-breaker with operational history data. These data can be used for scheduling preventive maintenance programs for the circuit-breaker.

7. 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.

8. 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 will be used for alerting the operator. When a permanent relay fault is detected the protection functions of the relay will be completely blocked to prevent any incorrect relay operation.

- Four current transformers (CT)
- Two digital control inputs
- Three additional digital control inputs on an optional I/O module
- Three normally open heavy-duty output contacts
- Two change-over signal output contacts
- Three additional signaling contacts on an optional I/O module
- One dedicated IRF contact
- Input/Output contacts freely configurable

ABB



The connection of the CTs to the REF 610 relay depends on the available number and types of CTs in the feeder cubicle. Generally an outgoing feeder is equipped with three phase current transformers for high- and low-set overcurrent protection. The residual current for the earth-fault protection can be derived from the three phase currents. It can also be measured with a ring-type cable current transformer, should the outgoing feeder be a cable line and a sensitive earth-fault protection be required.

11. Communication

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

Optional communication modules and protocols

Protocol	Plastic fibre ^{a)}	Plastic/Glass fibre ^{a)}	RS-485 ^{a)}	RS-485DNP ^{a)}	Bus connection modules and gateways
SPA	X	X	X	-	
DNP 3.0	-	-	-	X	
IEC 60780-5-103	X	X	X	-	
Modbus (RTU and ASCII)	X	X	X	-	
IEC 61850	X	X	-	-	  IED + SPA-ZC 402
LON	-	-	X	-	  IED + SPA-ZC 102
	X	X	-	-	   IED + SPA-ZC 21 + SPA-ZC 102
Profibus	-	-	X	-	  IED + SPA-ZC 302

a) Optional arc protection

12. Technical data

Dimensions

Width	frame	177 mm,
	case	164 mm
Height	frame	177 (4U),
	case	160 mm
Depth	case	149.3 mm
Weight	relay	3.5 kg
	spare unit	1.8 kg

Power Supply

Type:	REF 610CxxHxxx	REF 610CxxLxxx
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% x U_r (AC) 80...120% x U_r (DC)	80...120% x U_r (DC)
Burden of auxiliary voltage supply under quiescent (P_q)/operating condition	<9 W/13 W	
Ripple in DC auxiliary voltage	Max 12% of the DC value (at frequency of 100 Hz)	
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 with prevailing fault	<350 ms	
Internal overtemperature limit	+100°C	
Fuse type	T2A/250 V	

Energizing inputs

Rated frequency	50/60 Hz $\pm$ 5 Hz		
Rated current, I_n	0.2 A	1 A	5 A
Thermal withstand capability:			
• continuously	1.5 A	4 A	20 A
• for 1 s	20 A	100 A	500 A
• for 10 s	5 A	25 A	100 A
Dynamic current withstand:			
• half-wave value	50 A	250 A	1250 A
Input impedance	<750 m Ω	<100 m Ω	<20 m Ω

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...20 x I_n

Digital Inputs

Rated voltage	DI1...DI2	DI3...DI5 (optional on order)
• REF 610CxxHxxx Activating threshold	110/125/220/250 V DC Max. 88 V DC (110 V DC -20%)	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%)
• REF 610CxxLxxx Activating threshold	24/48/60/110/125/220/250 V DC Max. 19.2 V DC (24 V DC -20%)	
• REF 610CxxxxHx Activating threshold		
• REF 610CxxxxLx Activating threshold		
Operating range	±20% of the rated voltage	
Current drain	2...18 mA	
Power consumption/input	<0.9 W	

Signal output SO1 and optional outputs SO4 and SO5

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 (5 A/3 A/1 A for series connection of SO4 and SO5)
Minimum contact load	100 mA at 24 V AC/DC

Signal output SO2, optional output SO3, and 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	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

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Power outputs PO1, PO2 and 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
Trip-circuit supervision (only PO1): • 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)

Lens sensor and optic fibre for arc protection

Fibre-optic cable including lens	1.5 m, 2.0 m or 3.0 m
Normal service temperature range of the lens	-40...+100°C
Maximum service temperature range of the lens front, max 1 h	+140°C
Minimum permissible bending radius of the connection fibre	100 mm

Degree of protection by enclosure of flush-mounted relay

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

Environmental tests and conditions

Recommended service temperature range (continuous)	-10...+55°C
Relative humidity	<95%
Limit temperature range (short-term)	-40...+70°C
Transport and storage temperature range	-40...+85°C according to IEC 60068-2-48
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
Atmospheric pressure	86...106 kPa

Electromagnetic compatibility tests

The EMC immunity test level meets the requirements listed below:	
1 MHz burst disturbance test, class III: • Common mode • Differential mode	According to IEC 60255-22-1 2.5 kV 1.0 kV
Electrostatic discharge test, class IV: • For contact discharge • For air discharge	According to IEC 61000-4-2, IEC 60255-22-2 and ANSI 37.90.3-2001 8 kV 15 kV
Radio frequency interference tests: • Conducted, common mode • Radiated, amplitude-modulated • Radiated, pulse-modulated	According to IEC 61000-4-6 and IEC 60255-22-6 (2000) 10 V (rms), f = 150 kHz...80 MHz According to IEC 61000-4-3 and IEC 60255-22-3 (2000) 10 V/m (rms), f = 80...1000 MHz According to the ENV 50204 and IEC 60255-22-3 (2000) 10 V/m, f = 900 MHz
Fast transient disturbance tests: • Power outputs, energizing inputs, power supply • I/O ports	According to IEC 60255-22-4, and IEC 61000-4-4 4 kV 2 kV
Surge immunity test: • Power outputs, energizing inputs, power supply • I/O ports	According to IEC 61000-4-5 4 kV, line-to-earth, 2 kV, line-to-line 2 kV, line-to-earth, 1 kV, line-to-line
Power frequency (50 Hz) magnetic field	300 A/m continuous, according to IEC 61000-4-8
Voltage dips and short interruptions	According to IEC 61000-4-11 30%/10 ms 60%/100 ms 60%/1000 ms >95%/5000 ms
Electromagnetic emission tests: • Conducted, RF emission (Mains terminal) • Radiated RF emission	According to the EN 55011 EN 55011, class A, IEC 60255-25 EN 55011, class A, IEC 60255-25
CE compliance	Complies with the EMC directive 89/336/EEC and the LV directive 73/23/EEC

Insulation test

Dielectric tests: • Test voltage	According to IEC 60255-5 2 kV, 50 Hz, 1 min
Impulse voltage test: • Test voltage	According to IEC 60255-5 5 kV, unipolar impulses, waveform 1.2/50 μ s, source energy 0.5 J
Insulation resistance measurements Isolation resistance	According to IEC 60255-5 >100 M Ω , 500 V DC

Mechanical tests

Vibration tests (sinusoidal)	According to IEC 60255-21-1, class I
Shock and bump test	According to IEC 60255-21-2, class I

Data communication for front interface

Front interface: • Optical connection (infrared) via the front communication cable (1MRS050698) • SPA bus protocol • 9.6 or 4.8 kbps (9.6 kbps with front communication cable)

Protection functions

Stage I>, I>> and I>>>

Feature	Stage I>	Stage I>>	Stage I>>>
Set start value, I>, I>> and I>>> • at definite-time characteristic • at IDMT characteristic	0.30...5.00 x I _n 0.30...2.50 x I _n ^{a)}	0.50...35.0 x I _n	0.50...35.0 x I _n
Start time, typical	55 ms	30 ms	30 ms
Time/current characteristic • definite-time operate time, t>, t>> and t>>> • IDMT according to IEC 60255-3	0.05...300 s	0.04...300 s	0.04...300 s
time multiplier, k • Special type of IDMT characteristic	Extremely inverse Very inverse Normal inverse Long-time inverse 0.05...1.00 RI-type inverse RD-type inverse (RXIDG)		
time multiplier, k • IDMT according to IEEE C37.112	0.05...1.00 Extremely inverse Very inverse Inverse		
time dial, n	1...15		

(continued)

Feature	Stage I>	Stage I>>	Stage I>>>
Resetting time, maximum	50 ms ^{b)}	50 ms	50 ms
Retardation time, typical	30 ms	30 ms	30 ms
Set resetting time, t_r	0.05...2.50 s		
Drop-off/pick-up ratio, typical	0.96	0.96	0.96
Operate time accuracy - at definite-time characteristic - at IDMT characteristic according to IEC 60255-3: accuracy class index E - at IDMT characteristic according to IEEE C37.112 - at RI-type characteristic - at RD-type characteristic (RXIDG)	$\pm 2\%$ of the set operate time or ± 25 ms 5 $\pm 7\%$ of the calculated operate time $\pm 7\%$ of the calculated operate time $\pm 7\%$ of the calculated operate time	$\pm 2\%$ of the set operate time or ± 25 ms	$\pm 2\%$ of the set operate time or ± 25 ms
Operation accuracy $0.3...0.5 \times I_n$ $0.5...5.0 \times I_n$ $5.0...35.0 \times I_n$	$\pm 5\%$ of the set start value $\pm 3\%$ of the set start value	$\pm 3\%$ of the set start value $\pm 3\%$ of the set start value	$\pm 3\%$ of the set start value $\pm 3\%$ of the set start value

a) As the maximum measured current is $50 \times I_n$, a predefined current setting of $2.5 \times I_n$ is used for the operate time calculation at IDMT mode of operation, if the set start value is greater than $2.5 \times I_n$. This will speed up the operation of the relay making the operate time shorter than the theoretical IDMT curve would imply. However, the stage always starts according to the set start value.

b) Resetting time of the trip signal.

Stages I₀> and I₀>>

Feature	Stage I>	Stage I>>
Set start value, I ₀ > and I ₀ >> - at definite-time characteristic - at IDMT characteristic	$1.0...100\% I_n$ $1.0...100\% I_n^{a)}$	$5.0...800\% I_n$
Start time, typical	60 ms	50 ms

(continued)

Feature	Stage I>	Stage I>>
Time/current characteristic • definite time operate time, $t_0>$ and $t_0>>$ • IDMT according to IEC 60255-3 time multiplier, k_0 • Special type of IDMT characteristic time multiplier, k_0 • IDMT according to IEEE C37.112 time dial, n_0	0.05...300 s Extremely inverse Very inverse Normal inverse Long-time inverse 0.05...1.00 RI-type inverse RD-type inverse 0.05...1.00 Extremely inverse Very inverse Inverse 1...15	0.05...300 s
Resetting time, maximum	50 ms ^{b)}	50 ms
Retardation time, typical	30 ms	30 ms
Set resetting time, $t_{0r}>$	0.05...2.50 s	
Drop-off/pick-up ratio, typical	0.96	0.96
Operate time accuracy • at definite-time characteristic • at IDMT characteristic according to IEC 60255-3: accuracy class index E • at IDMT characteristic according to IEEE C37.112 • at RI-type characteristic • at RD-type characteristic RXIDG)	±2% of the set operate time or ±25 ms 5 ±7% of the calculated operate time ±7% of the calculated operate time ±7% of the calculated operate time	±2% of the set operate time or ±25 ms
Operation accuracy • 1.0...10.0% I_n • 10.0...100% I_n • 100...800% I_n	±5% of the set start value +0.05% I_n ±3% of the set start value	±5% of the set start value +0.05% I_n ±3% of the set start value ±3% of the set start value

a) As the maximum measured current is $50 \times I_n$, a predefined current setting of $2.5 \times I_n$ is used for the operate time calculation at IDMT mode of operation, if the set start value is greater than $2.5 \times I_n$. This will speed up the operation of the relay making the operate time shorter than the theoretical IDMT curve would imply. However, the stage always starts according to the set start value.

b) Resetting time of the trip signal.

Stage $\theta>$

Feature	Value
Set full load current, I_{θ}	$0.30 \dots 1.50 \times I_n$
Set alarm level, $\theta_a>$	50...100%
Trip level, $\theta_t>$	100 %
Time constant, τ	1...200 min
Operate time accuracy $I/I_{\theta} > 1.2$	$\pm 2\%$ of the set operate time or ± 1 s

Stage $\Delta I>$

Feature	Value
Set start value, $\Delta I>$ at definite-time characteristic	10...100% $\Delta I = (I_{\max} - I_{\min}) / I_{\max} * 100\%$
Start time, typical	100 ms
Time/current characteristics definite time operate time, $t_{\Delta I}>$	1...300 s
Resetting time, maximum	70 ms
Drop-off/pick-up ratio, typical	0.90
Operate time accuracy at definite-time characteristic	$\pm 2\%$ of the set operate time or ± 75 ms
Operation accuracy 10...100%	$\pm 3\%$ of the set start value and ± 1 unit

Stage ARC

Feature	Value
Stage ARC	
Set trip value $\text{ArcI}>$	$0.5 \dots 35.0 \times I_n$
Operate time	$< 15 \text{ ms}^{\text{a})}$
$\text{ArcI}_0>$	$5.0 \dots 800\% I_n$
Operate time	$< 17 \text{ ms}^{\text{a})}$
Resetting time	30 ms
Operation accuracy	$\pm 7\%$ of the set start value
LightSensor>	
Activation time of LightSensor>	$< 15 \text{ ms}$
Resetting time	20 ms

a) Applies only if a signal output contact (SO1...5) is used. If a power output contact (PO1...3) is used, 2...3 ms will be added. It is used only for alarm purposes.

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Auto-reclose function

Feature	Value
Trigger pulse	Any start/trip signal
Number of shots	0...3
CB Closing time	0.1...10 s
Start delay of stage I>	0...300 s
Start delay of stage I ₀ >	0...300 s
Reclaim time	3...300 s
Cutout time	0.1...300 s
Dead time of shot 1	0.1...300 s
Dead time of shot 2	0.1...300 s
Dead time of shot 3	0.1...300 s
Operate time accuracy	±2% of the set time and ±25 ms

CBFP

Feature	Value
Set operate time	0.10...60.0 s
Phase-current threshold for external triggering of CBFP	
• pick-up/drop-off	0.08/0.04 x I _n

13. Mounting methods

Using appropriate mounting accessories the standard relay case for the RE_ 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°) 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 relay 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 a RTXP 18 test switch to a 19" rack

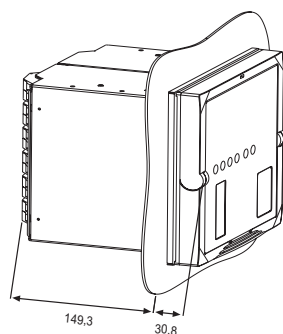


Fig. 4 Flush mounting

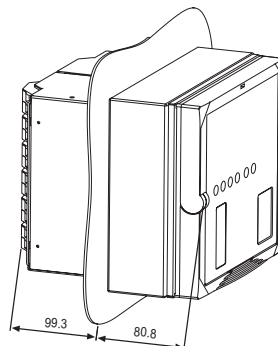


Fig. 5 Semi-flush mounting

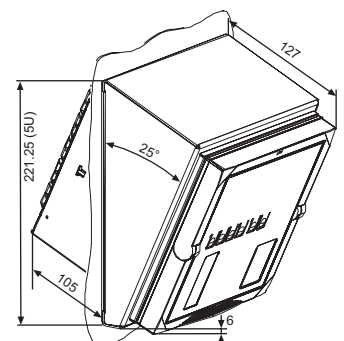


Fig. 6 Semi-flush mounting in a 25° angle

14. Relay case and relay plug-in unit

As a safety measure the relay cases for the current measuring 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 preventing current measuring relay plug-in units from being inserted into a case for a voltage relay unit and vice versa, i.e. the relay cases are associated to a certain type of relay plug-in unit.

There is, however, an 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 will automatically adapt to that particular relay type, i.e. the short-circuiting contacts will be activated as will the mechanical blocking system. Hereafter the relay case is permanently associated to a certain relay type.

15. Selection and ordering data

When ordering REF 610 protection relays and/or accessories please specify the following: Order number, HMI language set number and quantity. The order number identifies the protection relay type and hardware as described in the figures below and is labeled on the marking strip under the lower handle of the relay.

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

Revision		
Current revision	C	
Phase current inputs		
5 = 5 A	5	
1 = 1 A	1	
Earth-fault current input		
5 = 5 A	5	
1 = 1 A	1	
2 = 0.2 A	2	
Power supply:		
H = 110-240 V AC/110-250 V DC, 2xDI (110/125/220/250 VDC), 3xPO, 2xSO	H	
L = 24-60 V DC, 2xDI (24/48/60/110/125/220/250 V DC), 3xPO, 2xSO	L	
I/O extension module:		
H = 3xSO and 3xDI (110/125/220/250 VDC)	H	
L = 3xSO and 3xDI (24/48/60/110/125/220/250 V DC)	L	
N = none	N	
Communication module		
P = plastic fiber	P	
M = plastic fiber with input for arc protection	M	
G = plastic and glass fiber	G	
K = plastic and glass fiber with input for arc protection	K	
R = RS-485	R	
T = RS-485 with input for arc protection	T	
D = RS-485 including DNP 3.0 protocol	D	
E = RS-485 including DNP 3.0 protocol with input for arc protection	E	
N = none	N	
Language set:		
01 = (IEC) English, Swedish, Finnish	01	
02 = (IEC) English, German, French, Italian, Spanish, Polish	02	
11 = (ANSI) English, Spanish, Portuguese	11	

Fig. 7 Ordering key for complete relays

REF610□□□□S□S,□□

Revision		
Current revision		C
Phase current inputs		
5 = 5 A		5
1 = 1 A		1
Earth-fault current input		
5 = 5 A		5
1 = 1 A		1
2 = 0.2 A		2
Power supply:		
H = 110-240 V AC/110-250 V DC, 2xDI (110/125/220/250 VDC), 3xPO, 2xSO		H
L = 24-60 V DC, 2xDI (24/48/60/110/125/220/250 V DC), 3xPO, 2xSO		L
I/O extension module:		
H = 3xSO and 3xDI (110/125/220/250 VDC)		H
L = 3xSO and 3xDI (24/48/60/110/125/220/250 V DC)		L
N = none		N
Language set:		
01 = (IEC) English, Swedish, Finnish		01
02 = (IEC) English, German, French, Italian, Spanish, Polish		02
11 = (ANSI) English, Spanish, Portuguese		11

Fig. 8 Ordering key for spare units

16. Accessories and tools

Item	Order nr
Cables	
Front communication cable	1MRS050698
Cable for optical sensors for arc protection (X.X = length [m])	1MRS120534-X.X
Mounting accessories	
Semi-flush mounting kit	1MSR050696
Inclined semi-flush mounting kit	1MSR050831
19 " rack mounting kit with cutout for one relay	1MSR050694
19 " rack mounting kit with cutout for two relays	1MSR050695
Surface mounting frame	1MSR050697
Mounting bracket for RTXP 18	1MSR061207
Mounting bracket for 4U high Combiflex equipment frame	1MSR061208
Test switches:	
Test switch RTXP 18	1MSR050783
Optional communication cards:	
Plastic fibre	1MRS050889
Plastic fibre with inputs for arc protection	1MRS050890
RS-485	1MRS050892
RS-485 with inputs for arc protection	1MRS050888
Plastic and glass fibre	1MRS050891
Plastic and glass fibre with inputs for arc protection	1MRS050885
RS-485 including DNP 3.0 protocol	1MRS050887
RS-485 including DNP 3.0 protocol and inputs for arc	1MRS050886
RE_ 610 universal cases:	
Empty universal relay case for RE_ 610	1MSR050904

Configuration, setting and SA system tools	Version
CAP 501 Relay Setting Tool CAP 50	v. 2.4.0-1 or later
CAP 505 Relay Setting Tool CAP 505	v. 2.4.0-1 or later
SMS 510 Substation Monitoring System	SMS 510 v.1.2.0-1 or later
LIB 510 Library for MicroSCADA v. 8.4.4	LIB 510 v. 4.0.5-3 or later

17. Terminal diagram

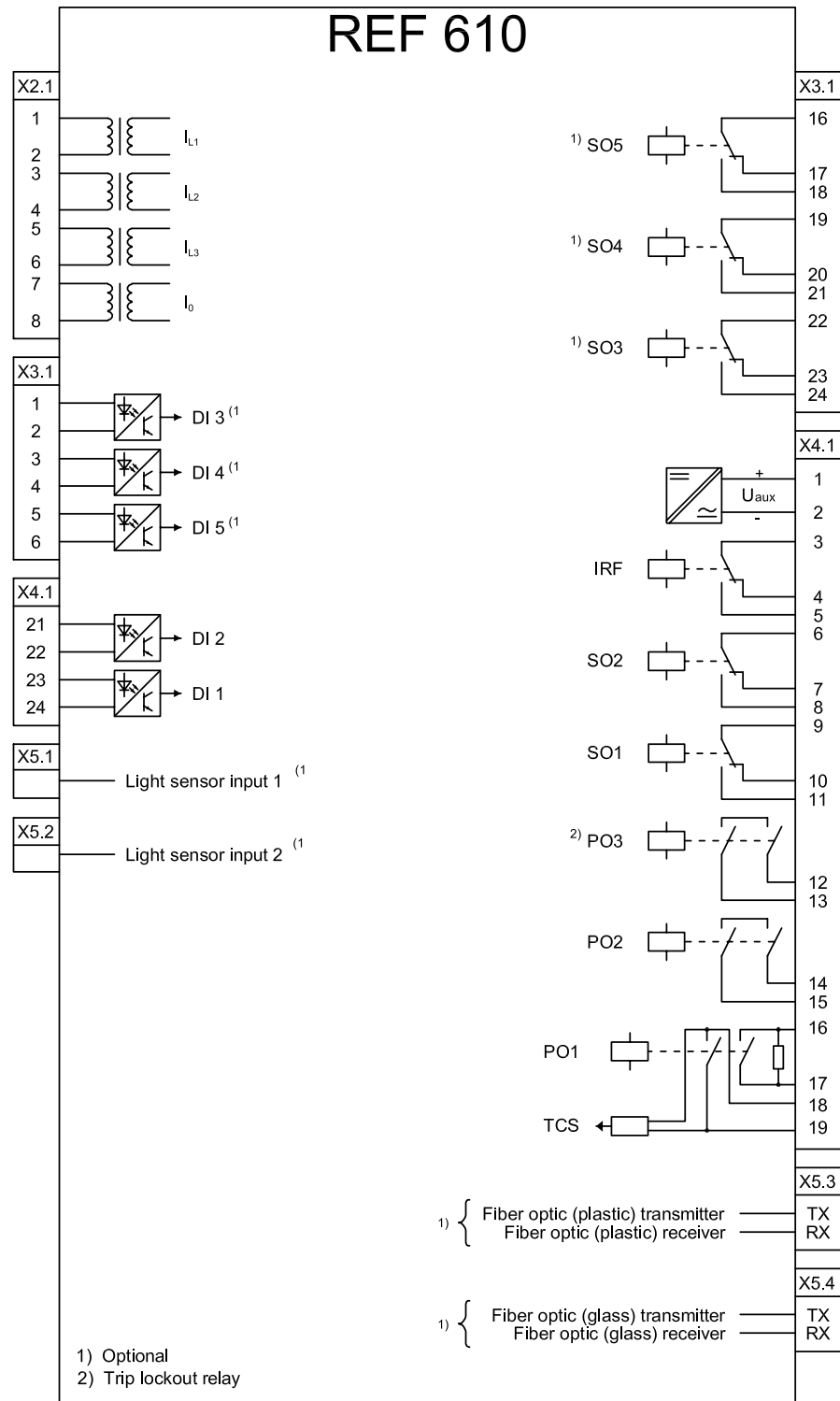


Fig. 9 Terminal diagram of REF 610

18. Approvals

REF 610 has been granted a preliminary EDF approval:
Number EDF R&D H-M2A-2006-02557-FR.

19. References

The www.abb.com/substationautomation portal offers you information about the distribution automation product and service range.

You will find the latest relevant information on the REF 610 protection relay on the [product page](#).

The download area on the right hand side of the web page contains the latest product

documentation, such as technical reference manual, installation manual, operators manual, etc. The selection tool on the web page helps you find the documents by the document category and language.

The Features and Application tabs contain product related information in a compact format.

Product Guide > Medium Voltage Products > Protection and Control (Distribution) > Feeder Protection and Control > Feeder Protection Relay > REF 610

Feeder Protection Relay REF 610

General

Service & Support

Application

Features

Contacts

The feeder protection relay REF 610 is part of the RE_610 series of numerical relays for the protection and supervision of utility substations and industrial switchgear.

The protection relay REF 610 is primarily targeted at the protection of incoming and outgoing feeders in distribution substations. REF 610 is also used as back-up protection for motors, transformers and generators, in utility and industry applications.

The numerical feeder protection relays of the RE_610 series support a wide range of standard communication protocols, among them the IEC 61850, IEC 60870-5-103, Modbus, Profibus and DNP communication protocols.



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Connection diagram

REF 610 Terminal Diagram, REF 610+RTXP 18

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REF 610 Terminal Diagram, REF 610+RTXP 18

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REF 610 Terminal Diagram, REF 610+RTXP 18

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Fig. 10 Product page



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