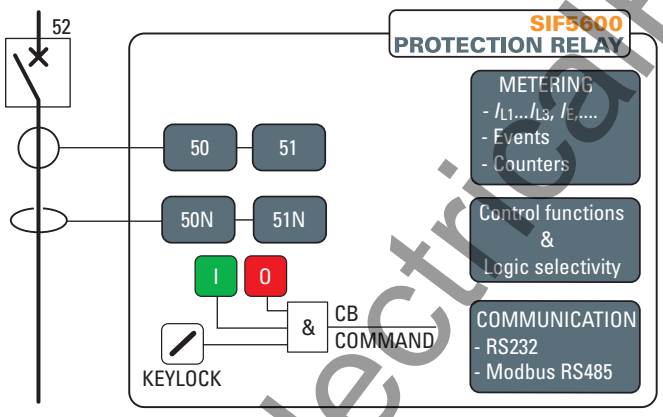
SIF5600 PHASE & RESIDUAL OVERCURRENT PROTECTION RELAY

Application

The relay type SIF5600 is intended for the protection against overloads, short circuits and earth faults in radial networks.
According to the hardware configurations, the SIF5600 protection relay can be shipped in various case styles depending on the required mounting options.
Versions with sensitive earth fault threshold, suitable for ungrounded and high impedance grounded networks, are available.
Compliant to Enel DK5600 requirements.

Protective functions

50/51	Phase overcurrent
50N/51N	Residual overcurrent



Measuring inputs

Two or three phase current inputs and one residual current input, with nominal currents independently selectable at 1 A or 5 A through jumpers.

Metering

The relay measures all the phase and residual currents and the relay input logic states, making them available for reading on a display or to communication interfaces.
Currents are sampled 32 times per period and measured in the effective value (RMS) of the fundamental component using the DFT (Discrete Fourier Transform) algorithm and digital filters.

Circuit Breaker monitoring and commands

Following functions for circuit breaker control and monitoring are provided:

- Status monitoring (open, closed, anomalous).
- Local and remote operation; a dedicated keylock switch enables commands of the "OPEN CB" and "CLOSE CB" push buttons.

Firmware updating

The use of flash memory units allows on-site firmware updating.

Logic selectivity

With the aim of providing a selective protection system, some of the SIF5600 relay protective functions may be blocked by logic selectivity binary input (pilot wire accelerated logic).

Sequence of events logging

Upon tripping/starting of each function, the relay records the last eight events.
Each event includes information in relation to the date, time, function activated, readings, block input and output status.

Construction

Flush or projecting mounting with plug in terminals

Communication

The relay makes use of two communication interfaces:

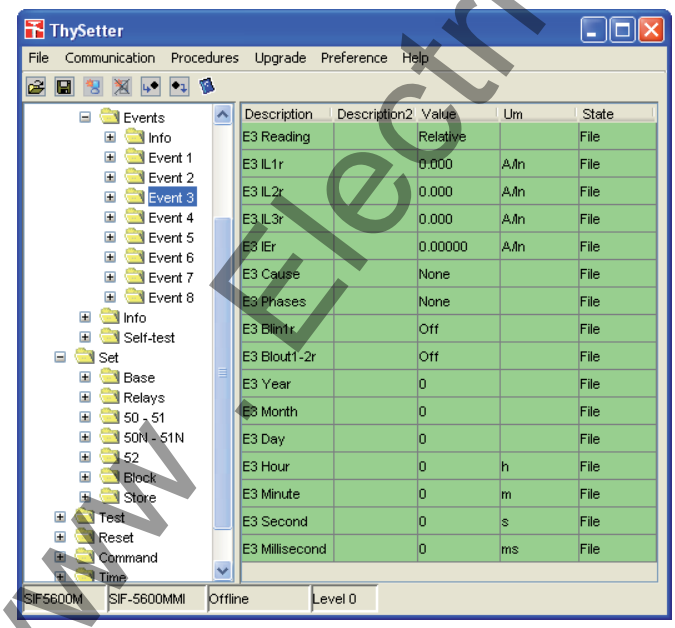
- A RS232 local communication front-end interface, used for protection management, viewing and changing the relay programming, obtaining readings of the logic states, the chronological events, measuring, and for relay testing and resetting commands.
- A back-end interface for communication with remote monitoring and control systems by RS485 using the MODBUS RTU protocol.

MMI (Man Machine Interface)

The user interface comprises a membrane keyboard, a backlight LCD alphanumeric display and five LEDs. Regarding the LEDs, one are set aside to indicate auxiliary and self diagnostics power supply (green ON LED), two are dedicated to the circuit breaker position (green LED for OPEN CB, red LED for CLOSED CB) and two red LEDs indicating TRIP of the 50-51 and 50N-51N protective functions.

Programming and settings

All relay programming and adjustment operations may be performed through MMI (Keyboard and display) or using a Personal Computer with the aid of the ThySetter software.



Binary inputs

Two binary inputs are available which may be used in testing Circuit Breaker position.

Output relays and LEDs

There are four change-over contacts Output Relays, and five indicator LEDs. Each output relay may be individually programmed in relation to resting state (normally energized- de-energized) and reset mode (manual or automatic).
The user may program the function of each final relay in accordance with a matrix (tripping matrix) structure.

Self diagnostics

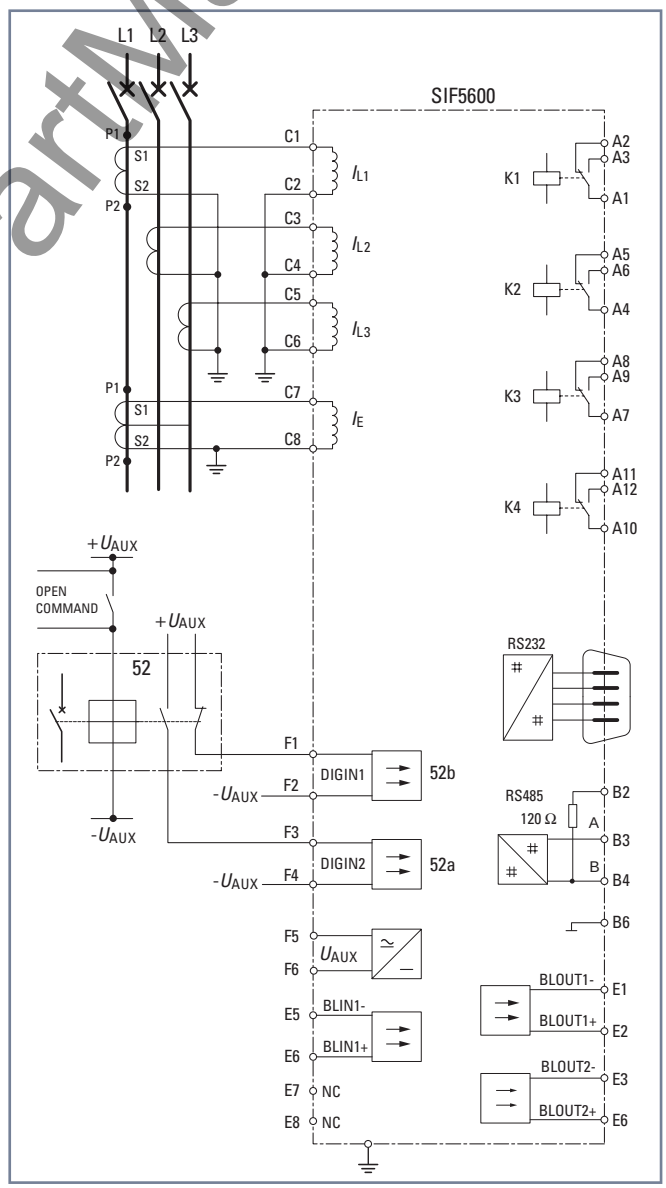
All hardware and software functions are repeatedly checked and any anomalies reported via display messages, communication interfaces, LEDs and Output Relays.
Anomalies may refer to:

- Hw faults
- Output relay coil interruptions
- Pilot wire faults (breaked, shorted)
- CB fault
- EEPROM memory checksum failure.

Testing

Using the ThySetter software, it is possible to check the correct operation of each relay function without compromising protection. Verification does not include the measuring transformers, the relevant secondary circuits and the measuring inputs of the SIF5600 relay.

Connection diagram example (3 phases version)



SPECIFICATIONS

GENERAL

Mechanical data

Mounting	flush projecting
Terminals	plug screw connection
Mass	2.0 kg

Insulation tests

Reference standards	EN 60255-5
High voltage test 50Hz	2 kV 60 s
Impulse voltage withstand (1.2/50 µs)	5 kV
Insulation resistance	>100 MΩ

Voltage dip and interruption

Reference standards	EN 61000-4-29

EMC tests for interference immunity

1 MHz damped oscillatory wave	EN 60255-22-1	1 kV-2.5 kV
Electrostatic discharge	EN 60255-22-2	8 kV
Fast transient burst (5/50 ns)	EN 60255-22-4	4 kV
Conducted radio-frequency fields	EN 60255-22-6	10 V
Radiated radio-frequency fields	EN 60255-4-3	10 V/m
High energy pulse	EN 61000-4-5	2 kV
Magnetic field 50 Hz	EN 61000-4-8	1 kA/m
Damped oscillatory wave	EN 61000-4-12	2.5 kV
Ring wave	EN 61000-4-12	2 kV
Conducted common mode (0...150 kHz)	EN 61000-4-16	10 V

Emission

Reference standards	EN 61000-6-4 (ex EN 50081-2)
Conducted emission 0.15...30 MHz	Class A
Radiated emission 30...1000 MHz	Class A

Climatic tests

Reference standards	IEC 60068-x, ENEL R CLI 01, CEI 50

Mechanical tests

Reference standards	EN 60255-21-1, 21-2, 21-3

Safety requirements

Reference standards	EN 61010-1
Pollution degree	3
Reference voltage	250 V
Overvoltage	III
Pulse voltage	5 kV
Reference standards	EN 60529
Protection degree (front side for flush mounting)	IP51

Environmental conditions

Ambient temperature	-25...+70 °C
Storage temperature	-40...+85 °C
Relative humidity	10...95 %
Atmospheric pressure	70...110 kPa

Certifications

Product standard for measuring relays	EN 50263
CE conformity	
• EMC Directive	89/336/EEC
• Low Voltage Directive	73/23/EEC
Type tests	IEC 60255-6

INPUT CIRCUITS

Auxiliary power supply Uaux

Nominal value (range)	24...48 Vac/dc 115...230 Vac/110...220 Vdc
Operative range (each one of the above nominal values)	
	19...60 Vac/dc 85...265 Vac/75...300 Vdc
Maximum power consumption	10W (20 VA)

Phase current inputs

Nominal current I_n	1 A or 5 A selectable by jumpers
Permanent overload	20 A
Thermal overload (1 s)	500 A
Rated consumption (for any phase)	≤ 0.2 VA

Residual current input

Nominal current I_{En}	1 A or 5 A selectable by jumpers
Permanent overload	25 A
Thermal overload (1 s)	500 A
Rated consumption	≤ 0.2 VA

Binary inputs

Quantity	2
Type	dry inputs
Max permissible voltage	19...265 Vac/19...300 Vdc
Max consumption, energized	3 mA

Block input (Logic selectivity)

Quantity	1
Type	polarized wet input (powered by internal isolated supply)
Max consumption, energized	5 mA

OUTPUT CIRCUITS

Output relays K1...K4

Quantity	4
Nominal current	5 A
Nominal voltage/max switching voltage	250 Vac/400 Vac
Breaking capacity:	
• Direct current (L/R = 40 ms)	30 VA
• Alternating current (λ = 0,4)	40 W
Make	1000 W/VA
Short duration current (0,5 s)	15 A

Block output (Logic selectivity)

Quantity	2
Type	optocoupler

COMMUNICATION INTERFACES

Local PC	RS232
Network	RS485
Protocol	ModBus® RTU

GENERAL SETTINGS

Rated values

Relay phase nominal current (I_n)	1 A, 5 A
Phase CTs nominal primary current (I_{np})	1 A...10 kA
Relay residual nominal current (I_{En})	1 A, 5 A
Residual CT nominal primary current (I_{Enp})	1 A...10 kA

FUNCTIONS

Phase overcurrent (50/51)

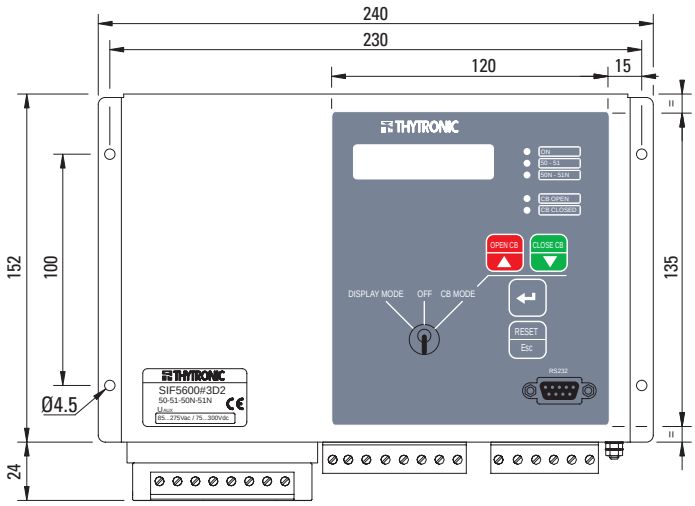
Pickup $I>$ (definite-time)	0.100...10.00 I_n
Time delay $t>$ (definite-time)	0.05...180 s
Pickup $I>$ (inverse-time)	0.100...2.50 I_n
Time delay $t>$ (inverse-time)	0.05...60 s
Pickup $I>>$	0.100...20.00 I_n
Time delay $t>>$ (definite-time)	0.03...10.0 s

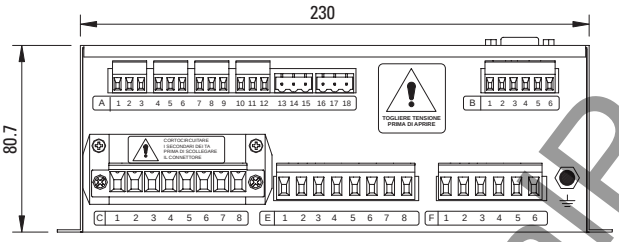
Residual overcurrent (50N/51N)

Pickup $I_E>$ (definite-time)	0.05... 12.00 I_{En}
High sensitivity pickup $I_E>$ (definite-time)	0.002...0.500 I_{En}
Time delay $t_E>$ (definite-time)	0.05...180 s
Pickup $I_E>$ (inverse-time)	0.05...0.750 I_{En}
High sensitivity pickup $I_E>$ (inverse-time)	0.002...0.050 I_{En}
Time delay $t_E>$ (inverse-time)	0.05...60.0 s
Pickup $I_E>>$	0.05...12.00 I_{En}
High sensitivity pickup $I_E>>$	0.002...0.500 I_{En}
Time delay $t_E>>$ (definite-time)	0.03...10.0 s

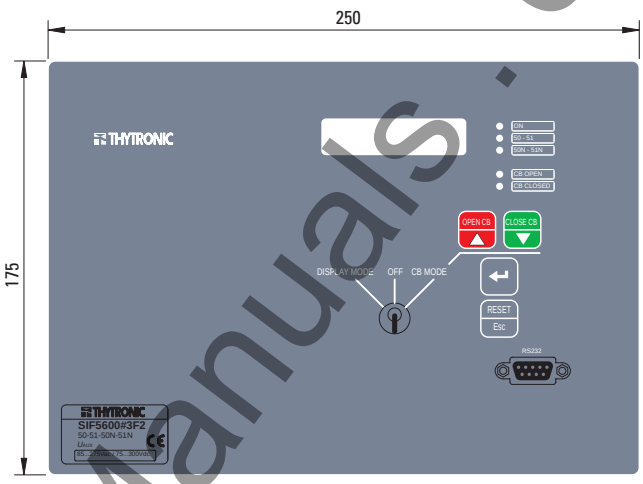
DIMENSIONS

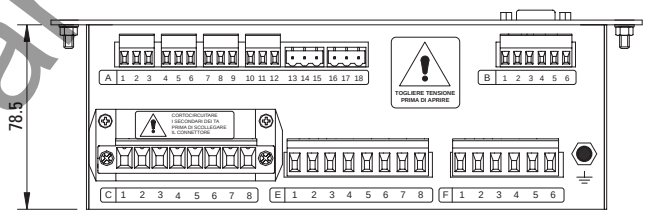
☐ Projecting mounting

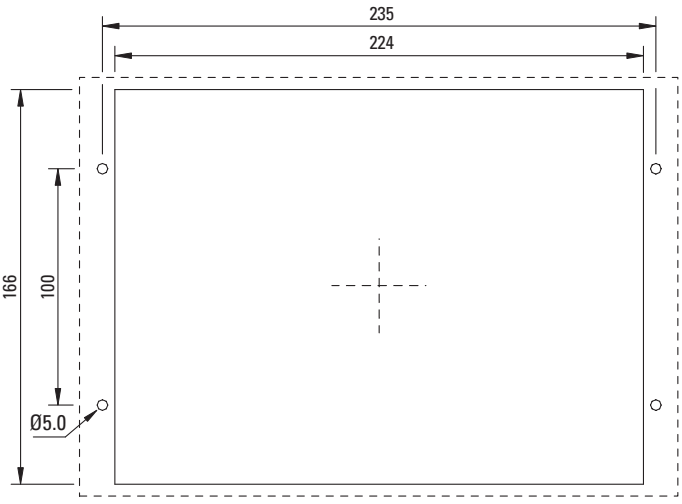




☐ Flush mounting







PANEL CUTOUT