COL GIOVANNI PAOLO S.p. A.
COSTRUZIONI ELETTROMECCANICHE
DIVISIONE ELETTRONICA E SISTEMI

Directional fault and voltage absence detector

RGDAT-A70

(compliant with ENEL DY1059-A70 technical spec.)

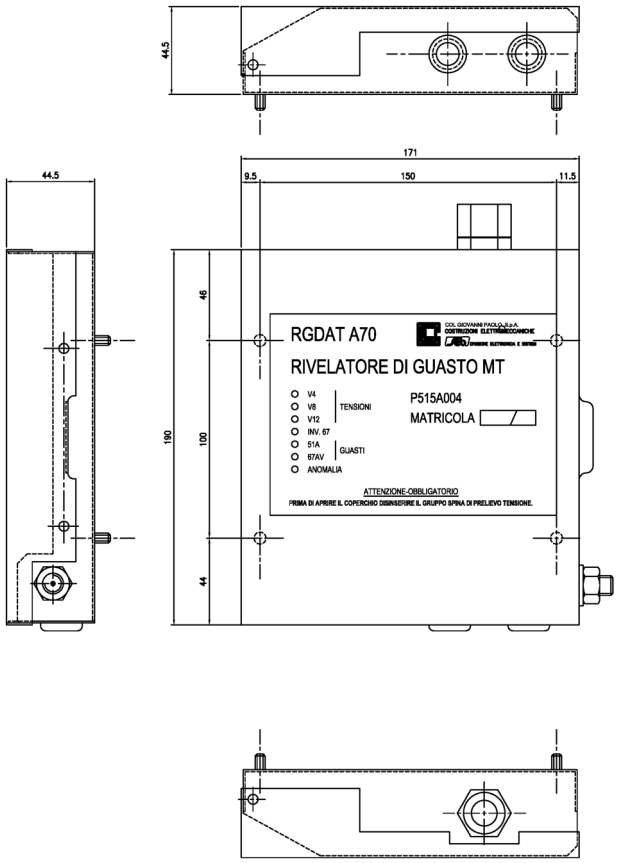
Summary

The fault detector RGDAT-A70 is made according to technical specification DY1059-A70 by ENEL Distribuzione; it is installed in remote controlled Secondary Substations in order to provide local and remote signaling of short circuit faults and ground faults that may occur in medium voltage distribution network, as well as to signal the absence of line voltage. This information can help to locate the section of the network affected by fault.

The voltage measurement is taken using voltage signals supplied by capacitor dividers that normally, when installed on MV protected switchgears, provide signals to voltage presence signaling lamps.

The obtained voltage measurements are used for directional earth fault function and for presence/ absence of line voltage detection; values of phase voltages V4, V8 and V12 are processed in order to eliminate measurement errors due to capacitive dividers thanks to voltage self-calibration function.

The current measurement is done using three openable current sensors, included in delivery. The device RGDAT-A70 detects phase faults producing a current greater than a threshold value and ground faults both in isolated neutral networks and in compensated neutral networks.



There are 3 relay outputs, which generally have the following functions:

- relay TS51A: signals the intervention of short-circuit function for phase faults (polyphase or double single-phase to ground)
- relay TS67AV: signals the intervention of directional earth fault function for line side faults (with reverse direction disabled)
- relay TSPresV: managed by voltage presence function

The device RGDAT-A70 has a current converter with output 4÷20 mA for sending the measurement of phase current connected to pin 2 of terminal block MA to a remote control unit.

Using the configuration software, the user can program the full scale value of current output, from 100 A to 900 A, in steps of 10 A

On the front cover of device, starting from the top, there are several leds, to indicate the following conditions:

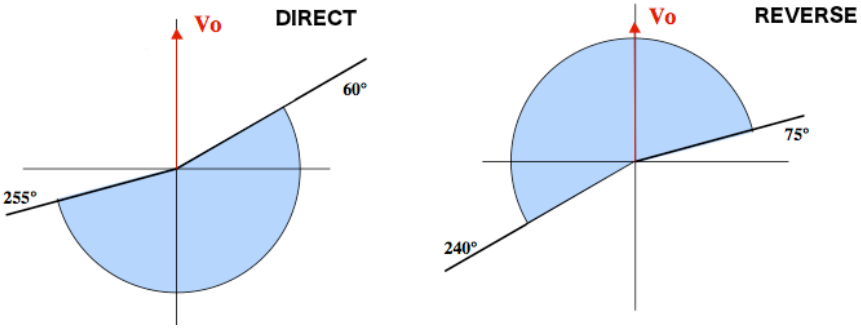
- three GREEN LEDs, to signal the voltage presence of three phases of MV network
- a WHITE LED, to signal the inversion of surveillance direction of directional earth fault protection
- an ORANGE LED, to locally signal the intervention for polyphase fault or double single-phase ground fault
- a RED LED, to locally signal the intervention for line side single-phase fault
- a RED LED, blinking, to signal a device failure

Protections and Functions

The device RGDAT-A70 implements the following protections / functions

Id	Protection / functions	Settings
51	Phase overcurrent protection	100 A ÷ 900 A, step 50 A
51N	Earth fault overcurrent protection	10 A ÷ 200 A, step 10 A
67N	Directional earth fault protection (2 thresholds) Surveillance direction “direct” or “reverse”, selected by digital input	Voltage threshold: 1 ÷ 16% Vn, step 1% Current threshold: 1 ÷ 20 A, step 0.5 A Angular sector of intervention S1 (direct): 60° ÷ 255° Angular sector of intervention S2 (direct): 90° ÷ 120° Angular sector of intervention S1 (reverse): 240° ÷ 75° Angular sector of intervention S2 (reverse): 240° ÷ 300°
27/59	Voltage presence/absence function	Voltage presence detected if: (VR > 80%Vn) OR (VS > 80%Vn) OR (VT > 80%Vn) Voltage absence detected if: (VR < 20%Vn) AND (VS < 20%Vn) AND (VT < 20%Vn)
27Vd	Positive sequence undervoltage protection	70% ÷ 110% Vn, step 1%
59Vi	Negative sequence overvoltage protection	1% ÷ 40% Vn, step 1%
59Vo	Residual overvoltage protection	1% ÷ 40% Vn, step 1%
VSS	Voltage sensors supervisor function	1% ÷ 40% Vn, step 1%
Monit. Tens	Voltage monitoring function	

Trip characteristic for threshold 67N (in specific case 67N.S1)



Fault recording function: thresholds trips are recorded to a 10 position circular buffer. For each threshold trip are recorded: threshold id, voltages and currents measurements, date and time.

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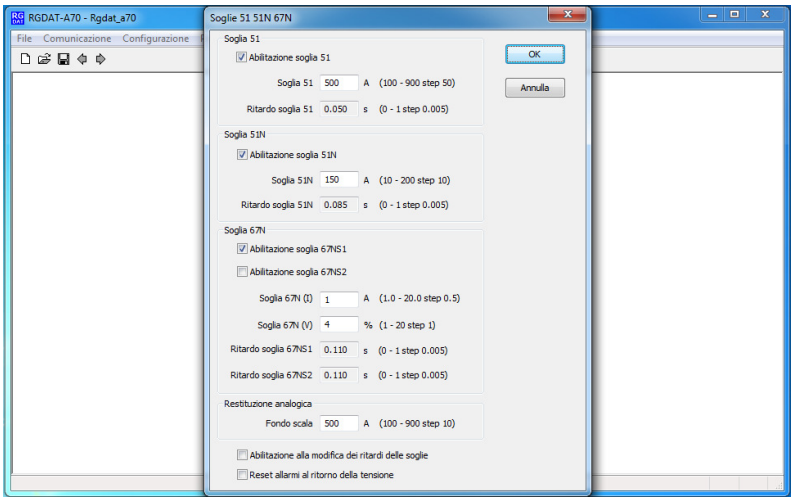
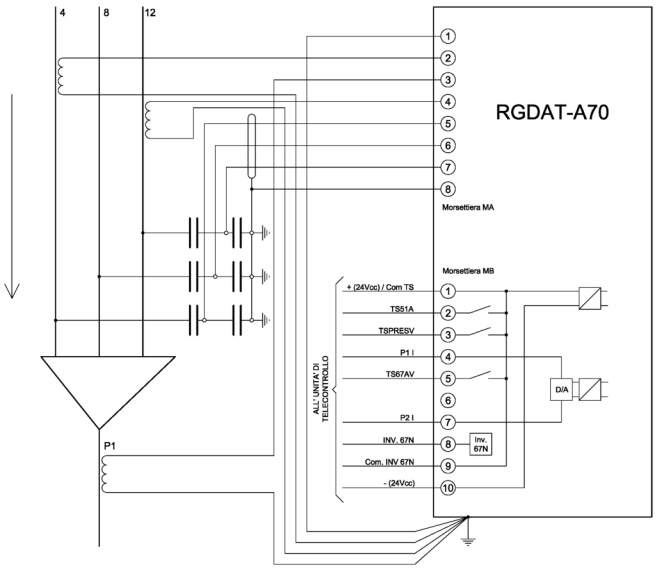
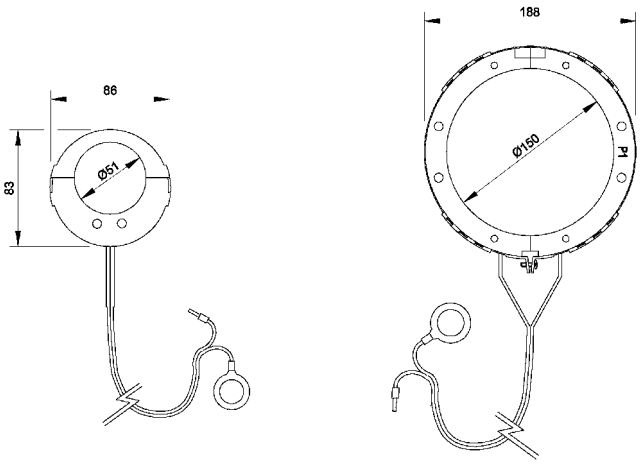
To setup configuration data of RGDAT-A70 and for commissioning activities, a specific software is available. The software runs in Windows® environment and is multi-language (Italian, English, Spanish; other languages on request).

To setup data and for commissioning and maintenance activities, a serial port RS232 is available on the RGDAT-A70 (9 pin D-sub connector).





Insertion diagram



Overall dimensions of current sensors

TECHNICAL DATA

Auxiliary power supply
- Rated value: 24 V_{DC}
- Range of application:19 ÷ 29 V_{DC}
- Typical power consumption (at 24 V_{DC}): 80 mA

Digital input
- Type of circuit: Optoinsulated
- Rated voltage: As auxiliary power supply
- Supply power consumption: 3 mA

Output relays
- Type of contacts: Normally open
- Rated voltage: 250 V
- Rated current: 5 A
- Breaking capability (24 V_{DC}, L/R = 40 ms): 0.2 A

Current converter
- Measurement range: 0 ÷ 900 A (programmable)
- Output current: 4÷20 mA
- Precision: 10%
- Maximum output load: 700 Ω
- Response time: < 300 ms

Environmental conditions
- Operating temperature: -10 ÷ +55 °C
- Relative humidity: ≤ 93% (without condensing)
- Storage temperature: -20 ÷ +70 °C

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