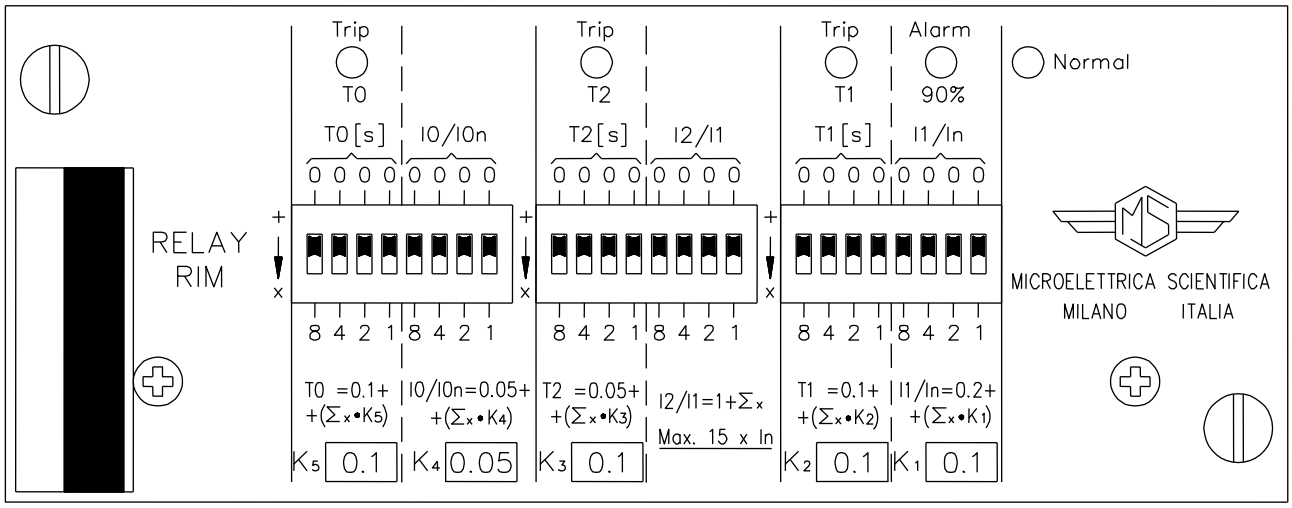
MICROPROCESSOR OVERCURRENT AND EARTH FAULT PROTECTION DIRECT RELAY

TYPE

RIM-STO

OPERATION MANUAL



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1. General utilization and commissioning directions

Always make reference to the specific description of the product and to the Manufacturer's instruction. Carefully observe the following warnings.

1.1 - STORAGE AND TRANSPORTATION,

must comply with the environmental conditions stated on the product's instruction or by the applicable IEC standards.

1.2 - INSTALLATION,

must be properly made and in compliance with the operational ambient conditions stated by the Manufacturer.

1.3 - ELECTRICAL CONNECTION,

must be made strictly according to the wiring diagram supplied with the Product, to its electrical characteristics and in compliance with the applicable standards particularly with reference to human safety.

1.4 - MEASURING INPUTS AND POWER SUPPLY,

carefully check that the value of input quantities and power supply voltage are proper and within the permissible variation limits.

1.5 - OUTPUTS LOADING,

must be compatible with their declared performance.

1.6 - PROTECTION EARTHING

When earthing is required, carefully check its effectiveness.

1.7 - SETTING AND CALIBRATION

Carefully check the proper setting of the different functions according to the configuration of the protected system, the safety regulations and the co-ordination with other equipment.

1.8 - SAFETY PROTECTION

Carefully check that all safety means are correctly mounted, apply proper seals where required and periodically check their integrity.

1.9 - HANDLING

Notwithstanding the highest practicable protection means used in designing M.S. electronic circuits, the electronic components and semiconductor devices mounted on the modules can be seriously damaged by electrostatic voltage discharge which can be experienced when handling the modules. The damage caused by electrostatic discharge may not be immediately apparent but the design reliability and the long life of the product will have been reduced. The electronic circuits reduced by M.S. are completely safe from electrostatic discharge (8 KV IEC 255.22.2) when housed in their case; withdrawing the modules without proper cautions expose them to the risk of damage.

a. Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.

b. Handle the module by its front-plate, frame, or edges of the printed circuit board. Avoid touching the electronic components, printed circuit tracks or connectors.

c. Do not pass the module to any person without first ensuring that you are both at the same electrostatic potential. Shaking hands achieves equipotential.

d. Place the module on an antistatic surface, or on a conducting surface which is at the same potential as yourself.

e. Store or transport the module in a conductive bag.

More information on safe working procedures for all electronic equipment can be found in BS5783 and IEC 147-OF.

1.10 - MAINTENANCE

Make reference to the instruction manual of the Manufacturer; maintenance must be carried-out by specially trained people and in strict conformity with the safety regulations.

1.11 - FAULT DETECTION AND REPAIR

Internal calibrations and components should not be altered or replaced.
For repair please ask the Manufacturer or its authorised Dealers.

Misapplication of the above warnings and instruction relieves the Manufacturer of any liability.

2. GENERAL

Input currents are supplied from 3 current transformers. Relay's rated input current is In=0,1A.
Current measurement dynamic (15In) ranges from 0.1A through 1.5A for the first and the second overcurrent elements.
High set instantaneous element (third element) can operate up to 4A (40In).

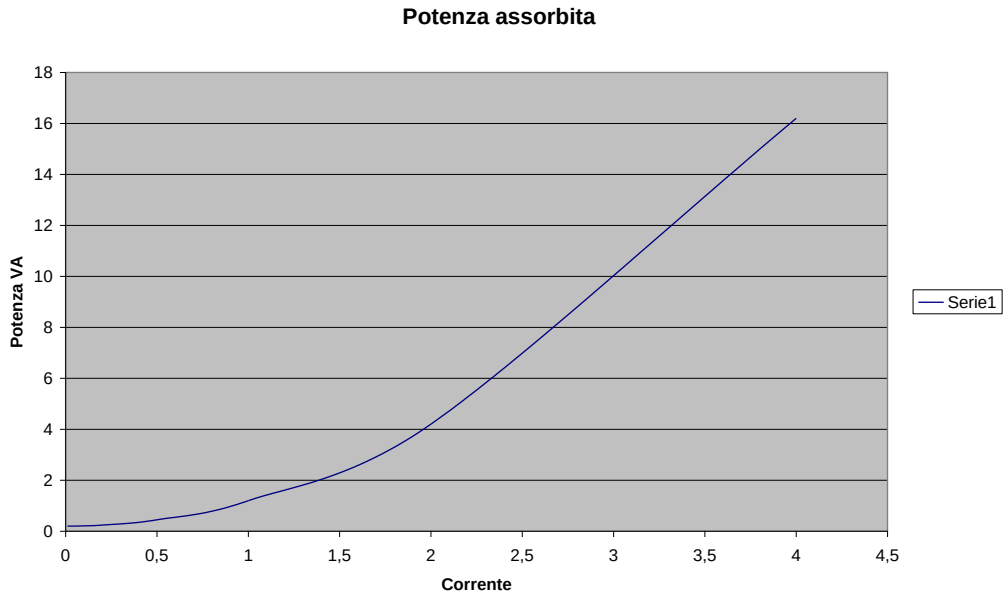
When relay is only powered by the input current, its minimum single phase operating current is 0.013A (≡ 13%In).
If current flows into more than one phase the minimum operating current is proportionally decreased: example 2 phases x 0.007A

Input CT's connection must be 6 wires as showed on the diagram without wye connection which may cause relay misoperation.
Earth Fault detection element is supplied by an independent input via a dedicated CT.

2.1 - POWER SUPPLY

Relay can be directly supplied by system's current transformers.
Input impedance is 1 ohm in series with an electronic shunt for powering electronics.
Total power consumption with input current equal to I is approximately (1 Ohm•I^2) on each phase plus the power drawn by common electronic circuits equal to 0.2VA (15V•13mA) shared among the three phases.

Relay can also be powered by external source with voltage in the range 18 – 35 Vdc.
Average current is 15mA with peaks of 100mA for some seconds.

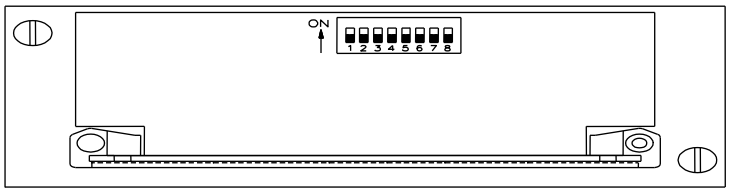


3. SETTINGS

All settings are made by dip-switches on relays front face, except for:
third element, which is switched by jumpers on relay's card;
PTC trip level, which is factory preset.

FUNCTION	VARIABLE	RANGE	Notes
First element I1/**In**	Pick-up Level (rms)	(0,2 to 1,7)**In**	Step 0,1•**In** For 60Hz version: t1=(0.1-1.3)s, step 0.08s
t1	Definite time delay	(0,1 to 1,6) sec. *	Step 0,1 sec. *
Second element I2/I1	Pick-up Level (peak)	(1 to 16)I1	Step 1•I1; measurement limited to 15•**In**
t2	Definite time delay	(0.05 to 1,55) sec.	Step 0,1 sec.
Io/**Ion**	Pick-up Level (rms)	(0,05 to 0,8)**Ion**	Step 0,05•**Ion**
t0	Definite time delay	(0,1 to 1,6) sec.	Step 0,1sec.

BASIC SETTINGS (INTERNAL)

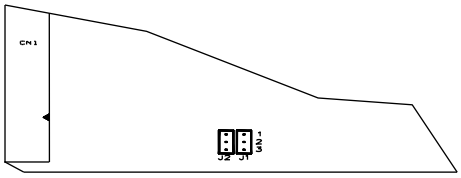


DIP	OFF	ON	FUNCTIONS
1	50 Hz	60 Hz	**FREQUENCY**
2	ENABLE	DISABLE	**I1/In**
3	ENABLE	DISABLE	**I2/In**
4	ENABLE	DISABLE	**I0/In**
5	LEAVE OFF	Don't set ON	Factory reserved
6	LEAVE OFF	Don't set ON	Factory reserved
7	LEAVE OFF	Don't set ON	Factory reserved
8	LEAVE OFF	Don't set ON	Factory reserved

THIRD ELEMENT SETTINGS

FUNCTION	VARIABLE	RANGE	Notes
Third element I3/**In**	Pick-up Level (peak)	(16 to 40)x**In**	Steps 8x**In**
t3	Definite time	Less than 1msec.	Plus output relay's pick-up time

The settings are available in 4 steps moving the two-jumpers (J1, J2):



J1	J2	xIn
1–2	1–2	16
2–3	1–2	24
1–2	2–3	32
2–3	2–3	40

PTC FUNCTION	LEVEL	Notes
PTC open /Trip	> 2900 ohm	Reset : < 1600 ohm
PTC short circuited	<15 ohm	Reset : >40 ohm

Disabled if inserting a 1500 ohm resistor on terminals 17-16 in place of PTCs

4. SIGNALS

Five signal leds (four normally off) are provided:

a)	Green LED	(Normal)	❑	Lit-on when power supply is present.
b)	Yellow LED	(Alarm 90%)	❑	Lit-on when the input current exceeds the 90% of I1 set level
c)	Red LED	(Trip T1)	❑ ❑	Flashing when the input current exceeds the I1 set level Lit-on at the end of T1 time delay.
d)	Red LED	(Trip T2)	❑ ❑	Flashing when the input current exceeds the I2 set level Lit-on at the end of T2 time delay.
e)	Red LED	(Trip T0)	❑ ❑	Flashing when the input current exceeds the I0 set level Lit-on at the end of T0 time delay.

The reset of the leds takes place as follows:

Leds	c, d, e	❑	From flashing to off, automatically when the lit-on cause disappears. ❑ From ON to OFF, as follows: Case 1: RIM powered by ct's; automatically when current drops to zero. Case 2: RIM externally powered: Reset takes place when current flow is restored after having been interrupted.
Leds	b	❑	From ON to OFF when current drops below 80% of I1 set level.
Leds	a	❑	Off when power voltage is not present or too low

5. OUTPUT RELAYS

5.1 - Two solid state output relays are available (R1, R2)

The relays **R1,R2** are normally deenergized (energised on trip).
The two relays are associated to the following functions.

Relay **R1** (ALARM): energized when current exceeds 90% of I1 set level; reset below 80% I1.
Relay **R2** (BLO): energized when current exceeds I2 set level; reset below I2 set.

If the Blocking Input (BI) is activated, reset is delayed by 50ms.
This function can be used for logic selectivity.
R1 and R2 are both solid-state devices.

Max voltage: 200V rms; Current: 90mA rms @25°C; max dV/dt (break state): 500V/usec.
Current derating: -1,3mA rms per °C over +30°C;

5.2 - Trip output for magnetic retention solenoid

All trips are directed to Trip Output, to operate an external magnetic retention solenoid.
A capacitor is discharged on the solenoid. The energy stored is:
Min: 34mJ +/-20% @ 12V, 25°C; Max: 46mJ +/-20% @ 14V, 25°C.
RIM is tested with magnetic restrain solenoid available from RS, code RS 352-941.

6. SERIAL COMMUNICATION (Optional)

Serial communication, available on request, is provided for reading and resetting internal trip counters. Physical level is RS485. In case of relay powered by input current the serial output starts to operate with input current exceeding 0.5 In.
Software driver is available on our standard MS-COM control software.

7. AUXILIARY INPUTS

- **BI** input terminals 18 - 12 : closing B2 insert 50ms time delay on R2 reset
- **PTC** input terminals 17, 16 : See § 3.

Warning: inputs have internal common circuitry. Don't connect input cabling together on field.

8. TEST

An independent "WATCHDOG" circuit is provided to ensure predictable behaviour of relay.

9. MAINTENANCE

No maintenance is required. **In** case of malfunctioning please contact Microelettrica Scientifica Service or the local Authorised Dealer mentioning the relay's Serial No reported in the label on relays enclosure.

10. ELECTRICAL CHARACTERISTICS

REFERENCE STANDARDS IEC 60255 - EN50263 - CE Directive - EN/IEC61000 - IEEE C37

❑ Dielectric test voltage	IEC 60255-5	2kV, 50/60Hz, 1 min.		
❑ Impulse test voltage	IEC 60255-5	5kV (c.m.), 2kV (d.m.) – 1,2/50μs		
❑ Climatic tests	IEC 68-2			

CE EMC Compatibility (EN50081-2 - EN50082-2 - EN50263)

❑ Electromagnetic emission	EN55022			
❑ Radiated electromagnetic field immunity test	IEC61000-4-3 ENV50204	level 3	80-1000MHz 900MHz/200Hz	10V/m 10V/m
❑ Conducted disturbances immunity test	IEC61000-4-6	level 3	0.15-80MHz	10V/m
❑ Electrostatic discharge test	IEC61000-4-2	level 4	6kV contact / 8kV air	
❑ Power frequency magnetic test	IEC61000-4-8		1000A/m	50/60Hz
❑ Pulse magnetic field	IEC61000-4-9		1000A/m, 8/20μs	
❑ Damped oscillatory magnetic field	IEC61000-4-10		100A/m, 0.1-1MHz	
❑ Voltage interruptions (only external power supply)	IEC60255-4-11			
❑ Resistance to vibration and shocks	IEC60255-21-1 - IEC60255-21-2			

CHARACTERISTICS

❑	Accuracy at reference value of influencing factors	2% In for measure 0,2% On 3% +/- 20ms for times
❑	Rated Current	In = 0,1A - On = 0,1A or external (1A)
❑	Input current overload	40 A for 1 sec; 0,5A continuous
❑	Burden on current inputs (self-powered case) (In = 0,1A) Burden on current inputs (external supply case)(In=0,1A)	Phase: 0,2VA@ 0,15*In; 0.21VA@ 1*In; 1,2VA@ 10*In Phase: 0.01VA@ In; 1VA@ 10*In
❑	External supply voltage	18 – 32Vdc
❑	Average power supply consumption	0,2 VA
❑	Output relays	Max voltage: 200V rms; Current: 90mA rms @25°C; max dV/dt (break state): 500V/usec. Current derating: -1,3mA rms per °C over +30°C;
❑	Operation ambient temperature	-10°C / +55°C
❑	Storage temperature	-25°C / +70°C
❑	Humidity	93% Without Condensing

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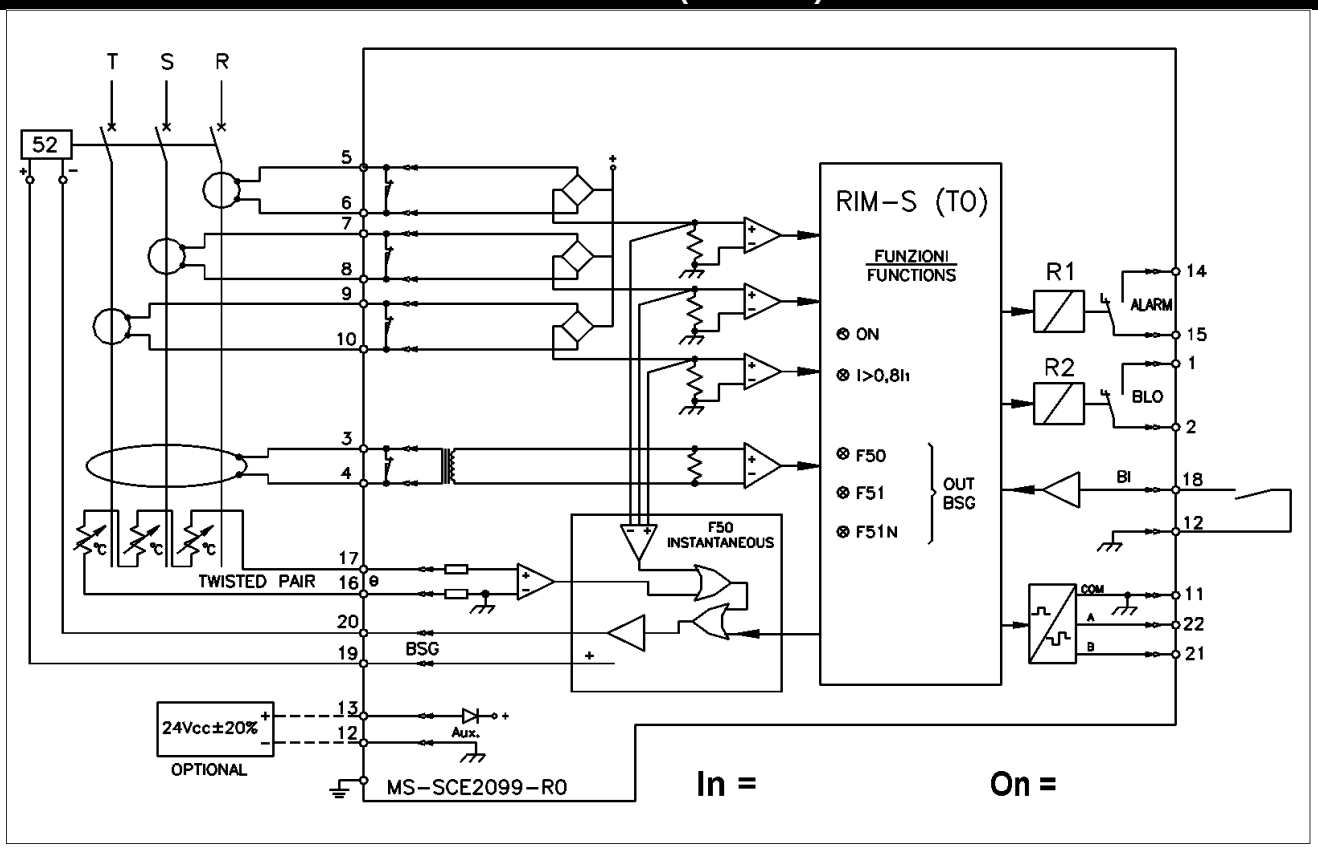
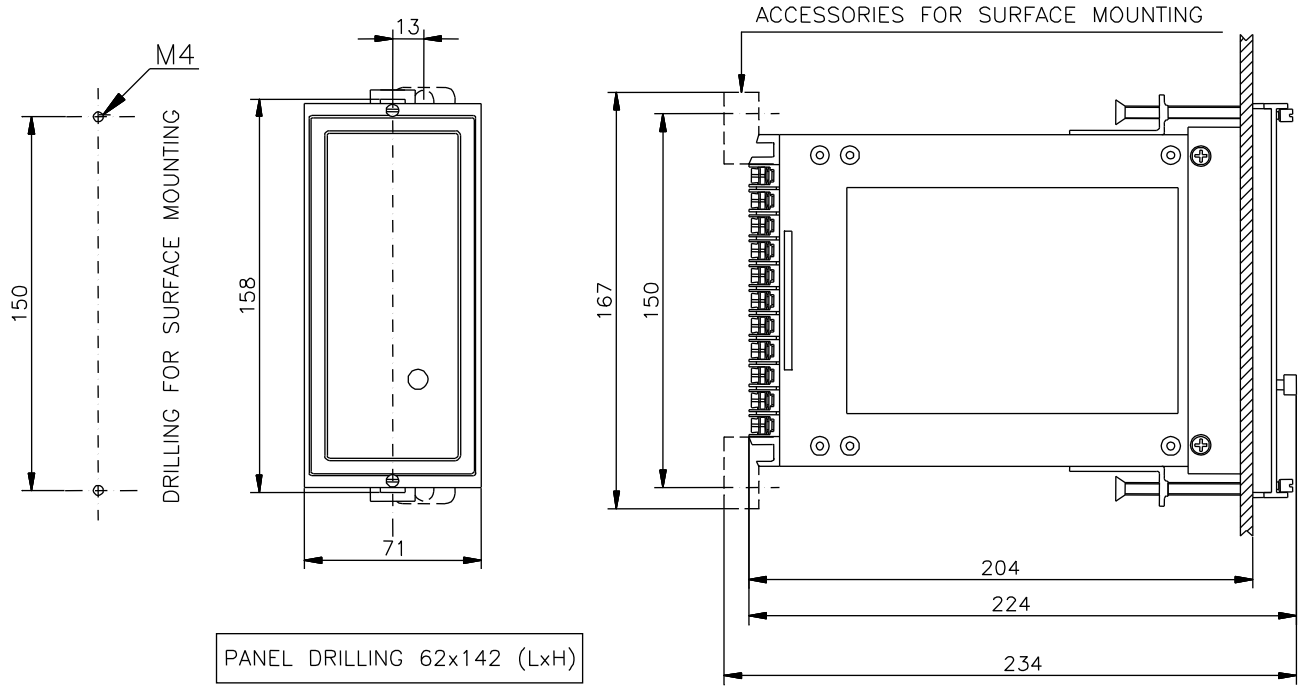
11. CONNECTION DIAGRAM STANDARD OUTPUT (SCE2099)



12. OVERALL DIMENSIONS



13. DIRECTION FOR PCB'S DRAW-OUT AND PLUG-IN

13.1 - Draw-out

Rotate clockwise the screws ① and ② in the horizontal position of the screws-driver mark.
Draw-out the PCB by pulling on the handle ③

13.2 - Plug-in

Rotate clockwise the screws ① and ②in the horizontal position of the screws-driver mark.
Slide-in the card on the rails provided inside the enclosure.
Plug-in the card completely and by pressing the handle to the closed position.
Rotate anticlockwise the screws ① and ② with the mark in the vertical position (locked).