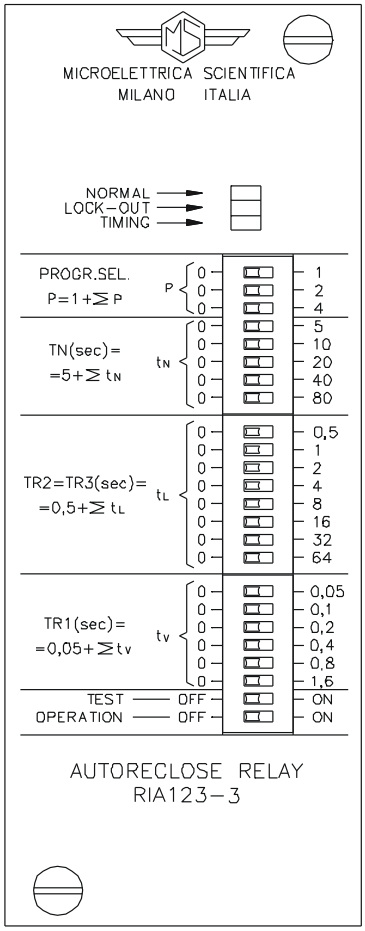
MULTIFUNCTION AUTORECLOSE RELAY

TYPE

RIA123-3

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

The relay RIA123-3 is designed for controlling the autoreclosing of the main breakers. It is operated by a microprocessor which allows to select the operational programs according to the requirements of different installations.
The execution of the unit is modular on standard European size withdrawable P.C. board with 51mm. wide front.
The following versions are available:

- "E" for flush mounting; complete with accessories for surface mountings;

- "E/R" for 19" 3U rack mounting.

2.1 – POWER SUPPLY

The relay can be fitted with two different types of **power supply** module :

a) - { **24V(-20%) / 110V(+15%) a.c.** ; **24V(-20%) / 125V(+20%) d.c.** }

b) - { **80V(-20%) / 220V(+15%) a.c.** ; **90V(-20%) / 250V(+20%) d.c.** }

Before energising the unit check that supply voltage is within the allowed limits.

3. SIGNALIZATION

Three signal leds on relay's front provide the following information:

- Green Led **NORMAL** : when lit-on indicates the presence of power supply and the regular operation of the relay.
- Red Led **LOCK-OUT** : lit-on when relay's lock-out status and output relay R2 are activated (see description of operating programs).
- Yellow Led **TIMING** : flashing during operation of the timers.

4. SETTING AND CONTROL

The following parameters can be set by multiple DIP-SWITCHES on the relay's front.

TR1	fast reclosure dead time = (0,05 - 3,2) sec. by 0,05 sec. steps
TR2 - TR3 –TR4	slow reclosure dead time = (0,5 - 126) sec. by 0,5 sec. steps
TN	reclaim time after reclosure = (5 - 160) sec. by 5 sec. steps After each reclosure the timing TN is started: TN1 = TN after reclosure dead time TR1 TN2 = TN after reclosure dead time TR2 TN3 = TN after reclosure dead time TR3 TN4 = TN after reclosure dead time TR4 TN5 = TN after normal closing A new circuit breaker opening which takes place during the time TN is considered as a second opening during the same operation cycle that has started TN. Any circuit breaker opening that takes place after TN, initiates a new operation cycle.
P	ection of operational program (1 - 8)
TEST	OFF = relay's normal operation ON = the relay executes the selected reclosure program without operating the output relays R1 and R3 and the counter output; R2 is energized.
OPERATION	ON = relay's normal operation OFF = relay's operation is inhibited. It is recommended to set the switch on the OFF position when plugging out/in the relay card. Moving the switch from OFF to ON also operates as relay's manual reset. By means of a DIP-SWITCH on relay card it is possible to select different operation modes for the output relay R3.

5 . INPUTS FROM EXTERNAL COMMANDS

(See wiring diagram)

5	=	Input from N/O contact of protection relay X1(F50) fast reclosure
16	=	Input from N/O contact of protection relay X2(F51) slow reclosure
7	=	Input from N/O contact indicating the circuit breaker's status
17	=	Input from N/O contact signalling manual closing of circuit breaker (close control)
6	=	Input from N/O contact signalling manual opening of circuit breaker (open control)
11	=	Input from N/O contact for lock-out of relay's operation
21	=	Input from N/O contact for remote reset
10, 20	=	Power supply input

6. CONTROL AND SIGNALLING OUTPUTS

(See wiring diagram)

- **Relay R1** : Reclosure actuation (79) — Terminals : 2-12 contact N/O (or N/C on request)
2-13 contact N/O (or N/C on request)
- **Relay R2** : Lock-out status signalling — Terminals : 14-15 contact N/O (or N/C on request)
- **Relay R3** : External controls interlock (enabling of instantaneous circuit breaker opening from F50 relay)

  Terminals : 3-4 (shorted when relay card is drawn-out)
N/C contact

9	Open collector output for actuation of the fast reclosure counter
19	Open collector output for actuation of the slow reclosure counter
8	Open collector output for actuation of the failed reclosure counter
22	Common output for counters actuation
S+, S-	RS485 serial communication output (optional)

7. SELECTION AND DESCRIPTION OF THE OPERATIONAL PROGRAMS

The selection of the different operating modes is made by setting the relevant switches

- **Selection of the autoreclose program** — by means of the DIP SWITHES "P" on relay's front panel
P= 1 + ∑P = number of the selected reclose program.
- **Operation of the interlock output relay R3** — by means of the DIP SWITCHES on the relay P.C. board.

7.1 - AUTORECLOSE PROGRAMS (P1-P8)

The following abbreviations are used in the present description:

So	=	Reset status where no dead reclose timing (TR1,2,3) or reclaim timing (TN) is active and the relay is ready to start the reclosing cycle.
BL	=	Lock-out status where the output relay R2 and the relevant signal Led are energized and the operation of the reclose control relay R1 is inhibited

The following functions are common to any reclose program:

- In any situation Manual opening of the circuit breaker (input 6 active) produces the lock-out status BL
- Manual closing of the C/B (input 17 activated with input 7 non active) starts the reclaim time TN5
- Opening of the C/B operated by tripping of protection relays X1 (input 5) or X2 (input 16) during TN5 produces BL status
- Restoring of the Reset Status So can be operated via the inputs 21(Remote Reset) or 17 (manual closing) after at least 5 seconds from the beginning of the BL status
- The relay reaches a lock-out status when one of the following conditions is verified:
    1. when a command is given from X1 (input 5) or from X2 (input 16) the command 52/3 (input 7) must be removed in 250 msec.
    2. when the command 52/3 (input 7) is removed the commands from X1 or X2 (input 5 or 16) must be cleared in 250 msec.
    3. when, by exciting the relay R1, is given the reclose command the command 52/3 (input 7) must reclose in 0,5 sec. as well

7.1.1 - Program P1: P=1+(0) - P8: P=1+1+2+4 - No Reclosure

- C/B opening by X1 or X2 tripping during So : BL

7.1.2 - Program P2: P=1+(1) - 1 Slow Reclosure

- C/B opening by X1 during So : BL
- C/B opening by X2 during So : Reclosure after Dead Time TR2 with starting of Reclaim Time TN2 and activation of the output control to the counter CTN2 (TN2 = Reclaim time started by reclosure after the dead time TR2)
- C/B opening by X1 or X2 during TN2 : BL with activation of CTN3 control output

7.1.3 - Program P3: P=1+(2) - 2 Slow Reclosure

- C/B opening by X1 during So : BL
- C/B opening by X2 during So : Reclosure after TR2 with starting of TN2 and activation of CTN2 control output
- C/B opening by X1 or X2 during TN2 : Reclosure after TR3 with starting of TN3 and activation of CTN2
- C/B opening by X1 or X2 during TN with CTN3 activation

7.1.4 - Program P4: P=1+(1+2) - 1 Fast Reclosure

- C/B opening by X1 during So : Reclosure after TR1 with starting of TN1 and activation of CTN1
- C/B opening by X1 or X2 during TN1 : BL and CTN3 activation
- C/B opening by X2 during So : BL

7.1.5 - Program P5: P=1+(4) - 1 Fast + 1 Slow Reclosure or 1 Slow Reclosure

- C/B opening by X1 during So : Reclosure after TR1 with starting of TN1 and activation of CTN1
- C/B opening by X1 or X2 during TN1 : Reclosure after TR2 with starting of TN2 and activation of CTN2
- C/B opening by X1 or X2 during TN2 : BL and CTN3 activation
- C/B opening by X2 during So : Reclosure after TR2 with starting of TN2 and activation of CTN2
- C/B opening by X1 or X2 during TN2 : BL and CTN3 activation

7.1.6 - Program P6: P=1+1+(4) - 1 Fast + 2 Slow Reclosure or 2 Slow Reclosure

- C/B opening by X1 during So : Reclosure after TR1 with starting of TN1 and activation of CTN1
- C/B opening by X1 or X2 during TN1 : Reclosure after TR2 with starting of TN2 and activation of CTN2
- C/B opening by X1 or X2 during TN2 : Reclosure after TR3 with starting of TN3 and activation of CTN2
- C/B opening by X1 or X2 during TN3 : BL and CTN3 activation
- C/B opening by X2 during So : Reclosure after TR2 with starting of TN2 and activation of CTN2
- C/B opening by X1 or X2 during TN2 : Reclosure after TR3 with starting of TN3 and activation of CTN2
- C/B opening by X1 or X2 during TN3 : BL and CTN3 activation

7.1.7 - Program P7: P=1+(2)+(4) - 3 Slow Reclosure

- C/B opening by X1 during So : No reclosure – BL activation.
- C/B opening by X2 during So : Reclosure after TR2 with starting of TN2 and CT2 activation.
- C/B opening by X1 or X2 during TN2 : Reclosure after TR2 with starting of TN2 and CT2 activation.
- C/B opening by X1 or X2 during TN3 : Reclosure after TR3 with starting of TN3 and CT2 activation.
- C/B opening by X1 or X2 during TN3 : Reclosure after TR4 with starting of TN4 and CT2 activation.

7.2 - OPERATION OF THE OUTPUT RELAY R3

Oper. mode 1:	switches	1,2,3 OFF	**R3 permanently deenergized (*)**
Oper. mode 2:	switches	1 ON, 2 OFF, 3 OFF	**R3 energized during So only**
Oper. mode 3:	switches	1 OFF, 2 ON, 3 OFF	**R3 energized during TR1 and TN1**
Oper. mode 4:	switches	1 ON, 2 ON, 3 OFF	**R3 energized during TR2 and TN2**
Oper. mode 5:	switches	1 OFF, 2 OFF, 3 ON	**R3 energized during TR3 and TN3**
Oper. mode 6:	switches	1 ON, 2 OFF, 3 ON	**R3 energized during TR4 and TN4**
Oper. mode 7:	switches	1 OFF, 2 ON, 3 ON	**R3 energized during TN5 only**
Oper. mode 8:	switches	1 ON, 2 ON, 3 ON	**R3 permanently energized**

(*) When delivered the relay is programmed in mode 1 (1,2,3 OFF)

8 . AUTOTEST

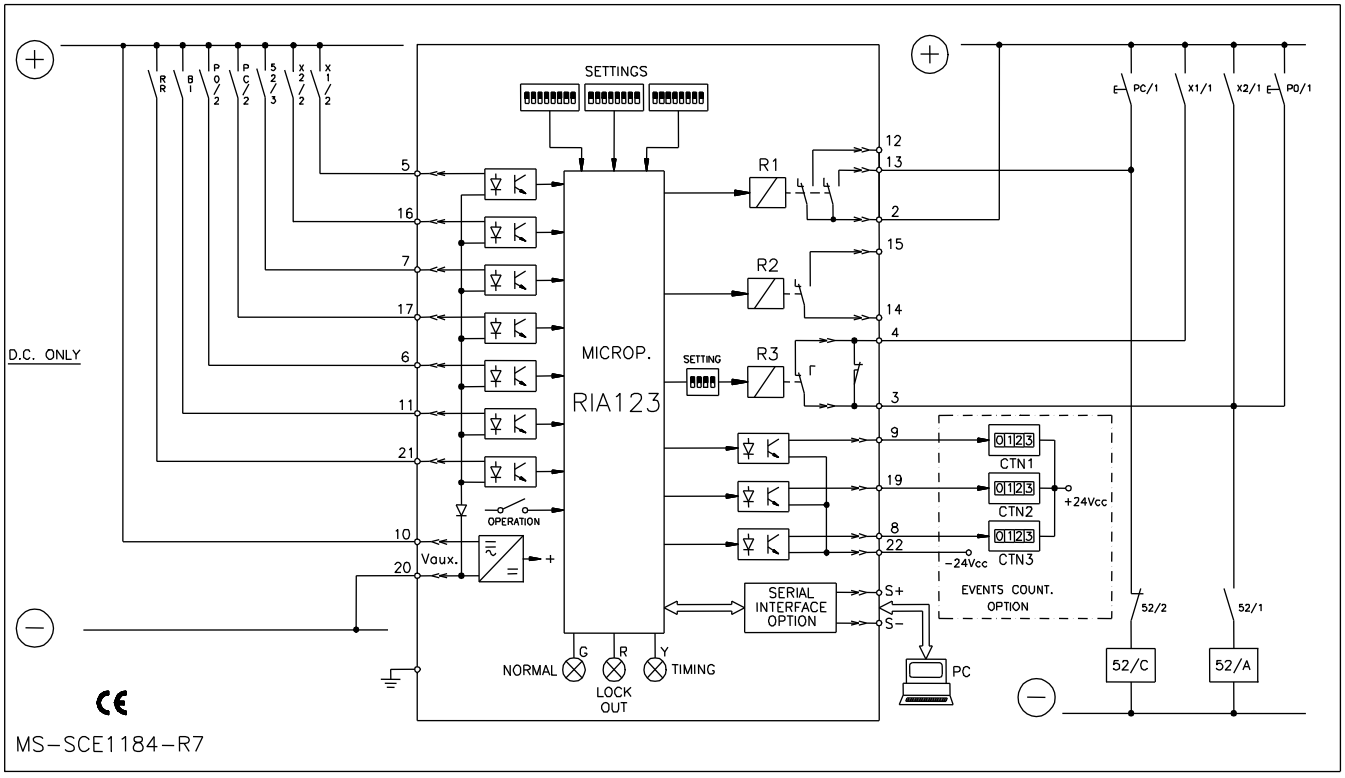
The relay performs a self-diagnostic feature :

1 – **Functional test** : A “watch-dog” guarantee a correct operation of the relay.

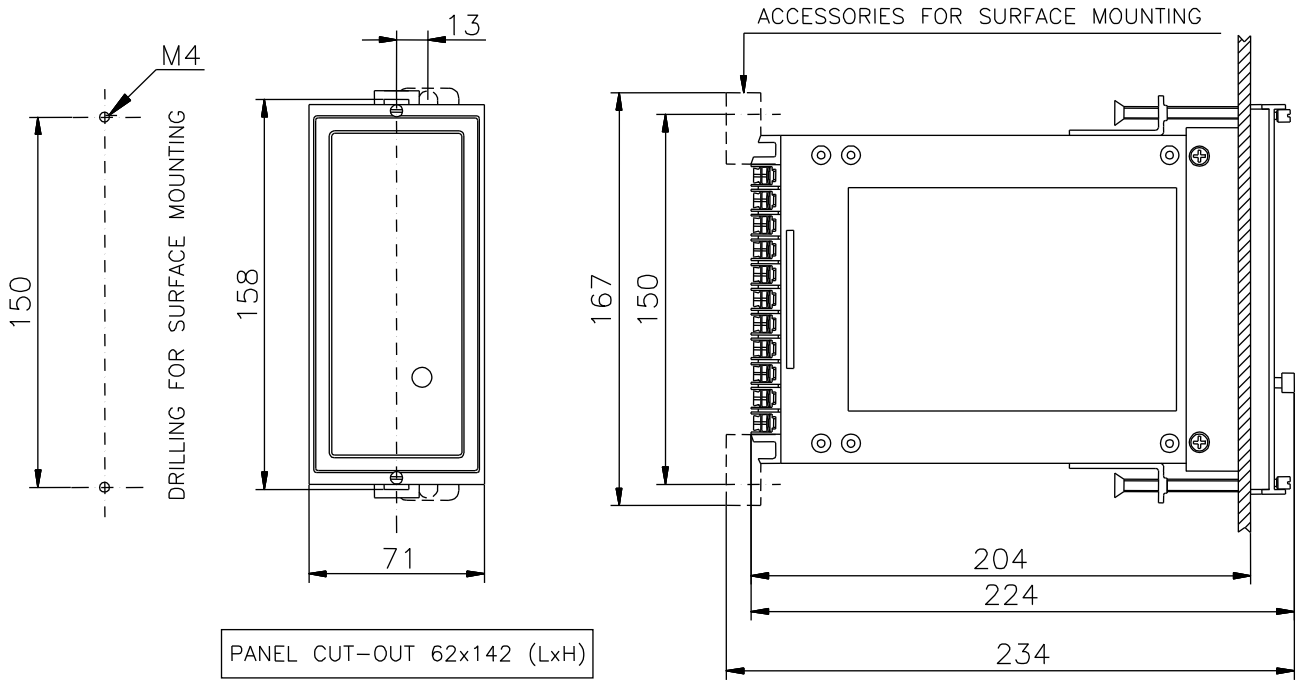
2 – **X1-X2 test** : If the contact 52 N.O. does not change-over within 250ms when X1 or X2 are activated the relay goes in the lock-out condition (R2 and red led activated). This lock-out delay can be disactivated (voltage reclosures).

3 – **Reclosure test** : If the change-over of the contact 52 N.O. does not happen within 500ms from the reclosure command the relay goes in the lock-out condition (R2 and red led activated).

9. WIRING DIAGRAM (SCE1184 Rev.7)



10. OVERALL DIMENSIONS



11. ELECTRICAL CHARACTERISTICS

- Conformity to standards : CEI 41-1;IEC 255;BS 142
- Rated insulation voltage : 600V
- Dielectric withstand voltage : 2000V, 50Hz, 1 min.
- Impulse test voltage : 5kVp. 1,2/50μs
- Accuracy at reference values influencing factors : ±2%
- Insensitivity to high frequency disturbance : 2,5 and 1kV - 1MHz
- Power consumption : ≤ 3,5VA
- Input impedance : 24 (-20%) - 110 (+20%) V 18KΩ or
  90 (-20%) - 220 (+20%) V 68KΩ
- Output relays : Rated current: 5A; Vn=380V
  Resistive switching power 1100W, 380V a.c.
  Make: 30A (peak) x 0,5 sec.
  Brake: 0,3A - 110Vd.c. L/R=40ms(10^5 op.)
- Solid state outputs : Open collector
  0,2A continuous
  0,7A x 1 sec.
  Vmax 36V (zener protected)
- Storage temperature : -20°C to +70°C
- Operating temperature : -15°C to +65°C

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