HIGH IMPEDANCE DIFFERENTIAL RELAY

UB0/ATR

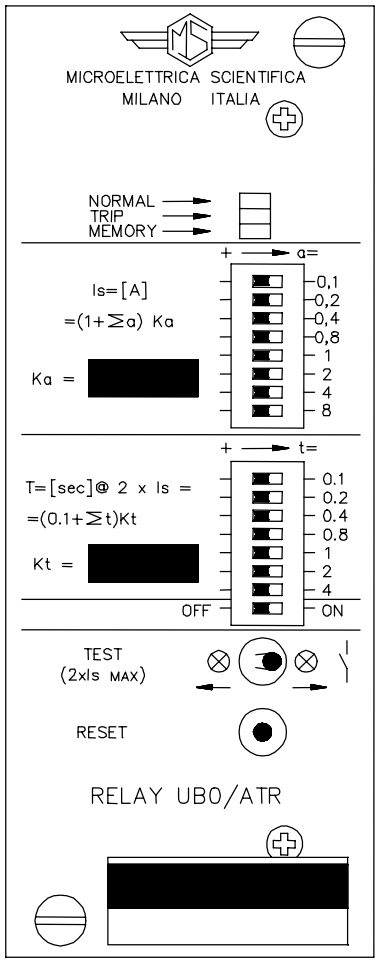
Microelettrica Scientifica

CAT. K3 B-89

12-01-99

GENERAL CHARACTERISTICS

- Versions for CT input or Core Balance CT input;
- Single phase unit;
- One adjustable level;
- One instantaneous output (≤20ms);
- One time delayed output;
- Digital blocking input.



SETTINGS

Settings are made on front face by means of two 8-poles dip switches that allow to obtain a wide and accurate setting range for the instantaneous trip level as well as for the trip time delay.

SIGNALIZATIONS

- 1 Green led for signalization of auxiliary supply presence and relay regular operation.
- 1 Red led for trip signalization.
- 1 Yellow led for trip memory signalization.

COMMANDS

- Test spring lever: when pressed it simulates a differential current of 2 times the maximum set current and allows the complete functional check of the relay and of the trip time delay. In one position test function does not operate the output relays; in the other it also operates the output relays.
- ON-OFF switch that enables or blocks the tripping of the output relays.
- Output relays reset after trip can be:
  - manual by reset push button on front face
  - manual by remote push button connected to the relevant terminals provided on the relay
  - automatic by connecting a bridge on remote reset terminals.

The trip memory led can be reset only by the front face reset push button.

OUTPUT RELAYS

- Timed output: 1 relay with one C/O contact rating 5A.
- Instantaneous output: 1 relay with two C/O contacts rating 5A.

The output relays are normally deenergized (energized on trip). On request they can be normally energized (deenergized on trip).

ORDERING DATA

- Relay Type
- Rated Input Current
- Auxiliary Power Supply
- Setting Ranges
- Output Relays Configuration
- Execution
- Options on Request

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OPTIONS

On request is provided:

- Blocking input **(BI)**.

OVERALL DIMENSIONS

See Overall Dimensions - **1 Module Relay**.

ELECTRICAL CHARACTERISTICS

Rated input current : 1A or 5A

Burden on input current : 0.02VA@1A ; 0.2VA@5A
Burden on power supply : 3W(d.c.); 6VA(a.c.)

Auxiliary power supply :
Type 1 : 24-110 V d.c./a.c. ± 20% permanent
Type 2 : 90-220 V d.c./a.c. ± 20% permanent

STANDARD SETTING RANGES (Different on request)

Trip level (*)

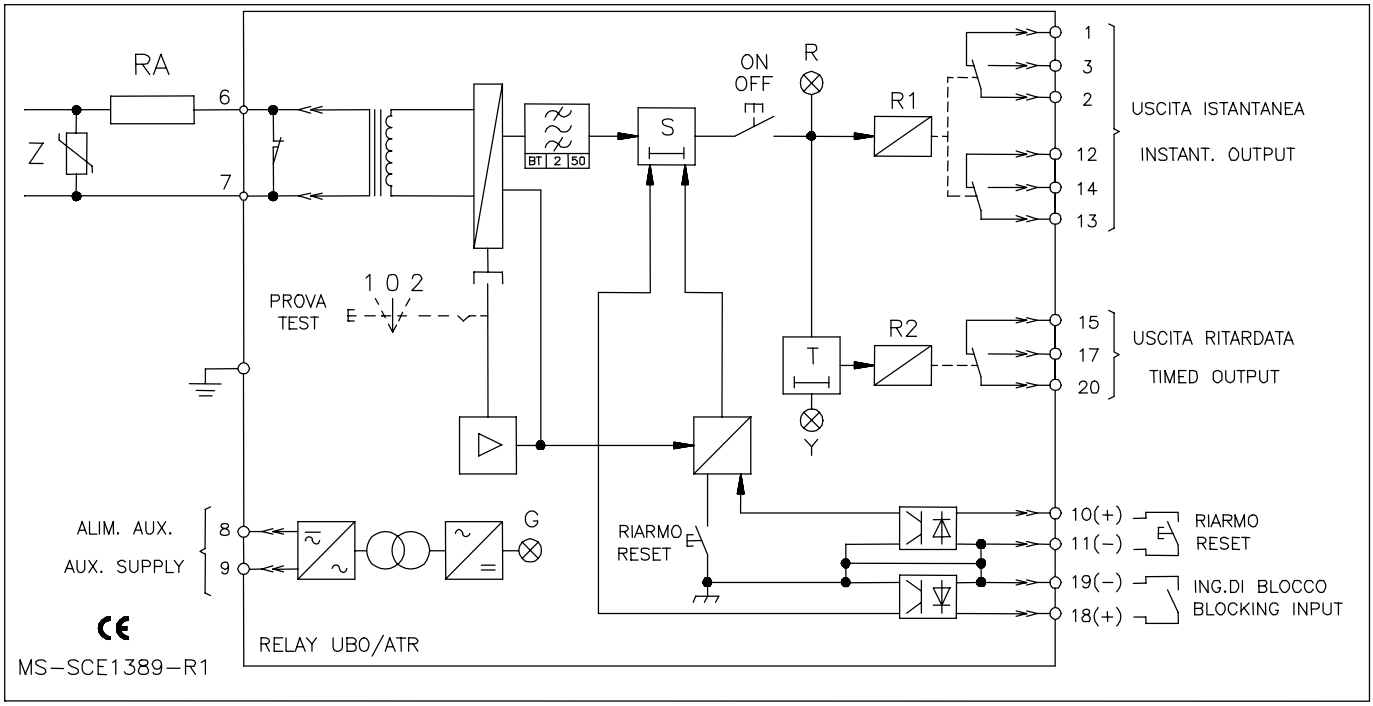
Is = [1 + (0 ÷ 16.5)] x Ka [A]
Ka = 0.1 : Is = (0.1÷1.75) A **(1)**
Ka = 0.5 : Is = (0.5÷8.75) A
Ka = 1 : Is = (1 ÷1.75) A **(2)**

Trip time delay

Instantaneous output : ≤20ms @2xIs
Timed output : [1 + (0 ÷ 8.5)] x Kt sec.
Kt = 1 = (1÷8.6) sec

(*) The set current corresponds to input Amps (CT's secondary) in the version for connection to CTs. In the version for input from Core Balance CT, the set current corresponds to primary side Amps.
(1) Standard for connection to CT
(2) Standard for connection to Core Balance transformer ratio 100/1A

WIRING DIAGRAM



CHARACTERISTICS OF THE CTs AND VALUE OF THE STABILISING RESISTORS

Reference is made to the following simbology:

- **IS** = Set trip current of the relay.
- **IE** = CTs secondary current corresponding to the maximum prospective current for fault within the protected area.
- **IM** = CTs secondary current corresponding to the maximum prospective current for fault outside the protected area.
- **N** = Number of CTs feeding the relay in parallel
- **RT** = Resistance of the CTs secondary winding.
- **RC** = Resistance of the connection cables between CTs and the relay.

The current transformers feeding the relay must comply with the following requirements:

- Minimum knee-point voltage Vm of the secondary magnetising curve (the knee-point is that where a 10% increase of the voltage requires a 50% increase of the magnetising current):
  $Vm \geq 2\ IM\ (RT + RC)$
- Magnetising current Im at 1/2 Vm :
  a) Restricted earth fault protection:
  with 3 CTs $Im \leq (IE-IS):3$ $IS = IE-3\cdot Im$
  with 4 CTs $Im \leq (IE-IS):4$ $IS = IE-4\cdot Im$
  b) Busbar differential protection:
  $Im \leq (IE-IS):N$ $IS = IE-N\cdot Im$
  c) Differential protection of machines:
  $Im \leq (IE-IS):2$ $IS = IE-2\cdot Im$

The value of the stabilising resistor RA must be:

$$RA \geq \frac{V_m}{2\,IS} - ZR$$

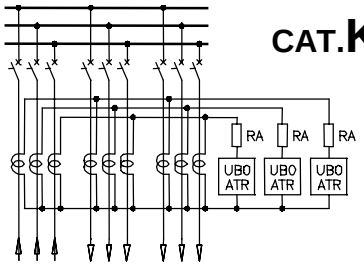
where ZR is the impedance of the relay:

Setting range	Impedance ZR
0,1÷1,75 A	2,15 ohm
0,5÷8,75 A	1,35 ohm
1÷17,5 A	0,67 ohm

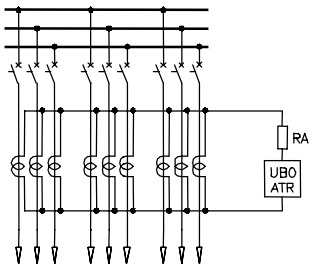
The additional resistors supplied are adjustable in the following ranges:

- For CT/1 A: 0-200 ohm 50W
- For CT/5 A: 0-50 ohm 50W

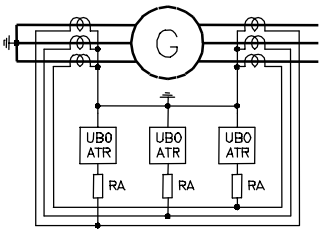
In the unlikely case where the maximum prospective current IE during internal fault can produce at CTs terminals a voltage VE = IE(RA+RT+RC)>2kV, a non linear voltage limiting device Z is available.



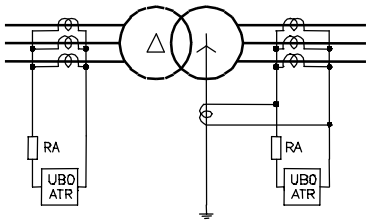
THREE-PHASE BUS BAR DIFFERENTIAL PROTECTION



BUS BAR RESTRICTED EARTH-FAULT PROTECTION



MACHINE DIFFERENTIAL PROTECTION



TRANSFORMER RESTRICTED EARTH-FAULT PROTECTION