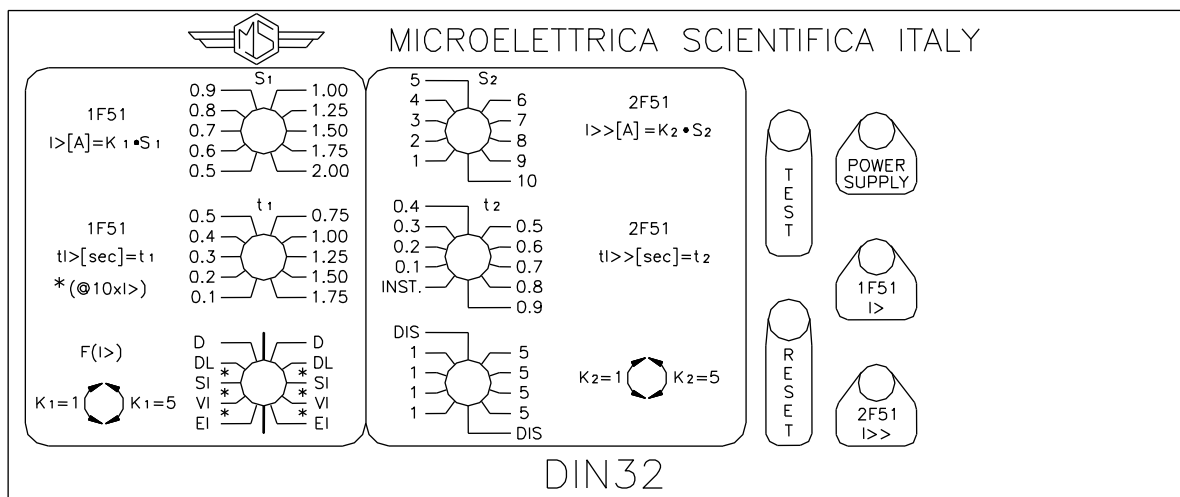


# MULTIFUNCTION THREE PHASE OVERCURRENT DIGITAL RELAY FOR SELECTIVE PROTECTION OF MEDIUM VOLTAGE AND LOW VOLTAGE POWER DISTRIBUTION SYSTEMS

## TYPE

# DIN32

# 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 efficiency.

### 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 produced 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.

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## 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 CHARACTERISTICS AND OPERATION

### 2.1 - Input quantities are supplied to four current transformer

- 3 for phase current measurement rated 5A with burden  $2m\Omega$  ( $\equiv 0,05VA @ 5A$ );  
measurement is linear from 0,1 to 50A with resolution of 0,1A in the calculation of RMS value

Permissible overload : 10A permanent, 200A for 1s.

Recommended C.Ts.  $\geq 3VA$  class 5P10

### 2.2 - Power supply

Power supply input (terminals 1-2) is multivoltage autoranging 2kV isolated has no polarity and can accept any AC or DC voltage in the range a or b - Consumption  $\leq 3VA$ .

|             |  |             |  |
|-------------|--|-------------|--|
| Type a) - { | { 24V(-20%) / 110V(+15%) a.c.<br>24V(-20%) / 125V(+20%) d.c. | Type b) - { | { 80V(-20%) / 220V(+15%) a.c.<br>90V(-20%) / 250V(+20%) d.c. |
|-------------|--|-------------|--|

### 2.3 - Digital Input (terminals 15-16)

It is electrically connected to power supply and can be operated only by a cold (not energized) contact.

The Digital Input controls the Reset mode of output relays R1, R2.

If terminals 15-16 are shorted, reset after tripping takes place automatically as soon as the input current drops below the minimum pick-up level ( $I < [I_>]$ ,  $I < [I_>>]$ ).

If terminals 15-16 are open, reset after tripping is controlled via the Reset button on relay's front or via closing a N/O contact connected to terminals 15-16 (Remote Reset).

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## 2.4 - Output relays R1 - R2

Relay R1 is operated by the 1<sup>st</sup> and 2<sup>nd</sup> phase overcurrent element ( $I_{>}$ ,  $tI_{>}$ ), (normally de-energized, energized on trip)

Relay R2 is operated by the Diagnostic element (normally energized, de-energized on internal fault)

Two N/O contacts with a common point are controlled by relays R1 and R2 (one for each relay)

- Maximum continuous rating : 5A - 250V
- Maximum switching power : 1250VA (5A resistive)
- Maximum switching voltage : 250Vac - 110Vdc
- Maximum make current : 20A - 0,5s
- Maximum DC brake current : 0,2A - 110Vdc L/R=40ms

## 2.5 - Signalizations and controls (see Fig. 1)

### 2.5.1 – First Phase Overcurrent element 1-F51

$I_{>} = S_1 \cdot K_1$  : minimum pick-up current (input Amps) of 1<sup>st</sup> overcurrent element.

$tI_{>} = t_1$  : trip time delay (sec) of 1<sup>st</sup> overcurrent element.

-①- 10-step Rotary Switch for setting the value :

**$S_1 = 0.5 - 0.6 - 0.7 - 0.8 - 0.9 - 1 - 1.25 - 1.5 - 1.75 - 2$**

-②- 10-step Rotary Switch for setting the coefficient  $K_1$  and select the operation mode of the first phase overcurrent element (1-F51,  $I_{>}$ )  
The rotary switch has 5 positions on the right side half of the scale repeated on the left side half of the scale.  
When using the settings on the right side the coefficient :  $K_1 = 5$ ;  
When using the settings on the left side the coefficient :  $K_1 = 1$ ;

The five positions individuate the time current curve of the overcurrent element :

- D** = standard independent Definite time :  
Relay's pick-up takes place when the actual current exceeds the set level [ $I_{>}$ ]  
for the set time [ $tI_{>}$ ] = [ $t_1$ ]
- DL** = Long independent Definite time :  
Relay's pick-up takes place when the actual current exceeds the set level [ $I_{>}$ ]  
for the set time [ $tI_{>}$ ] =  $10 \cdot [t_1]$

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**SI** = Standard dependent Inverse time :  
Element's operation starts when the actual current exceeds the set level [ $I >$ ]  
and relay's pick-up time delay  $t_{l>}$  depends on the ratio of the actual current  $I$  to  
the set level [ $I >$ ] :

$$t_{l>} = \frac{10^{0,02} - 1}{(I/I_{>})^{0,02} - 1} \cdot [t_{l>}] = \frac{0,047}{(I/I_{>})^{0,02} - 1} \cdot [t_{l>}]$$

**VI** = dependent Very Inverse time :  
Same as for the setting SI with

$$t_{l>} = \frac{10 - 1}{(I/I_{>}) - 1} \cdot [t_{l>}] = \frac{9}{(I/I_{>}) - 1} \cdot [t_{l>}]$$

**EI** = dependent Extremely Inverse time :  
Same as for the setting SI with

$$t_{l>} = \frac{10^2 - 1}{(I/I_{>})^2 - 1} \cdot [t_{l>}] = \frac{99}{(I/I_{>})^2 - 1} \cdot [t_{l>}]$$

-③- 10-step Rotary Switch for setting of the trip time delay of the O/C element  $[t_{l>}] = [t_1]$

(\*) In the dependent time operation modes SI, VI, EI, the set time  $[t_1]$  corresponds to the  
actual relay's pick-up time delay when the fault current  $I$  is ten times the set  
level [ $I >$ ]:

$$I = 10 \times [I_{>}] \Rightarrow t_{l>} = [t_1]$$

-④- Red signal led 1-F51 -  $I >$

Operates when the actual current  $I \geq [I_{>}]$ ; the led is :

a - Flashing during the trip time delay  $t_{l>}$

b - Illuminated on tripping after  $t_{l>}$

Reset from status - a - is automatic

Reset from status - b - is manual by the Reset button ①

(\*) The status of the LEDs is memorized even on failure of power supply

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## 2.5.2 – Second Phase Overcurrent element 2-F51

$I_{>} = S_2 \bullet K_2$  : minimum pick-up current (input Amps) of 2<sup>nd</sup> overcurrent element.

$t_{I>} = t_2$  : trip time delay (sec) of 2<sup>nd</sup> overcurrent element.

-⑤- 10-step Rotary Switch for setting the value :

**$S_2 = 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10$**

-⑥- 10-step Rotary Switch for setting the coefficient  **$K_2$**  and select the operation mode of the second phase overcurrent element (2-F51,  $I_{>}$ )  
The rotary switch has 5 positions on the right side half of the scale repeated on the left side half of the scale.

When using the settings on the right side the coefficient :  **$K_2 = 5$** ;

When using the settings on the left side the coefficient :  **$K_2 = 1$** ;

“ **Dis** ” function Disabled.

-⑦- 10-step Rotary Switch for setting of the trip time delay of the second overcurrent element  $[t_{I>}] = [t_2]$

-⑧- Red signal led 2-F51N – I>>

Operates when the actual current  $I \geq [I>>]$ ; the led is :

a - Flashing during the trip time delay  $t_{I>>}$

b - Illuminated on tripping after  $t_{I>>}$

Reset from status - a - is automatic

Reset from status - b - is manual by the Reset button ⑪

(\*) The status of the LEDs is memorized even on failure of power supply

-⑨- Green Led “Power Supply” :

- Illuminated in normal operation when power input is energized.

- Flashing when a relay's internal fault is detected by the autodiagnostic function.

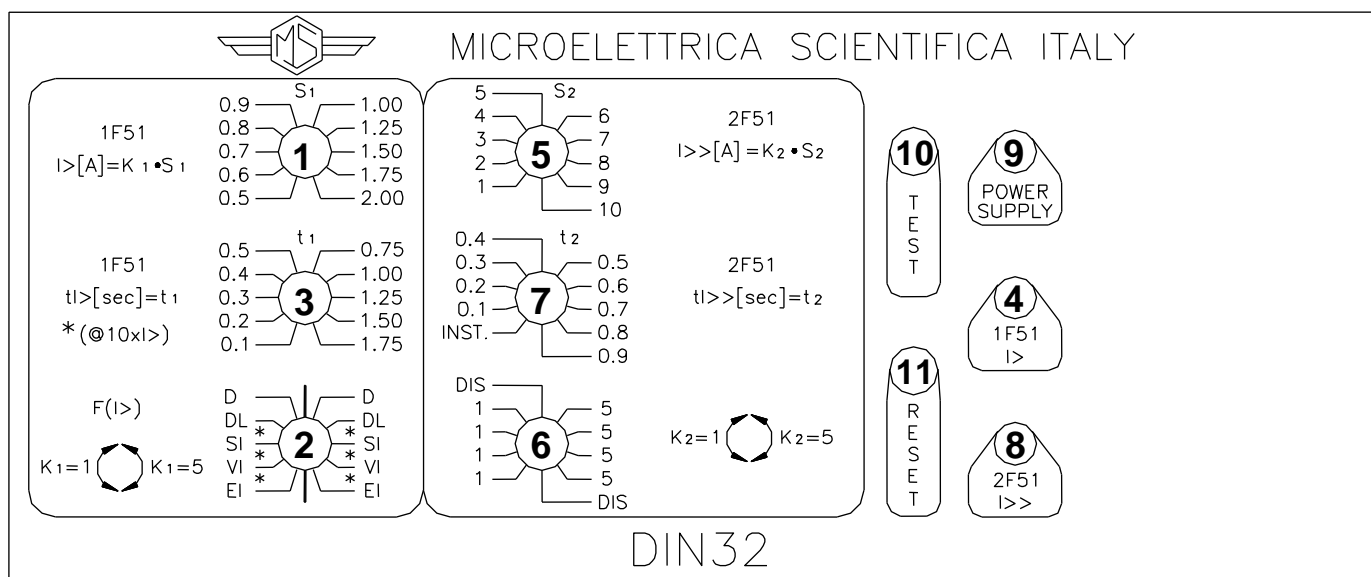
-⑩- Test push button :

- When pressed makes all the functions trip and all the leds lit-on

-⑪- Reset push button :

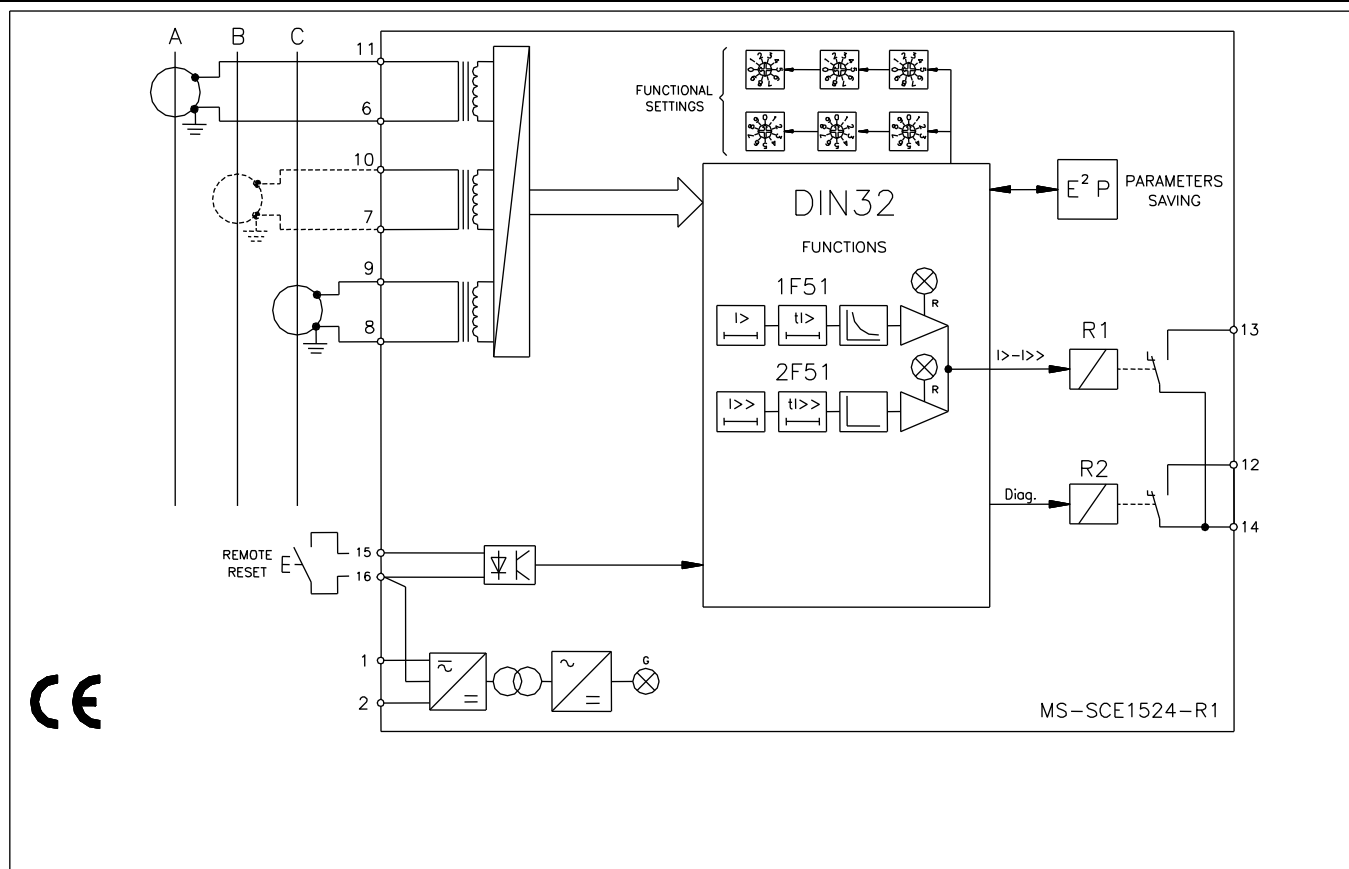
- Press to reset after function's tripping the signal led and the output relay (if terminals 15-16 are open)

**Fig.1**

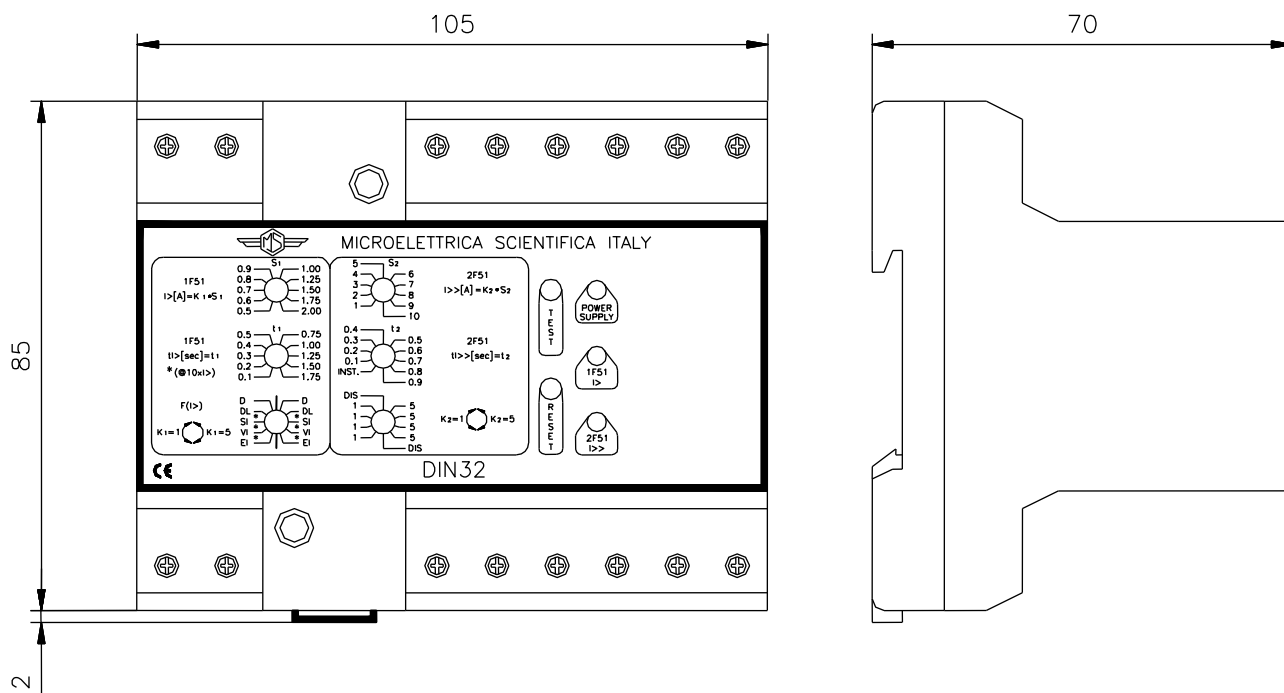




### 3 - CONNECTION DIAGRAM (SCE1524 Rev.1)



#### 4 - OVERALL DIMENSIONS (D46030 Rev.1)



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## 5 - MAINTENANCE

No maintenance is required. Periodically a functional check-out can be made by operating the TEST button on relay's front. 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.

## 6 - ELECTRICAL CHARACTERISTICS

|                                      |   |
|--------------------------------------|---|
| Reference standards                  | IEC 255, 801; CEI 41-1; IEEE C37; CE  |
| Dielectric test voltage              | 2000 V, 50 Hz, 1 min.   |
| Impulse test voltage                 | 5kV (MC), 1kV (MD) - 1,2/50µµs  |
| Immunity to high frequency burst     | 1 kV (MC), 0,5 kV (MD) - 0,1 MHz<br>2,5 kV (MC), 1 kV (MD) - 1 MHz  |
| Immunity to electrostatic discharge  | 15 kV   |
| Immunity to sinusoidal wave burst    | 100 V - (0,01-1) MHz  |
| Immunity to radiated E.M. field      | 10 V/m - (20-1000) MHz  |
| Immunity to 50-60 Hz magnetic field  | 1000 A/m  |
| Immunity to impulse magnetic field   | 1000 A/m - 8/20µs   |
| Immunity to magnetic burst           | 100A/m - (0,1-1) MHz  |
| Resistance to vibration and shocks   | 10-500 Hz - 1 g - 0,075 mm  |
| Rated current phase input            | In = 1 or 5 A   |
| Rated current residual current input | On = 1 or 5 A   |
| Current overload                     | 200 a for 1 sec; 10 A continuos   |
| Burden on current inputs             | Z <sub>F</sub> =2mΩ phase at In; Z <sub>0</sub> =3/10mΩ at On = 1/5A  |
| Average power supply consumption     | 2,5 VA  |
| Output relays                        | rating 5 A; 250V AC<br>Max switching power = 1250VA<br>Max switching current = 5A (resistive)<br>Max switching voltage = 250V AC - 110V DC<br>Max make current= 0,2A, 110V DC, L/R=40ms |
| Operation ambient temperature        | -20°C / +60°C   |
| Storage temperature                  | -30°C / +80°C   |

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*The performances and the characteristics reported in this manual are not binding and can modified at any moment without notice*