

D.C. CURRENT and VOLTAGE RELAY  
with  
HIGH SENSITIVITY  
HALL EFFECT TRANSDUCER

TYPE

**N-DIN-TO64-V**

OPERATION MANUAL



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## **1. General Utilization and Commissioning Directions**

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

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### **1.1 - Storage and Transportation**

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

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### **1.2 - Installation**

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

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### **1.3 - Electrical Connection**

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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.

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### **1.4 - Measuring Inputs and Power Supply**

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

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### **1.5 - Outputs Loading**

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must be compatible with their declared performance.

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### **1.6 - Protection Earthing**

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When earthing is required, carefully check its efficiency.

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### **1.7 - Setting and Calibration**

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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.

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### **1.8 - Safety Protection**

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

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### **1.9 - Handling**

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Notwithstanding the highest practicable protection means used in designing M.S. electronic circuits, the electronic components and semiconductor devices mounted inside can be seriously damaged by electrostatic voltage discharge which can be experienced when handling the cards.

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 when housed in their case; dismantling the cards without proper cautions expose them to the risk of damage and voids any guarantee and relieves the Manufacture of any liability.

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### **1.11 - Waste Disposal of Electrical & Electronic Equipment**

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(Applicable throughout the European Union and other European countries with separate collection program). This product should not be treated as household waste when you wish dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequence to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resource.

## 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

The relay "N-DIN-TO64-V" connected to the magnetic detector "TO64", allows for very accurate measurement of D.C. low current (minimum 4A) on a rated maximum continuous overload current of 1000A.  
The operation of the relay can be directional (direct or reverse current) or bidirectional (independent of direction of current).

Dynamic range:  $(1 - 150)\%I_n$  ( $I_n$  = Rated Input Current of magnetic detector)

It is provided an input for voltage measurement, through isolated transducers with an output " $(0) / (10) / (20)\text{mA} \equiv (-V_n) / 0 / (+V_n)$ ".

It is recommended to use series converters MLIT or MHIT expressly designed by Scientifica Microelettrica for measurement and protection of current lines.

For magnetic detector "TO64" are available following versions:

Type	$I_n$ (A) Rated Input Current	(*) $I_{th}$ (A) Max. admissible continuous overload	$V_n$ (Vcc) Rated Input Voltage	Measurement Range (A)	Dielectric withstand voltage 1' @ 50Hz (kV)	Maximum Dynamic Current (kA per 1s)
TO64 - <b>100</b>	100	1000	1000	4 - 100	10	100
TO64 - <b>500</b>	500	1000	1000	20 - 500	10	100
TO64 - <b>100H</b>	100	1000	5000	4 - 100	18.5	100
TO64 - <b>500H</b>	500	1000	5000	20 - 500	18.5	100
(*) on request other value						

**Note: for commissioning see paragraph "installation procedure"**

The relay is provided:

- ☐ Three optoisolated, self-powered digital inputs (D1, D2, D3) are provided.  
The digital inputs D1 and D2 are activated when their input terminals (6-8, 6-9, 6-9) are shorted by a cold contact ( $R \leq 3k\Omega$ )
- ☐ Two output relays (R1, R2), each with one Normally Open 6A rating contact, are available.  
Programmable: N.E. (Normally Energized) or N.D. (Normally Deenergized).
- ☐ 5 relay output and 5 additional digital inputs, using the EX-IO expansion module.

Make electric connection in conformity with the diagram reported on relay's enclosure.  
Check that input currents are same as reported on the diagram and on the test certificate.

## 2.1 - Power Supply

The auxiliary power is supplied by a built-in module fully isolated and self-protected.

Two options are available:

- |        |                            |        |                             |
|--------|----------------------------|--------|-----------------------------|
| a) - { | 24V(-20%) / 80V(+15%) a.c. | b) - { | 80V(-20%) / 230V(+15%) a.c. |
| {      | 24V(-20%) / 90V(+20%) d.c. | {      | 90V(-20%) / 250V(+20%) d.c. |

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

## 2.2 - Operation and Algorithms

### 2.2.1 - Reference Input Values

	Display		Description	Setting Range		Step	Unit
<b>In</b>	100 (*)	<b>A</b>	Maximum current detectable from magnetic detector TO64	50	- 2500	1	A
<b>K</b>	360 (*)	-	Gain of the magnetic detector TO64	1	- 1000	1	-
<b>Vn</b>	1000 (*)	<b>V</b>	Transducer Primary voltage	50	- 4000	1	V
<b>N_TRP</b>	3 (*)	<b>N</b>	Maximum number of closures MTA	3	- 5	1	N
<b>Freq</b>	50 (*)	<b>Hz</b>	System rated frequency	50	- 60	10	Hz

(\*) Factory default setting

### 2.2.2 - Input Quantities

#### 2.2.2.1 - Input fault element

The relay directly displays the value of the primary current flowing in magnetic detector TO64.

The reading primary Ampere adapts magnetic detector used on TO64, programming the "In" parameter.

"**In**" is the nominal measurement current of the magnetic detector TO64

## 2.2.3 - Functions And Settings

### 2.2.3.1 - 1F64 (I>) – First Overcurrent Element

<b>FuncEnable</b>	→	<b>Status</b>	Enable	[Disable / Enable]
<b>Options</b>	→	<b>OUT</b>	R1	[R1, R2, R1 + R2, None]
	→	<b>DIR</b>	None	[None / POS / NEG]
	→	<b>BI</b>	Enable	[Disable / Enable]
<b>TripLev</b>	→	<b>I&gt;</b>	50	<b>%In</b> (4 ÷ 100) step 1 %In
<b>Timers</b>	→	<b>tI&gt;</b>	60	<b>s</b> (0.03 ÷ 60.00) step 0.01 s

- ☐ **FuncEnable** : *Disable* = Function disabled.  
*Enable* = Function enabled.
- ☐ **OUT** : Selection of the output relay operated at the end of trip time delay:  
*R1* = Trip on output relay R1.  
*R2* = Trip on output relay R2.  
*R1+R2* = Trip on output relay R1+R2.  
*None* = None.  
It is possible, if the expansion module EX/IO is present, assign an additional relay output different from those present in the relay (see § Form EX/IO)
- ☐ **DIR** : Operation mode:  
*None* = Bidirectional.  
*POS* = Positive.  
*NEG* = Negative.
- ☐ **BI** : Blocking Input
- ☐ **I>** : Minimum operation level
- ☐ **tI>** : Trip time delay

- Trip when* : The current trip level [I>] is exceeded for time [tI>].
- When the function is tripped* : *Signalization* = *FFP* Led "Trip" is illuminated.  
*RMB* Led "Trip" is illuminated.  
*Output Relay* = Is tripped (when programmed).  
*Event Recording* = Is recorded.  
*Counter* = Is incremented.
- Function reset when* : *Manual (Digital D1 open)* = "Reset" Push-button is pressed or via serial communication, when the current drop below 95% of the set threshold [I>].  
*Automatic (Digital D1 closed)* = The current drop below 95% of the set threshold [I>].
- Led reset when* : *Manual / Automatic* = The led "Trip" is memorized until push-button "Reset" is pressed or via serial command.

<b>Test</b>	: The closure of the digital input "DC" simulates a current of 2In allowing the "I>" and "I >>" testing.
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### 2.2.3.2 - 2F64 (I>>) – Second overcurrent Element

<b>FuncEnable</b>	→	<b>Status</b>	Enable		[Disable / Enable]
<b>Options</b>	→	<b>OUT</b>	R1		[R1, R2, R1 + R2, None]
	→	<b>DIR</b>	None		[None / POS / NEG]
	→	<b>BI</b>	Enable		[Disable / Enable]
<b>TripLev</b>	→	<b>I&gt;&gt;</b>	100	<b>%In</b>	(4 ÷ 100) step 1 %In
<b>Timers</b>	→	<b>tI&gt;&gt;</b>	0.10	<b>s</b>	(0.03 ÷ 60.00) step 0.01 s

- ❑ **FuncEnable** : *Disable* = Function disabled.  
*Enable* = Function enabled.
- ❑ **OUT** : Selection of the output relay operated at the end of trip time delay  
*R1* = Trip on output relay R1.  
*R2* = Trip on output relay R2.  
*R1+R2* = Trip on output relay R1+R2.  
*None* = None.  
It is possible, if the expansion module EX/IO is present, assign an additional relay output different from those present in the relay (see § Form EX/IO)
- ❑ **DIR** : Operation mode:  
*None* = Bidirectional.  
*POS* = Positive.  
*NEG* = Negative.
- ❑ **BI** : Blocking Input
- ❑ **I>** : Minimum operation level
- ❑ **tI>** : Trip time delay

<b>Trip when</b>	:	The current trip level [I>>] is exceeded for time [tI>>].
<b>When the function is tripped</b>	:	<i>Signalization</i> = Led "Trip" is illuminated <i>Output Relay</i> = Is tripped (when programmed) <i>Event Recording</i> = Is recorded. <i>Counter</i> = Is incremented
<b>Function reset when</b>	:	<i>Manual (Digital D1 open)</i> = "Reset" Push-button is pressed or via serial communication, when the current drop below 95% of the set threshold [I>]. <i>Automatic (Digital D1 closed)</i> = The current drop below 95% of the set threshold [I>].
<b>Led reset when</b>	:	<i>Manual / Automatic</i> = The led "Trip" is memorized until push-button "Reset" is pressed or via serial command.

<b>Test</b>	:	The closure of the digital input "DC" simulates a current of 2In allowing the "I>" and "I >>" testing.
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### 2.2.3.3 - F59 – Overvoltage A.C. protection with d.c. filter

<b>FuncEnable</b>	→	<b>Status</b>	Enable		[Disable / Enable]
<b>Options</b>	→	<b>OUT</b>	R2		[R1, R2, R1 + R2, None]
<b>TripLev</b>	→	<b>Vca</b>	50	<b>V</b>	(40 ÷ 170) step 1 V
<b>Timers</b>	→	<b>tVca</b>	1.00	<b>s</b>	(0.00 ÷ 60.00) step 0.01 s

- ☐ **FuncEnable** : *Disable* = Function disabled.  
*Enable* = Function enabled.
- ☐ **OUT** : *Selection of the output relay operated at the end of trip time delay.*  
*R1* = Trip on output relay R1.  
*R2* = Trip on output relay R2.  
*R1+R2* = Trip on output relay R1+R2.  
*None* = None.  
It is possible, if the expansion module EX/IO is present, assign an additional relay output different from those present in the relay (see § Form EX/IO) (see § Form EX/IO)
- ☐ **Vca** : Minimum operation level
- ☐ **tVca** : Trip time delay

<i>Trip when</i>	:	The current trip level [Vca] is exceeded for time [tVca]. The DC component is ignored
<i>When the function is tripped</i>	:	<i>Signalization</i> <b>FFP</b> = Led "Trip" is illuminated <b>RMB</b> = Led "Trip" is illuminated <i>Output Relay</i> = Is tripped (when programmed) <i>Event Recording</i> = Is recorded. <i>Counter</i> = Is incremented
<i>Function reset when</i>	:	<i>Automatic</i> = The led "Trip" is memorized until push-button "Reset" is pressed or via serial command.





### 2.2.3.5 – Ntrp – Limitation of MTA Operation

<b>FuncEnable</b>	→	<b>Status</b>	Enable	[Disable / Enable]
<b>Options</b>	→	<b>OUT</b>	None	[R1, R2, R1 + R2, None]
<b>TripLev</b>	→		No Parameters	[No Parameters]
<b>Timers</b>	→		No Parameters	[No Parameters]

- ❑ **FuncEnable** : *Disable* = Function disabled.  
*Enable* = Function enabled.
- ❑ **OUT** : *Selection of the output relay operated at the end of trip time delay.*  
*R1* = Trip on output relay R1.  
*R2* = Trip on output relay R2.  
*R1+R2* = Trip on output relay R1+R2.  
*None* = None.  
It is possible, if the expansion module EX/IO is present, assign an additional relay output different from those present in the relay (see § Form EX/IO)

Note: This function requires the inputs DA and DB present in the module EX-IO, DA closed = MTA closed.

<i>Trip when</i>	:	When the number of operations per unit of time (1 min), reaches "N_TRP" set in the "nominal input values" (Rated Input Values). If, on expiry of the time "tMTA" the counter "N_TRP" did <u>not</u> reach the programmed value [NTrp], the counter is reset.
<i>When the function is tripped</i>	:	<i>Signalization</i> <i>FFP</i> = Led "Trip" is illuminated <i>Output Relay</i> <i>RMB</i> = Led "Trip" is illuminated = Is tripped (when programmed) (default: the RD relay normally energized on expansion module EX/IO). <i>Event Recording Counter</i> = Is recorded. = Is incremented "NTrp" We have the increase of "NTRP" counter, each digital input [DA] close (EX module / IO).
<i>Function reset when</i>	:	= At the close of the digital input "DB" (Form EX / IO) The led "Trip" is memorized until push-button "Reset" is pressed or via serial command.

### 2.2.3.3 – BF - Breaker Failure

<b>FunctEnable</b>	→	<b>Status</b>	Enable	[Disable / Enable]
<b>Options</b>	→	<b>OUT</b>	R2	[R2, None]
<b>TripLev</b>	→		No Parameters	[No Parameters]
<b>Timers</b>	→	<b>tBF</b>	0.75	s (0.05 ÷ 0.75) step 0.01 s

- ☐ **FunctEnable** : *Disable* = Function disabled.  
                          *Enable* = Function enabled.
- ☐ **OUT** : *Selection of the output relay operated at the end of trip time delay:*  
                          *R2* = Trip on output relay R2.  
                          *None* = None.
- ☐ **tBF** : Trip time delay

*Trip when* : Operation: If after the time "tBF" from pick-up of the relay R1 (i.e. from tripping of any protection function programmed to operate the output relay R1) the current measured still exceeds  $\geq 4\%I_n$ , the output relay R2 will trip.

*When the function is tripped* : *Signalization* = FFP Led "ON" flashing  
  *Output Relay* = Is tripped (when programmed)  
  *Counter* = Is incremented

*Function reset when* : *Automatic* = When the current is zero ( $< 4\%I_n$ )

### 2.2.3.4 – RTD – Remote trip / C/B Status

Terminals 6-7 (D3) N-DIN.

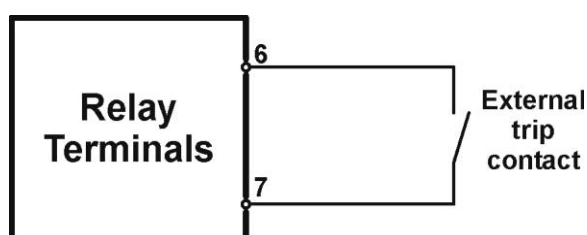
<b>FuncEnable</b>	→	<b>Status</b>	Enable	[Disable / Enable]
<b>Options</b>	→	<b>OUT</b>	None	[R1, R2, R1 + R2, None]
<b>TripLev</b>	→		No Parameters	[No Parameters]
<b>Timers</b>	→		No Parameters	[No Parameters]

- ☐ **FuncEnable** : *Disable* = Function disabled.  
*Enable* = Function enabled.
- ☐ **OUT** : *Selection of the output relay:*  
*R1* = Trip on output relay R1.  
*R2* = Trip on output relay R2.  
*R1+R2* = Trip on output relay R1+R2.  
*None* = None.  
It is possible, if the expansion module EX/IO is present, assign an additional relay output different from those present in the relay (see § Form EX/IO)

<i>Trip when</i>	:	When the digital input RTD is closed.
<i>Quando la funzione è scattata</i>	:	<i>Signalization</i> = <i>FFP</i> Red Led "ON" illuminated. Green Led "OFF" not illuminated.
		<i>Output Relay</i> = Trips (when programmed)
		<i>Event Recording</i> = Is recorded.
		<i>Counter</i> = Is incremented
<i>Function reset when</i>	:	<i>Automatic</i> = Digital input is open, Green Led "OFF" is illuminated.
<i>Led reset when</i>	:	= The push-button "Reset" is pressed or via serial command.

It is possible to use the RTD input as open remote command controlled by a remote dry contact, or as a input status of C/B.

The status of the external contact is displayed via LEDs ON (Closed) and OFF (open) on the module FFP.



### 2.2.3.7 - I.R.F. - Internal Relay Failure

<b>FuncEnable</b>	→	<b>Status</b>	Enable	[Enable]
<b>Options</b>	→	<b>OpIRF</b>	NoTrip	[Trip / NoTrip]
	→	<b>OUT</b>	None	[R1, R2, R1 + R2, None]
<b>TripLev</b>	→		No Parameters	[No Parameters]
<b>Timers</b>	→		No Parameters	[No Parameters]

- ☐ **FuncEnable** : *Disable* = Function disabled.  
*Enable* = Function enabled.
- ☐ **OpIRF** : *Selection of the output relay operated on tripping*  
*Trip* = Trip output relay (when programmed)  
*NoTrip* = No Trip
- ☐ **OUT** : *Selection of the output relay:*  
*R1* = Trip on output relay R1.  
*R2* = Trip on output relay R2.  
*R1+R2* = Trip on output relay R1+R2.  
*None* = None.  
It is possible, if the expansion module EX/IO is present, assign an additional relay output different from those present in the relay (see § Form EX/IO)

The variable "OpIRF" available in the options of the "IRF" function, can be programmed to trip the output relays same as the other protection functions (OpIRF = TRIP), or to only operate the "IRF" signal led without tripping the output relays (OpIRF = NoTRIP).

#### DIAGNOSTIC of the MAGNETIC DETECTOR TO64:

If Magnetic Detector TO64 is not connected or it is faulty, or one of the wiring connection is broken, the function I.R.F. trips and the green led "I.R.F" (FFP and RMB) flash.

### 2.2.3.5 - OperMod - Operation Mode

The relay is fitted with 2 output relays R1, R2 and 3 Digital Input D1, D2, RTD (see § 2):

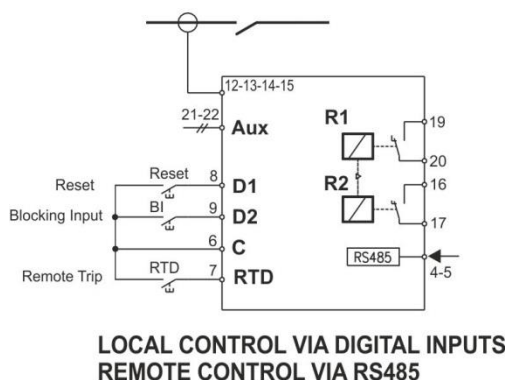
- **R1** Can be controlled by any of the functions (except Breaker Failure) according to programming.  
Reset can be operated by the reset button of the RMB and/or FFP and/or by activation of the Digital Input "D1".
- **R2** Can be controlled by any of the functions according to programming.  
Reset is automatic.
- **D1** (Terminals 6-8) Operates the reset after tripping cause is cleared (example: Overcurrent trip – Circuit Breaker Open– Current interrupted – Reset)  
If "D1" terminals (6-8) are permanently shorted, reset of "R1" after tripping takes place automatically as soon as the tripping cause disappears.
- **D2** (Terminals 6-9) When activated (terminal shorted) any function programmed (Parameter "BI" = Enable) is blocked to trip.
- **D3** (Terminals 6-7) Operates according to § RTD

The menu "OperMode", includes three submenus (OPTIONS):

<b>FuncEnable</b>	→	<b>Status</b>	No Parameters	[No Parameters]
<b>Options</b>	→	<b>Op_R1</b>	N.E.	[N.E. – N.D.]
	→	<b>Op_R2</b>	N.E.	[N.E. – N.D.]
	→	<b>Ctrl</b>	Rsrvd	Reserved
<b>TripLev</b>	→		No Parameters	[No Parameters]
<b>Timers</b>	→		No Parameters	[No Parameters]

- ❑ **Op\_R1** : For selection of different operation modes of the Output Relay "R1"  
*N.E.* = Normally energized, deenergized on trip  
*N.D.* = Normally deenergized, energized on trip
- ❑ **Op\_R2** : For selection of different operation modes of the Output Relay "R1"  
*N.E.* = Normally energized, deenergized on trip  
*N.D.* = Normally deenergized, energized on trip

### Example of application



### 2.2.3.6 - Load Profile

<b>FuncEnable</b>	→	<b>Status</b>	Enable	[Disable / Enable]
<b>Options</b>	→		No Parameters	[No Parameters]
<b>TripLev</b>	→		No Parameters	[No Parameters]
<b>Timers</b>	→	<b>tLP</b>	1.00	m (1 ÷ 650) step 1 m

☐ **FuncEnable**

:

Disable

= Function disabled.

Enable

= Function enabled.

☐ **tLP**

:

Time interval

The Load Profile function, when activated, records the value of current " I " exceed 4%In, at every time interval " tLP "and at any C/B opening, (tLP programmable 1 – 650 min, step 1min).

Each record is complete with time/date tagging (see § Time/Date).

The memory buffer can store up to 100 records.

All the recorded data can be downloaded by the serial communication port and, with MSCom interface program, they are displayed as time/current curve.

### 2.2.3.11 – MainComParam (Main Communication Parametres)

<b>FuncEnab</b>	→	Enable	[No Parameters]
<b>Options</b>	→	<b>Mode</b>	8,n,1 [8,n,1 / 8,o,1 / 8,e,1]
	→	<b>BaudR</b>	9600 [9600 / 19200]
<b>TripLev</b>	→	No Parameters	[No Parameters]
<b>Timers</b>	→	No Parameters	[No Parameters]

- ☐ **Mode** : RS485 communication parameters of serial port (terminals 4-5).  
Note: Any variation of parameters is valid after the restart of the relay.
- ☐ **BaudR** : Transmission Baud Rate

### 2.2.3.12 – MTA (Diagnostic C/B)

<b>FuncEnab</b>	→	Enable	[Disable / Enable]
<b>Options</b>	→	No Parameters	[No Parameters]
<b>TripLev</b>	→	No Parameters	[No Parameters]
<b>Timers</b>	→	<b>tMTA</b>	0.50 s (0.05 ÷ 0.75) step 0.01 s

- ☐ **tMTA** : Observation time.

Note: This function requires the inputs DA present in the module EX-IO, DA closed = MTA closed.

<b>Trip when</b>	:	At the trip of the functions F45 and F59 (if enabled), the timer "tMTA" starts, if at the expiration "tMTA" the C/B status "DA" (EX/IO) is not closed you have a diagnostic trip for the MTA.		
<b>When the function is tripped</b>	:	<b>Output Relay</b>	=	Is tripped (when programmed) [RC] (if this expansion module EX/IO is present)
	:	<b>Counter</b>	=	Is incremented "MTA"
<b>Function reset when</b>	:	<b>Automatic</b>	=	When the closing MTA is successful.



### 2.2.4 - Self-diagnostic

---

The N-DIN incorporates a sophisticated self-diagnostic feature that continuously checks the following elements:

- ☐ Magnetic Detector connection.
- ☐ A/D conversion
- ☐ Checksum of the settings stored into E<sup>2</sup>P.
- ☐ DSP general operation (Power, Routines, etc.)
- ☐ Lamp test (only on manual test).

Any time Power is switched on, a complete test is run; then, during normal operation, the test is run continuously and the checksum is done any time a parameter is stored into E<sup>2</sup>P.

If during the test any Relay Internal Failure (I.R.F) is detected:

- ☐ If "I.R.F." is programmed to "Trip" (see § I.R.F.) the output relays are operated same as on tripping of any protection function
- ☐ If "I.R.F." is programmed "NO Trip", operation is memorized in the "Event Records".

### 2.3 - Modulo EX/IO – Expansion Output Relays / Digital Inputs

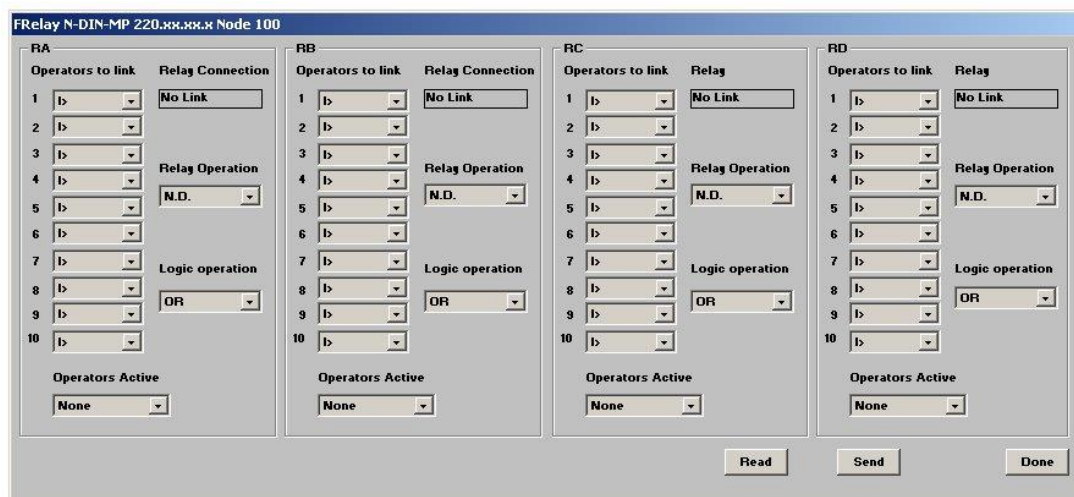
The EX-IO module expands the protection relay I/O with additional 4 programmable output relays (and one diagnostic) and 5 digital inputs. This optional module is connected to the relay via a communication port CANBUS (See connection example).

The relays and the additional inputs can be configured via the serial communication software "MScom" (see Operation Manual MScom).

1) Push the button



2) Configuration window will appear:



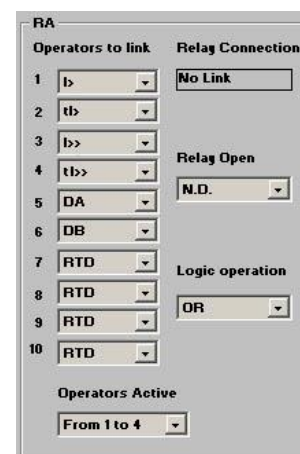
<b>RA-RB-RC-RD</b>	Output Relays	
<b>Operator to link</b>	Functions / Digital.	
<b>Relay Operator</b>	Operation mode	N.E. = Normally energized N.D. = Normally deenergized
<b>Logic Operation</b>	Logic	OR = energized if any associated function is activated AND = energizes if all functions are activated
<b>Operators Active</b>	Number of "Operators" used	None = None From 1 to 2 = Associated Function 1 to 2 From 1 to 3 = Associated Function 1 to 3

<b>Functions</b>	RTD, IRF, Rsvr, HR, I>, tI>, I>>, tI>>, BF, Vca, tVca, Vcc, tVcc, CanStatus, NTrp, diagMTA.
<b>Output Relays</b>	R1, R2. Repetition of the state of the output relay N-DIN in accordance with the setting of the operating mode. see § OpMode.)
<b>Digital Inputs</b>	D1, D2, DA, DB, DC, DD, DE, F27.

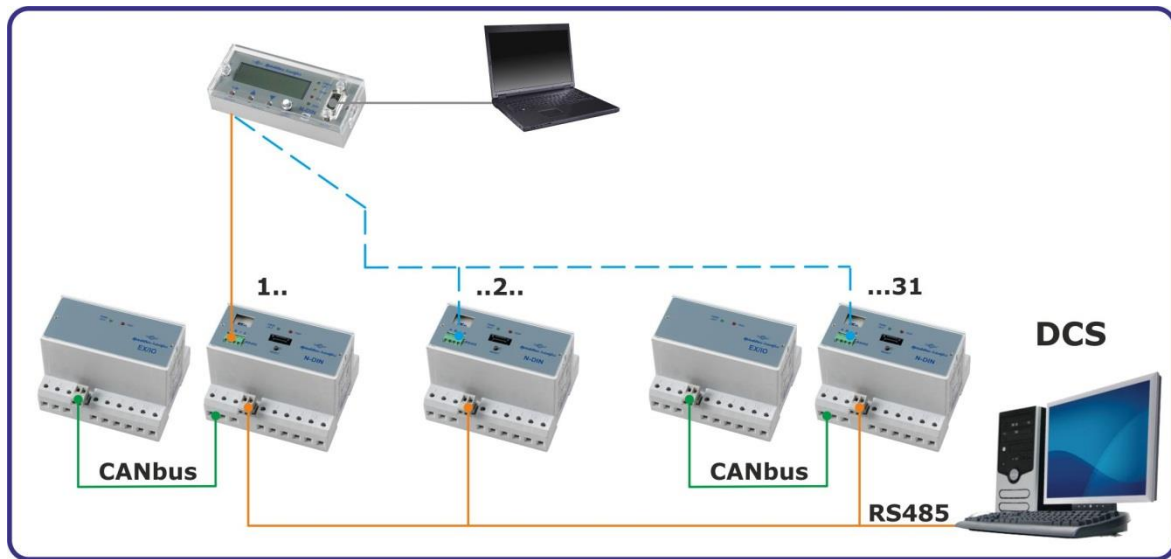
3) Configuration Example:

Assignment of relay "RA" so that we can excite, if one of the functions / Digital Inputs (I> - tI> - I>> - tI>> - DA - DB) is activated.

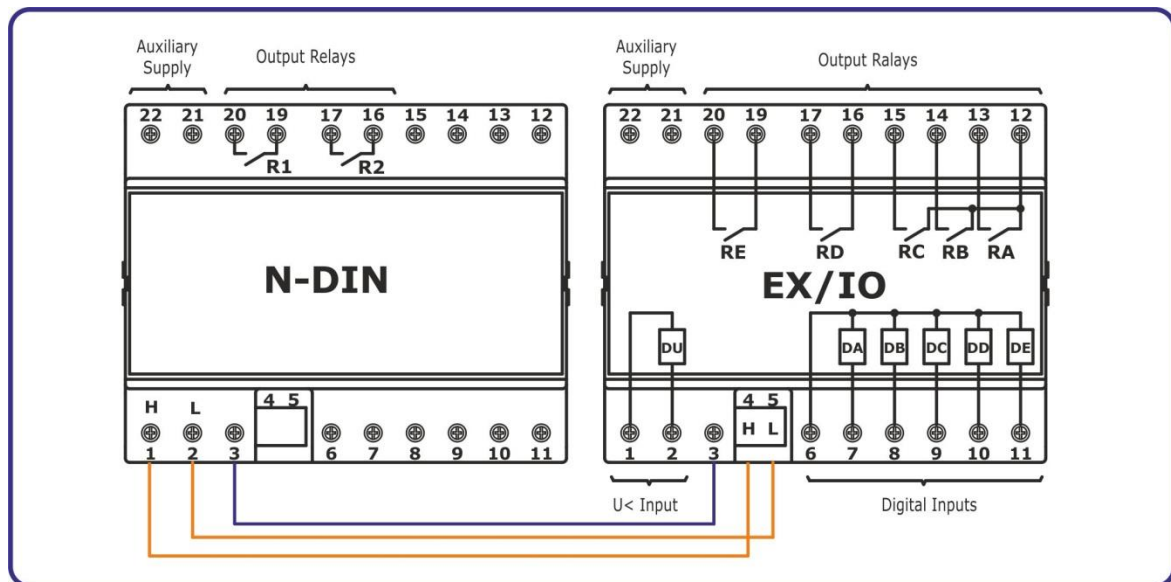
	RA
<b>Operator to link</b>	1 - I>      3 - I>>      4 - DA 2 - tI>      4 - tI>>      5 - DB
<b>Relay Operator</b>	N.D.
<b>Logic Operation</b>	OR
<b>Operation Active</b>	Da 1 a 4



### 2.3.1 – Connection example

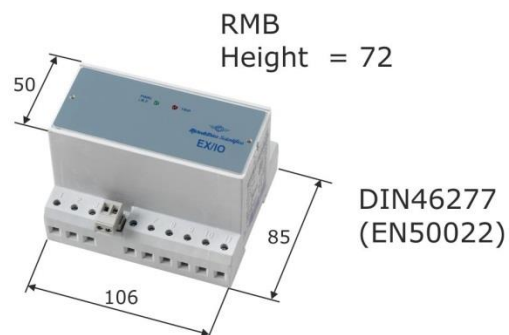


### 2.3.2 – Wiring Diagram



### 2.3.3 – Overall Dimensions (mm)

Transparent Cover  
Dimension = 45x108  
Height = 9



### 3. Installation Procedure

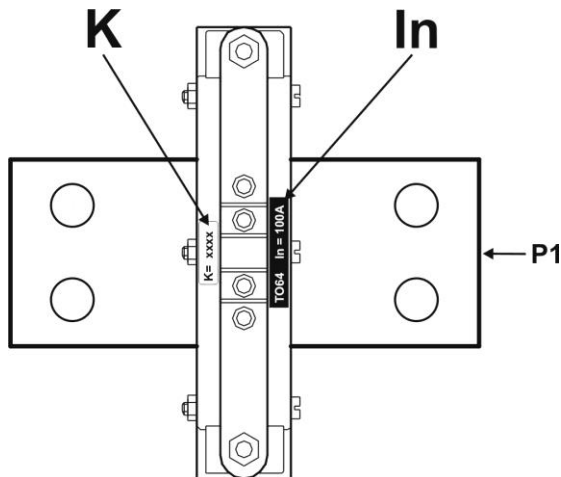
Connect the relay N-DIN to magnetic detector TO64 in according to wiring diagram SCE2038, using a three-pole shielded cable.

Make the following calibration procedure:

Program through the menu "RatedInputValues", the nominal value:

**In** = Maximum current detectable from magnetic detector TO64 as reported on the label (normally 100A or 500A).

**K** = Set the value reported on magnetic detector TO64 as reported on the label.



#### 2 – Clear residual measure (Offset Toroide).

Be sure that in the bus bar the current is not flowing.

Use command "CT Offset" present in "Commands" menu, to clear the residual measure normally present on the first installation.

1	RTMeas I    xxx    A	
2	<Main menu> RMB Selection	• Press " <b>Enter</b> " for access to the main menu.
3	<Main menu> Commands	• Press the pushbutton " <b>Select</b> " (" <b>Increase</b> " or " <b>Decrease</b> ") and select " <b>Commands</b> ". • Press " <b>Enter</b> " for access.
4	Commands Clear	• Press " <b>Select</b> " (" <b>Increase</b> " or " <b>Decrease</b> ") and select " <b>Offset Toroide</b> ".
5	Commands Offset Toroide	• Press " <b>Enter</b> " for reset residual measure .
6	Commands Command active..	• The command is activated.

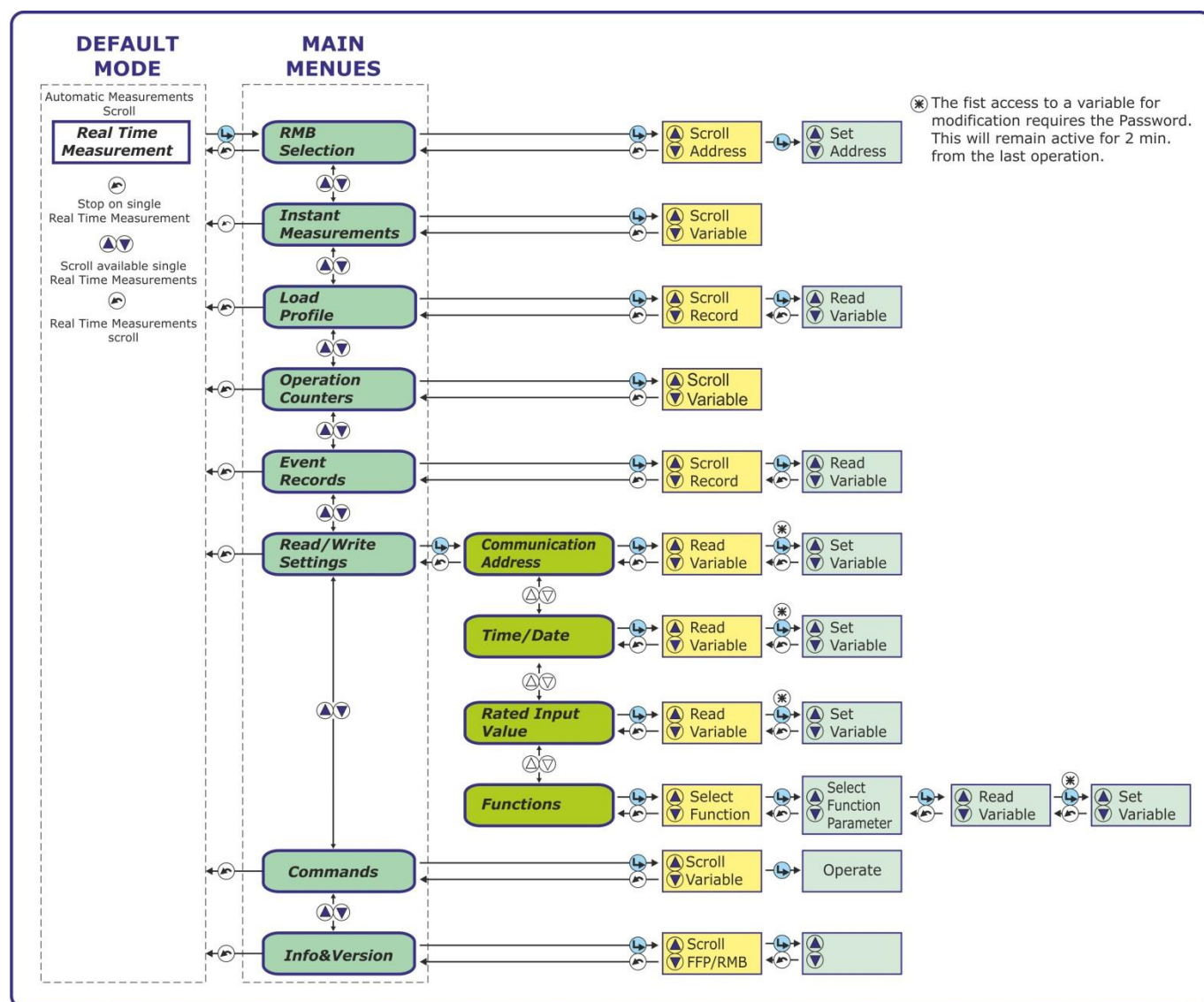
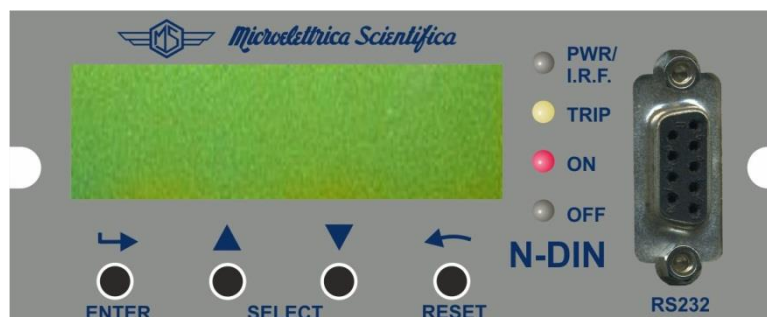
Verify that the current measure showed to display (RTMeas menu) is equal to zero.

## 4. Relay Management

The relay can be totally managed either locally by the 4 key buttons and the LCD display or remotely either by a PC connected to the serial port on Front Face (RS232) and/or by the main serial communication bus RS485 connected to the RMB.

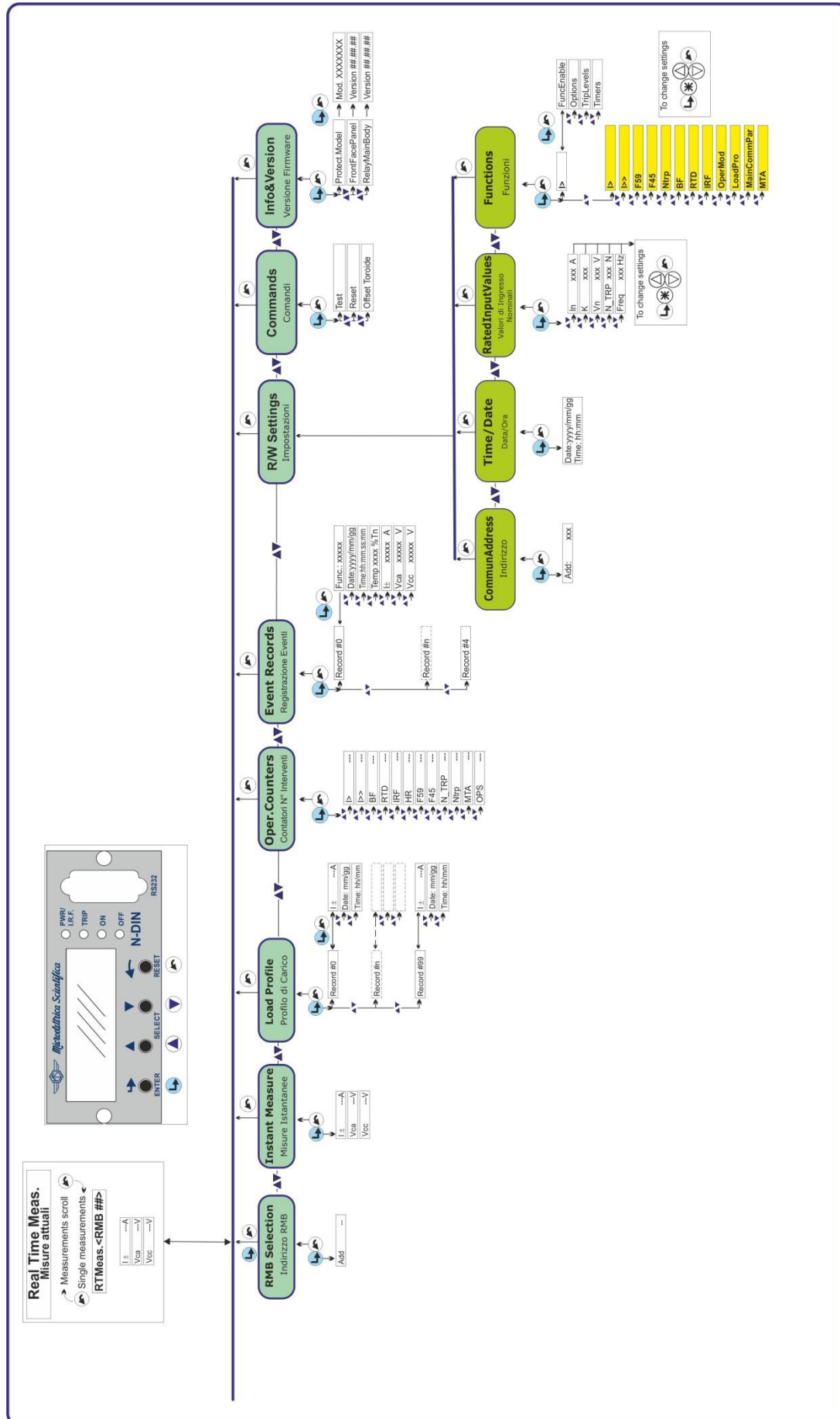
The 2 line x 16 characters LCD display shows the available information.

Key buttons operate according to the flow-chart here below.



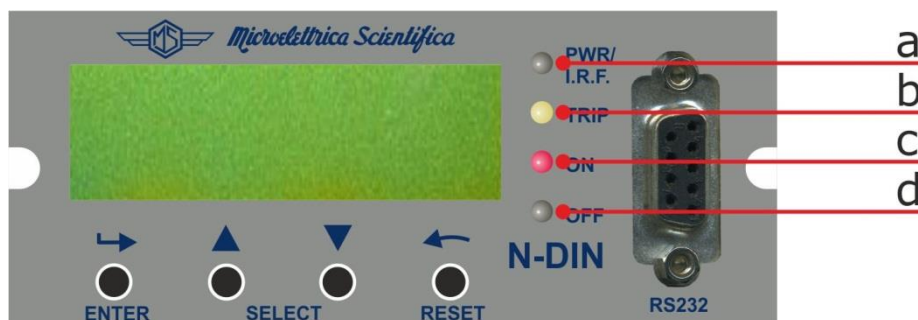


## 4.1 – Keyboard Operational Diagram



## 5. Signalization

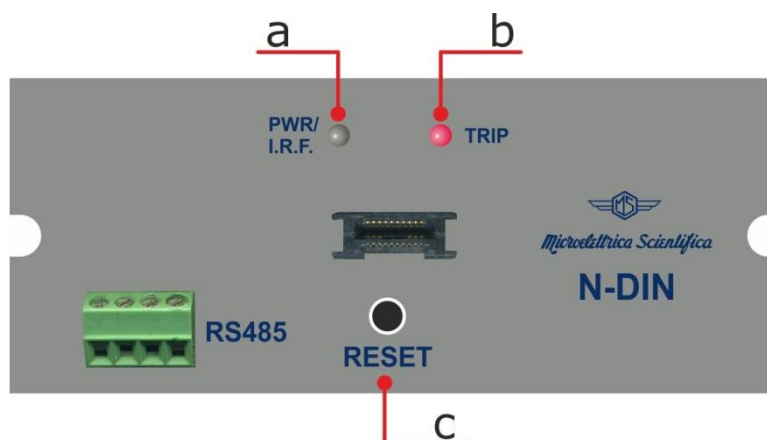
Four signal leds are available on the removable **Front Face Panel (FFP)**:



a)	Green LED	<b>PWR/ I.R.F.</b>	<input type="checkbox"/> Illuminated during normal operation when Power Supply is ON. <input type="checkbox"/> Flashing when a Relay Internal Fault is detected.
b)	Yellow LED	<b>TRIP</b>	<input type="checkbox"/> Flashing when a timed function has started to operate. <input type="checkbox"/> Illuminated when any function was tripped, reset takes places either by pressing the "Reset" or via serial communication.
c)	Red LED	<b>ON</b>	<input type="checkbox"/> Illuminated when C/B close status is detected (D3 close). <input type="checkbox"/> Flashing when function "BF" is tripped.
d)	Green LED	<b>OFF</b>	<input type="checkbox"/> Illuminated when C/B open status is detected (D3 open).

The reset button on FFP, resets the Output Relays and the Trip Signal Led after tripping.

Other two leds are provided on the **Relay Main Body (RMB)** visible when the front face is removed



a)	Green LED	<b>PWR/ I.R.F.</b>	<input type="checkbox"/> Illuminated during normal operation when Power Supply is ON. <input type="checkbox"/> Flashing when a Relay Internal Fault is detected.
b)	Red LED	<b>TRIP</b>	<input type="checkbox"/> Flashing when a timed function has started to operate. <input type="checkbox"/> Illuminated when any function was tripped until Reset button is pressed or via serial communication.
c)	Button	<b>RESET</b>	<input type="checkbox"/> To Reset after tripping the output relays and the trip signal led.

## 6. System Configuration Options

The relay N-DIN is constituted of two independent parts (**RMB** and **FFP**) that can be either used as stand-alone device or combined in different ways.

The FFP can be directly plug-in and fixed by two screws on one RMB or it can be remotely connected to one or more (up to 31) RMB by the relevant terminals.

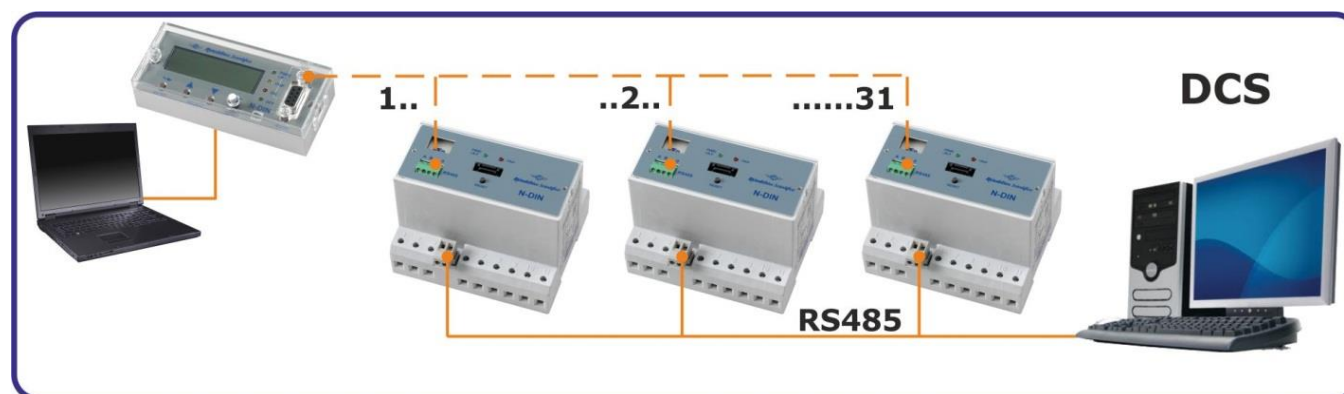
**It is recommended to power-off the RMB modules before plug-in/out or connecting the FFP.**

1) Use of one "**RMB + FFP**" assembly for each protection unit.



The **FFP** module can be mounted either directly on its **RMB** module or on the front panel of the board connected to the **RMB** by four wires (terminals A, B, +, 0).

2) Use of up to 31 **RMB** modules managed by only one **FFP**.

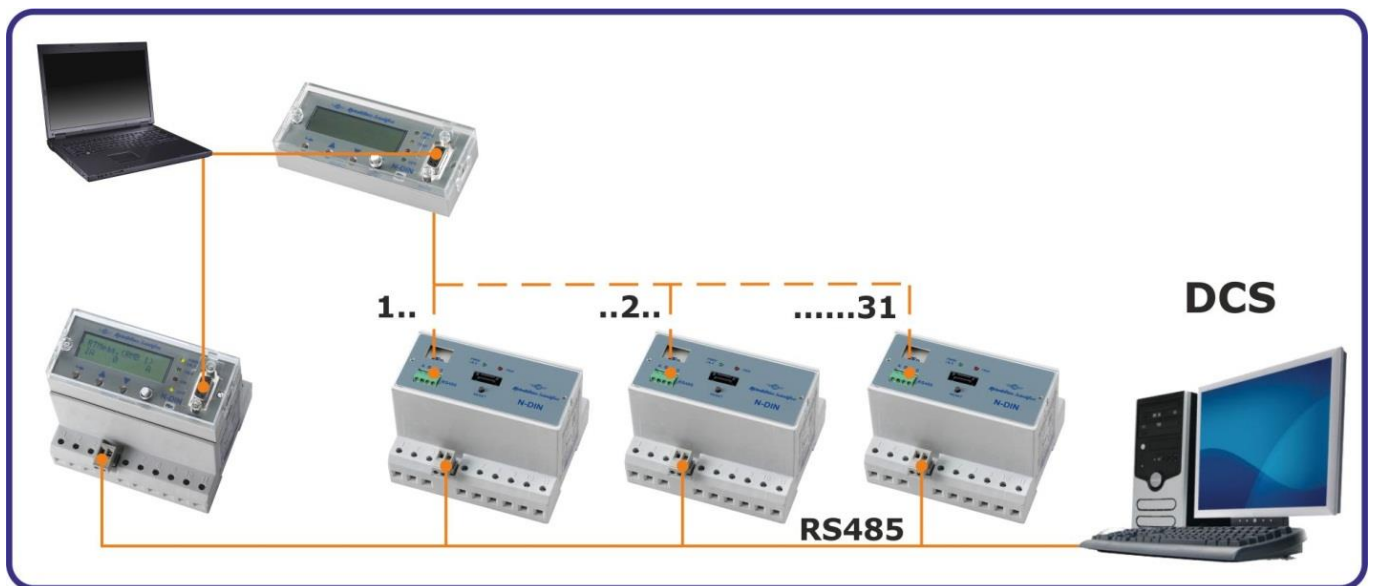




**3) Use of RMB modules only without FFP.**



**4) combination of configuration 1 – 2 – 3.**



## 6.1 - Main communication serial port on the Relay Main Body

This port is accessible via the plug-in terminals " 4 - 5 " provided on the RMB.

It is used for connection to a serial bus interfacing up to 31 - N-DIN units with the Central Supervision System (SCADA, DCS, ecc).

The serial bus is a shielded pair of twisted cables connecting in parallel (Multi Drop) the different units (slaves) by the relevant terminals available on the " **Relay Main Body** ".

The physical link is RS485 and the Communication Protocol is MODBUS/RTU:

The configuration is selectable.

<input type="checkbox"/>	Baud Rate	:	9600/19200 bps	9600/19200 bps	9600/19200 bps
<input type="checkbox"/>	Start bit	:	1	1	1
<input type="checkbox"/>	Data bit	:	8	8	8
<input type="checkbox"/>	Parity	:	None	Odd	Even
<input type="checkbox"/>	Stop bit	:	1	1	1

**Note:** any change of this setting became valid at the next power on.

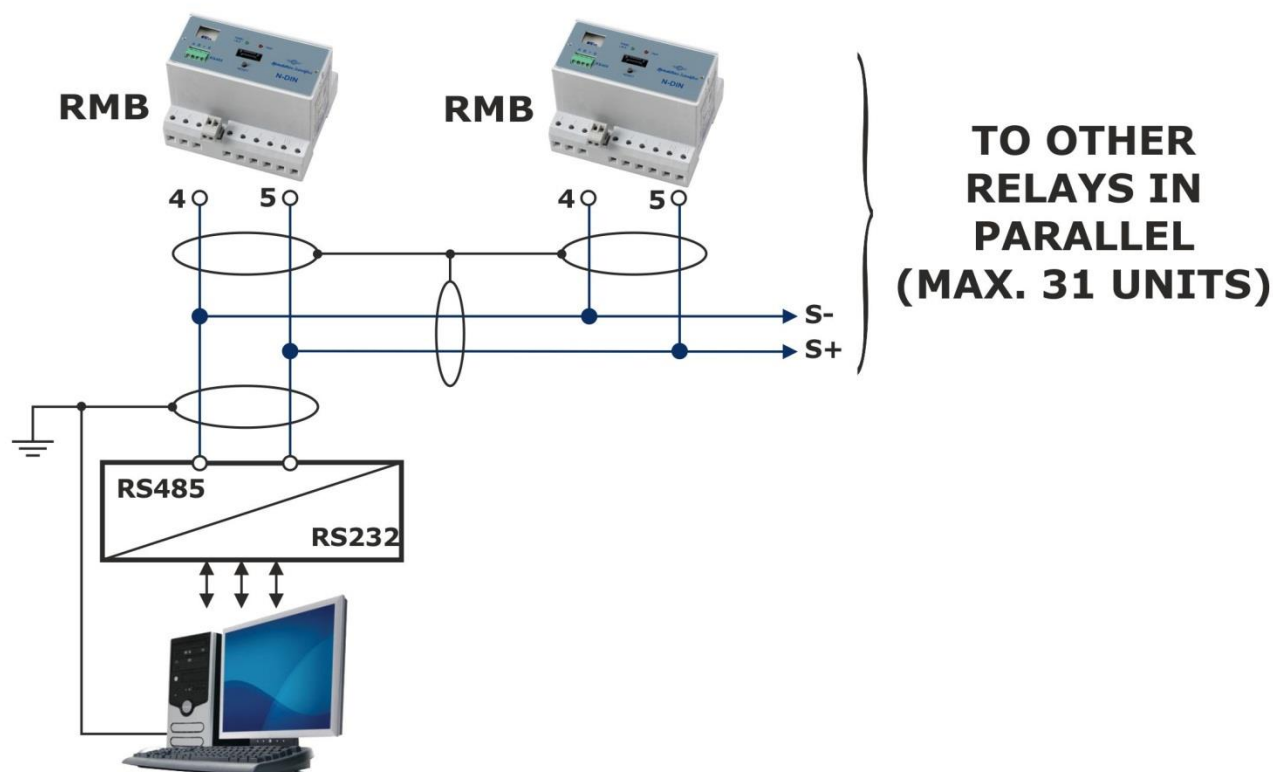
Each relay is identified by its programmable address code (NodeAd) and can be called from the P.C.

A dedicated communication software (MCom) for windows 98SE/XP/NT4 SP3 (or later) is available.

Please refer to the MCom instruction manual for more information.

Maximum length of the serial bus can be up to 200m.

## CONNECTION TO RS485



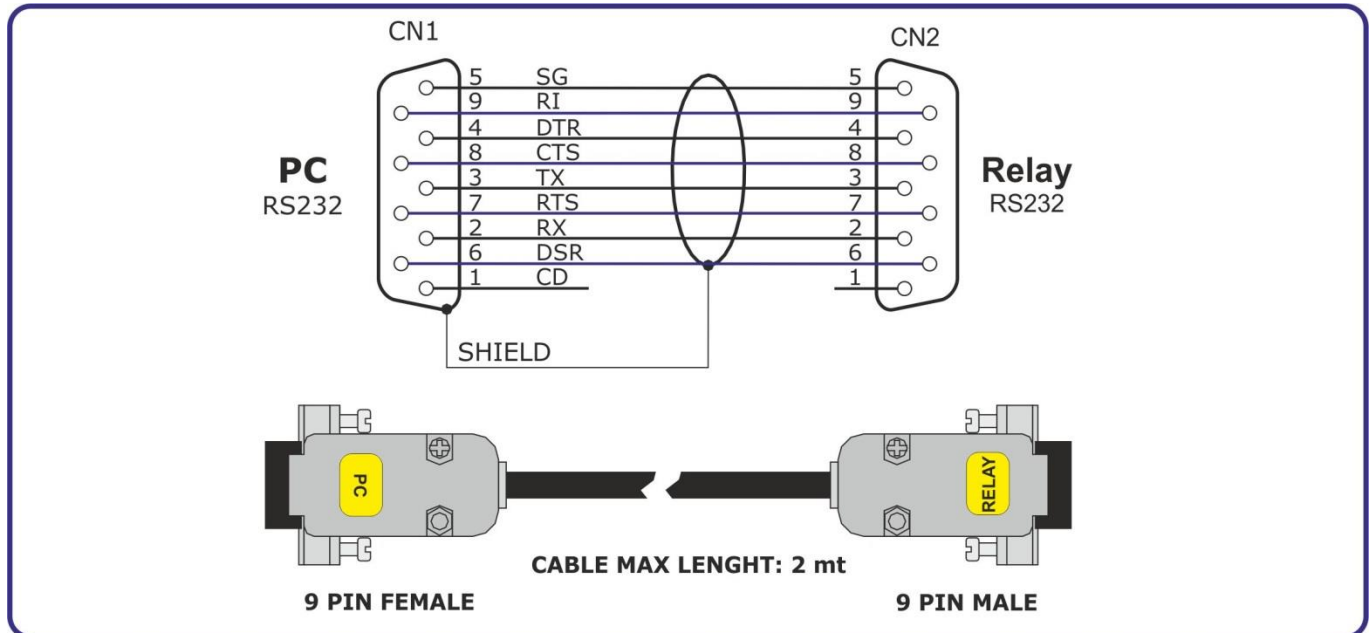
For longer distance and for connection of up to 250 Relays, optical interconnection is recommend.  
(please ask Microelettrica for accessories)

## 6.2 - Communication Port on Front Face Panel

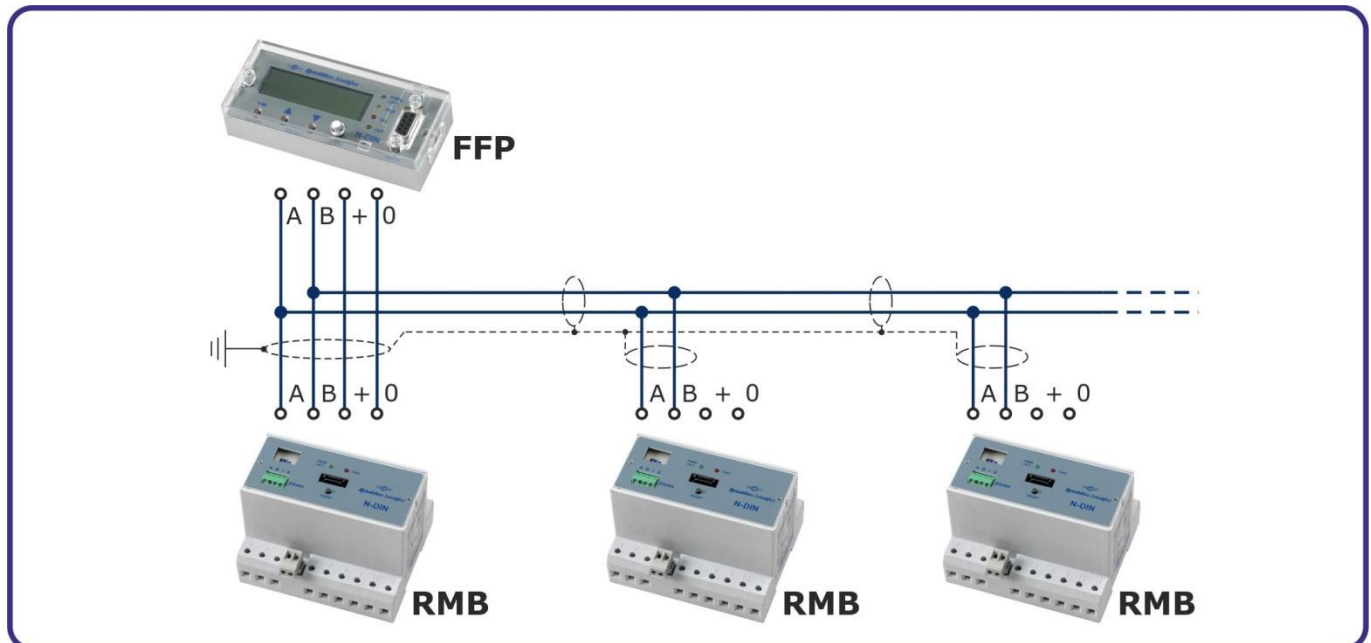
This port is used for communication through the Front Face Panel (FFP) between a local Lap-top PC and any of the RMB connected to the FFP.

The physical link is RS232 by the standard female 9-pin D-sub connector available on the Front Face Panel. Via this Port complete Relay management and data acquisition is possible.

When this serial Port is connected, the Front Face Panel is bypassed, but still in communication with the Relay Main Bodys connected..



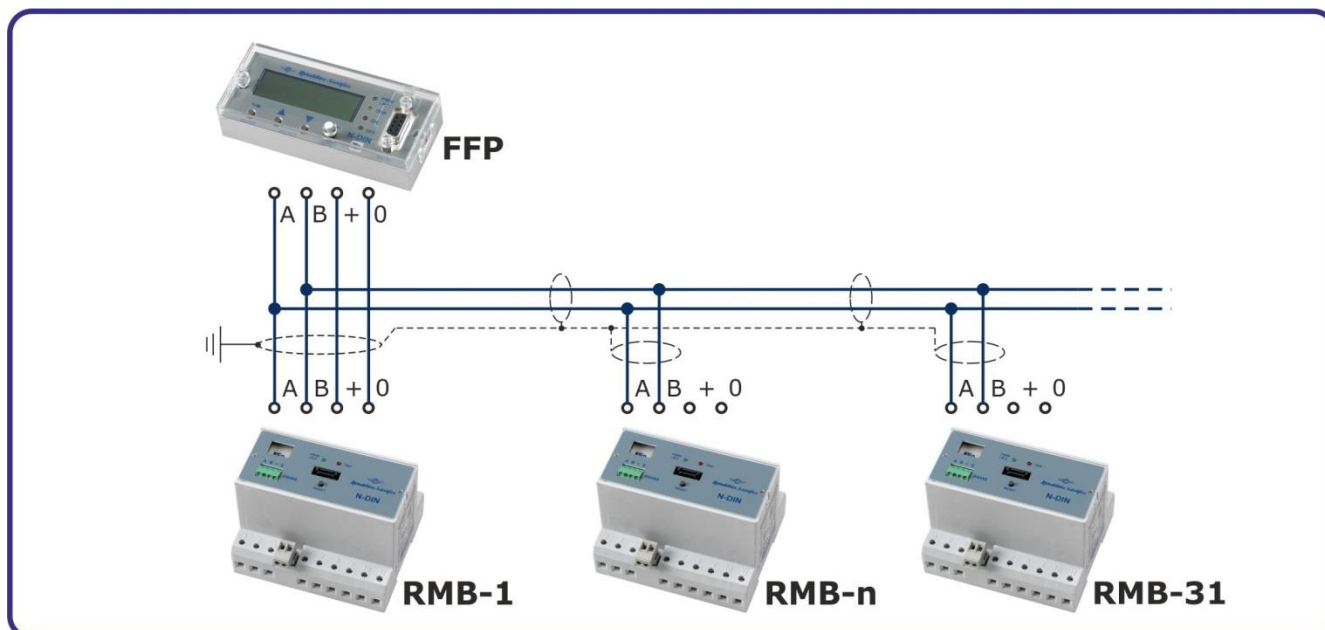
The connection between the "FFP" and the "RMB" (when FFP is removed) is made by four shielded twisted cables connected to the relevant terminals available on the back of the "FFP" and on the front of the "RMB". All additional RMBs only need a pair of shielded twisted cables.



The terminals on the "RMB" front can also be used for direct connection to a local Lap-top PC through a RS485/232 converter without going through a FFP.

### 5.3 - Communication between FFP and RMB

As already said, one Front Face Panel can control only one RMB or up to 31 RMB in Multi-Drop connection.



The FFP is powered by one RMB.

Anytime power to "RMB 1" is switched on, the FFP starts searching the RMBs connected (Scan Network) and, as soon as the first RMB (the one with the lowest address number from 1 to 250) is found the "Scan Network" stops and the RMB starts communicating with the FFP which displays the relevant Real Time Measurement:

- ```

- " RTMeas.<RMB ###> "
- |
- |
- |

```

If communication with another RMB among those connected is required, go to the "RMB Selection" menu and enter the required address Number






## 7. Menu and Variables

### 7.1 - Real Time Measurements

Scrolling display of the Real Time Measurements is the Default operation.








Scrolling can be stopped at any of the measurements and restarted by pressing the Reset button .

When stopped on one variable,  appears aside the measurement and the different available measurements can be selected by the   buttons.

|            | Display          |          | Description                        |
|------------|------------------|----------|------------------------------------|
| <b>I</b>   | = ± 0.0 - 6553.5 | <b>A</b> | Value of current measured          |
| <b>Vca</b> | = 0 - 65535      | <b>V</b> | Value of the c.a. voltage measured |
| <b>Vcc</b> | = 0 - 65535      | <b>V</b> | Value of the c.c. voltage measured |

### 7.2 - RMB Selection






Selection of the Address Number of the RMB to call for communication and Supervision.

|   |                                                                                                                                                                                                         |                                                                                   |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| - | "Real Time Meas"                                                                                                                                                                                        |  |
| - | "RMB Selection"                                                                                                                                                                                         |  |
| - | "Add ###"                                                                                                                                                                                               |  |
| - |   to input the Address from 1 to 250, |                                                                                   |
| - |  to validate,                                                                                                          |                                                                                   |
| - |  to go back                                                                                                            |                                                                                   |

|            | Display   | Description                                 |
|------------|-----------|---------------------------------------------|
| <b>Add</b> | = 1 - 250 | RMB address number for serial communication |

### 7.3 - Instantaneous Measurements








Real time measurements can be frozen at any moment selecting the menu "Instant Measure":

|   |                                                                                                                     |                                                                                                                                                                                            |
|---|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| - | "Real Time Meas"                                                                                                    |                                                                                                         |
| - | "Instant Meas"                                                                                                      |                                                                                                         |
| - | "1 <sup>st</sup> Measurement"                                                                                       |   other measurements |
| - |  to go back to "Real Time Meas". |                                                                                                                                                                                            |

|            | Display          |          | Description                        |
|------------|------------------|----------|------------------------------------|
| <b>I</b>   | = ± 0.0 - 6553.5 | <b>A</b> | Value of current measured          |
| <b>Vca</b> | = 0 - 65535      | <b>V</b> | Value of the c.a. voltage measured |
| <b>Vcc</b> | = 0 - 65535      | <b>V</b> | Value of the c.c. voltage measured |



## 7.4 - Load Profile

The relay can record the measurement of the feeder current "I" (largest of the 3 phase currents) at programmable time intervals "tLP".

- "Real Time Meas" 
-  "Load Profile" 
-  1<sup>st</sup> record,
-  to scroll available records,
-  to "Record #" selected,
-  to select the different fields;

The circular memory (FIFO) can store up to 100 records, each including:






|             | Display       |            | Description               |
|-------------|---------------|------------|---------------------------|
| <b>I</b>    | = ± 0 - 65535 | <b>%In</b> | Value of current measured |
| <b>Date</b> | = MM/GG       |            | Record Date               |
| <b>Time</b> | = hh/mm       |            | Record Time               |

-  to go back to "Record #",
-  to go back to "Real Time Meas".

Once the Load Profile function is programmed ( Enable/Disabled and "tLP" set) the recording automatically starts and stops any time the current (> 3%In) starts or stop to flow.  
Display of records is available in the menu " Load Profile".

## 7.5 - Operation Counters







The operation of any of the function herebelow reported, is counted and recorded in the menu " Operation Counters ".

- "Real Time Meas" 
- "Oper.Counters" 
-  "1<sup>st</sup> counters"  other counters
-  to go back to " Real Time Meas ".



|                  | Display     | Description                                         |
|------------------|-------------|-----------------------------------------------------|
| <b>I&gt;</b>     | = 0 - 65535 | Number of 1 <sup>st</sup> Overcurrent element.      |
| <b>I&gt;&gt;</b> | = 0 - 65535 | Number of 2 <sup>nd</sup> Overcurrent element.      |
| <b>BF</b>        | = 0 - 65535 | Number of operation of Breaker Failure              |
| <b>RTD</b>       | = 0 - 65535 | Number of operation remote trip / C/B status        |
| <b>I.R.F.</b>    | = 0 - 65535 | Number of Internal Relay Faults                     |
| <b>HR</b>        | = 0 - 65535 | Number of Hardware Restore (see § self-diagnostic)  |
| <b>F59</b>       | = 0 - 65535 | Number of operation of Overvoltage c.a.             |
| <b>F45</b>       | = 0 - 65535 | Number of operation of Overvoltage c.c.             |
| <b>N_TRP</b>     | = 0 - 65535 | Number of MTA operation made in a unit time (1 min) |
| <b>Ntrp</b>      | = 0 - 65535 | Number of MTA trip operation                        |
| <b>MTA</b>       | = 0 - 65535 | Number of MTA operation executed                    |
| <b>OPS</b>       | = 0 - 65535 | Total MTA operation                                 |

## 7.6 - Event Recording

The N-DIN records any tripping and stores the information relevant to the last five events (FIFO). Each event recording includes the following information.

- "Real Time Meas" 
- "Event Records" 
-  1<sup>st</sup> event,
-  to scroll available events,
-  to "Record #" selected,
-  to select the different fields;






| Func | Display          | Descrizione                                                                                                                                                                                                                                                                                                                                                                                   |
|------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| =    | xxxxx            | Indication of the protection function which caused the relay tripping.<br>For indication of the TRIP Cause the following acronyms are used<br><i>I&gt;</i> = 1 <sup>st</sup> Overcurrent element<br><i>I&gt;&gt;</i> = 2 <sup>nd</sup> Overcurrent element<br><i>F45</i> = Overvoltage c.c.<br><i>F59</i> = Overvoltage c.a.<br><i>RTD</i> = Remote trip<br><i>IRF</i> = Internal Relay Fault |
| Date | = YYYY/MM/GG     | Date: Year/Month/Day                                                                                                                                                                                                                                                                                                                                                                          |
| Time | = hh:mm:ss:cc    | Time: hours/minutes/second/hundredths of seconds                                                                                                                                                                                                                                                                                                                                              |
| I    | = ± 0.0 – 6553.5 | <b>A</b> Value of current measured                                                                                                                                                                                                                                                                                                                                                            |
| VCA  | = 0 – 65535      | <b>V</b> RMS value of c.a. voltage                                                                                                                                                                                                                                                                                                                                                            |
| VCC  | = 0 – 65535      | <b>V</b> Value of c.c. voltage (medium value)                                                                                                                                                                                                                                                                                                                                                 |

-  to go back to "Record #",
-  to go back to "Real Time Meas".

## 7.7 - Programming / Reading the Relay Settings (R/W Setting)

-  "Main Menu"
-  select "R/W Setting" 
-  select among following sub menus:

### 7.7.1 - Communication Address

-  "Communication Address" 
- "Add: #" 
- "Password ?????" (if not yet entered; see § Password)
-  to select the Address (1-250)
-  to validate.

The default address is 1.

| Display       | Description                                                      | Setting Range | Step | Unit |
|---------------|------------------------------------------------------------------|---------------|------|------|
| <b>Add:</b> 1 | Identification number for connection on serial communication bus | 1 - 250       | 1    | -    |



### 7.7.2 - Time/Date

|   |  |              |  |                                        |
|---|--|--------------|--|----------------------------------------|
| - |  | "Time/Date"  |  | Date: Current Date, Time: Current time |
| - |  | "20YY/....." |  | to set year,                           |
| - |  | "20XX/MM"    |  | to set month,                          |
| - |  | "20XX/XX/DD" |  | to set day,                            |
| - |  | "20XX/XX/XX" |  |                                        |
| - |  | "hh/mm"      |  | to set hour,                           |
| - |  | "XX/mm"      |  | to set minutes,                        |
| - |  | To validate  |  |                                        |
| - |  | Exit         |  |                                        |

### 7.7.3 - Rated Input Values

- "Rated Input Value"
- 1<sup>st</sup> Variable
- to scroll variables
- to modify selected variable
- "Password ?????" (if not yet entered; see § Password)
- to set variable value,
- to validate.

|              | Display  |           | Descrizione                                          | Setting Range | Step | Unit |
|--------------|----------|-----------|------------------------------------------------------|---------------|------|------|
| <b>In</b>    | 100 (*)  | <b>A</b>  | Maximum current detected from magnetic detector TO64 | 50 - 2500     | 1    | A    |
| <b>K</b>     | 360 (*)  |           | Gain magnetic detector TO64                          | 1 - 1000      | 1    | -    |
| <b>Vn</b>    | 1000 (*) | <b>V</b>  | Nominal primary voltage                              | 50 - 4000     | 1    | V    |
| <b>N_TRP</b> | 3 (*)    | <b>N</b>  | MTA maximum operation                                | 3 - 5         | 1    | N    |
| <b>Freq</b>  | 50 (*)   | <b>Hz</b> | System Frequency                                     | 50 - 60       | 10   | Hz   |

### 7.7.4 - Functions

|   |  |                                                                                   |                                                                                         |  |
|---|--|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--|
| - |  | "Functions",                                                                      |                                                                                         |  |
| - |  | 1 <sup>st</sup> function,                                                         |                                                                                         |  |
| - |  | to scroll available Functions,                                                    |                                                                                         |  |
| - |  | to Read/Write setting of the selected function,                                   |                                                                                         |  |
| - |  | to select the different definable fields;                                         | - <i>Function Enable</i><br>- <i>Options</i><br>- <i>Trip Levels</i><br>- <i>Timers</i> |  |
| - |  | to access the selected field and read the actual setting of the relevant variable |                                                                                         |  |
| - |  | to modify the actual setting;                                                     |                                                                                         |  |
| - |  | to set the new value.                                                             |                                                                                         |  |







| Function                     | Type              | Display | Variable                       | Default                       | Unit | Description                                                                                                                                            | Setting Range                           | Step        |
|------------------------------|-------------------|---------|--------------------------------|-------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------|
| <b>Password</b>              |                   | =       | 0000-0999                      | 1111                          | -    | Password for programming enable (see § Password)                                                                                                       |                                         |             |
| <b>I&gt;</b><br>(1F64)       | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       | OUT                            | R1                            |      | Selection of the output relay operated at the end of trip time delay                                                                                   | R1, R2,<br>R1 + R2, None                | -           |
|                              |                   |         | Dir                            | None                          |      | Operation mode                                                                                                                                         | Pos-Neg -None                           | -           |
|                              |                   |         | BI                             | Enable                        |      | Blocking Input                                                                                                                                         | Enable/Disable                          | -           |
|                              | <b>TripLevels</b> | →       | I>                             | 50                            | %In  | Minimum operation level                                                                                                                                | 4 – 100                                 | 1           |
|                              | <b>Timers</b>     | →       | tI>                            | 60.00                         | s    | Trip time delay *                                                                                                                                      | 0.03 – 60                               | 0.01        |
| <b>I&gt;&gt;</b><br>(2F64)   | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       | OUT                            | None                          |      | Selection of the output relay operated at the end of trip time delay                                                                                   | R1, R2,<br>R1 + R2, None                | -           |
|                              |                   |         | Dir                            | None                          |      | Operation mode                                                                                                                                         | Pos-Neg -None                           | -           |
|                              |                   |         | BI                             | Enable                        |      | Blocking Input                                                                                                                                         | Enable/Disable                          | -           |
|                              | <b>TripLev</b>    | →       | I>>                            | 100                           | %In  | Minimum operation level                                                                                                                                | 4 – 100                                 | 1           |
|                              | <b>Timers</b>     | →       | tI>>                           | 0.10                          | s    | Trip time delay *                                                                                                                                      | 0.03 – 60                               | 0.01        |
| <b>F59</b>                   | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       | OUT                            | R2                            |      | Selection of the output relay operated at the end of trip time delay                                                                                   | R1, R2,<br>R1 + R2, None                | -           |
|                              | <b>TripLevels</b> | →       | Vca                            | 50                            | V    | Minimum operation level                                                                                                                                | 4 – 170                                 | 1           |
|                              | <b>Timers</b>     | →       | tVca                           | 1.00                          | s    | Trip time delay *                                                                                                                                      | 0 – 60                                  | 0.01        |
| <b>F45</b>                   | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       | OUT                            | R2                            |      | Selection of the output relay operated at the end of trip time delay                                                                                   | R1, R2,<br>R1 + R2, None                | -           |
|                              | <b>TripLevels</b> | →       | Vca                            | 100                           | V    | Minimum operation level                                                                                                                                | 4 – 170                                 | 1           |
|                              | <b>Timers</b>     | →       | tVca                           | 0.10                          | s    | Trip time delay *                                                                                                                                      | 0 – 60                                  | 0.01        |
| <b>NTRP</b>                  | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       | OUT                            | None                          |      | Selection of the output relay operated at the end of trip time delay                                                                                   | R1, R2,<br>R1 + R2, None                | -           |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Timers</b>     | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
| <b>BF</b>                    | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       | OUT                            | None                          |      | Selection of the output relay operated at the end of trip time delay                                                                                   | R2, None                                | -           |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Timers</b>     | →       | tBF                            | 0.75                          | s    | Trip time delay                                                                                                                                        | 0.05 - 0.75                             | 0.01        |
| <b>RTD</b>                   | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       | OUT                            | None                          |      | Selection of the output relay operated at the end of trip time delay                                                                                   | R1, R2,<br>R1 + R2, None                | -           |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Timers</b>     | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
| <b>IRF</b>                   | <b>FuncEnab</b>   | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Options</b>    | →       | OpIRF<br>OUT                   | NoTrip<br>R2                  |      | Internal Relay Failure<br>Selection of output relay                                                                                                    | NoTrip – Trip<br>R1, R2,<br>R1+R2, None | -<br>-      |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Timers</b>     | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
| <b>OPERM0D</b>               | <b>FuncEnab</b>   | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Options</b>    | →       | Op_R1<br><br>Op_R2<br><br>Ctrl | N.D.<br><br>N.D.<br><br>Rsrvd |      | Can be controlled by any of the functions according to programming.<br>Can be controlled by any of the functions according to programming.<br>Reserved | N.E./N.D.<br><br>N.E./N.D.              | -<br>-<br>- |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Timers</b>     | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
| <b>LOADPRO</b>               | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the oscillographic recording                                                                                                                 | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Timers</b>     | →       | tLP                            | 1                             | m    | Time Interval                                                                                                                                          | 1-650                                   | 1           |
| <b>MAIN<br/>COMM<br/>PAR</b> | <b>FuncEnab</b>   | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Options</b>    | →       | Mode                           | 8,n,1                         |      | RMB main RS485 port configuration<br><b>Note:</b> any change of this setting became valid at the next power on                                         | 8,n,1<br>8,o,1<br>8,e,1                 | -<br>-<br>- |
|                              |                   |         | BaudR                          | 9600                          |      | Communication speed                                                                                                                                    | 9600 - 19200                            | -           |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
| <b>MTA</b>                   | <b>FuncEnab</b>   | →       | Status:                        | Enable                        |      | Enable of the protection function                                                                                                                      | Enable/Disable                          | -           |
|                              | <b>Options</b>    | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>TripLevels</b> | →       |                                | No Parameters                 |      |                                                                                                                                                        |                                         |             |
|                              | <b>Timers</b>     | →       | tMTA                           | 0.50                          | s    | Time Interval                                                                                                                                          | 0.05 - 0.75                             | 0.01        |

Settings can also be programmed via the serial communication ports.

\* No intentional delay (minimum trip time ≈30ms)














## 7.8 - Commands

-  "Commands"
-  1st Control,
-  to select other available control,
-  to operate selected control.

| Display            | Descrizione                                                 |
|--------------------|-------------------------------------------------------------|
| <b>Test</b> :      | Starts a relay diagnostic test                              |
| <b>Reset</b> :     | Reset output relay R1&R2.                                   |
| <b>CT Offset</b> : | Reset of magnetic detector measurement (See § Installation) |

## 7.9 - Firmware - Info&Version

The menu displays the Model Relay and the Firmware Version of the FFP and of the RMB actually in communication.

- "Real Time Meas", 
-  "Info&Version",
-  "Proctect. Model",
-  "Mod. XXXXXX",
-  to go back to "Proctect. Model",
-  to "FrontFacePanel",
-  "Version ##.##.##",
-  to go back to "FrontFacePanel",
-  to "RelayMainBody",
-  "Version ##.##.##",
-  to go back to "RelayMainBody",
-  to go back to "Info&Version".
-  to go back to "Real Time Meas".

## 8 - Password

In the system RMB + FFP + MS-Com there are three different passwords:









### 8.1 - FFP Password

This password is requested anytime the user wants to write in the "R/W Settings" menu of the FFP and/or to issue from the FFP a command of the "Commands" menu.


The default password is "1111"

When password is required, proceed as follows

The Display shows the message " Password ????"

|   |                                                                                   |                                       |                                                                                   |                        |
|---|-----------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------|------------------------|
| - |  | to select 1 <sup>st</sup> digit (1-9) |  | to validate            |
| - |  | to select 2 <sup>nd</sup> digit (1-9) |  | to validate            |
| - |  | to select 3 <sup>rd</sup> digit (1-9) |  | to validate            |
| - |  | to select 4 <sup>th</sup> digit (1-9) |  | to complete procedure. |

The "password" is required any time you attempt to modify one of the programmable variables at the first entrance in the "R/W Settings" and/or "Commands" menus.

The "password" remains valid for 2 minutes from the last operation of the programming buttons or until the  button is pressed to return to the default display (RT Meas).

Once the FFP Password has been entered, a "#" appears before the variable that can be modified.

### CHANGE PASSWORD

In order to CHANGE the FFP Password:


- ☐ Open the MS-Com software and connect the relay,
  - ☐ Open the "Settings" window,
  - ☐ Digit the new password (different from the default one - Example: 1234) in the "FFP Password" area (see fig. 1).
- Note: Any time the software MSCom is opened, the FFP Password is not visualized (see fig. 2) and cannot be modified until the MSCom Password is not entered by clicking the button .
- ☐ Click on the "Send" button to confirm the modification to the relay.

Fig.1



Fig.2



### 8.2 - Modbus Password

This Password is requested to a Supervision System any time the automation is programmed to modified whichever relay parameter and/or to issue commands through the relay itself.

**DEFAULT STATUS (DISABLED):** Password = 2295 at Address 8001

When set to the value 2295, the password is DISABLED and a DCS or whichever Supervision System can be programmed to both change the relay parameters and to issue commands through the relay itself without writing any password.

### ENABLED/DISABLED PASSWORD:

In order to ENABLE the Modbus Password the Supervision System must write the desired password (different from the default one) at the Address 8001.

In order to DISABLE the Modbus Password the Supervision System must write once the DEFAULT Password (2295) at the Address 8001.

### 8.3 - MS-Com Password

This password is requested anytime the user wants to send to the relay a setting parameters modification or to issue a command through the relay itself using the managing software MSCom.

The user can decide whether inserting his own password (see MSCom Operational Manual) or keeping the password disabled just clicking on the OK button when the password is requested.

## 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.

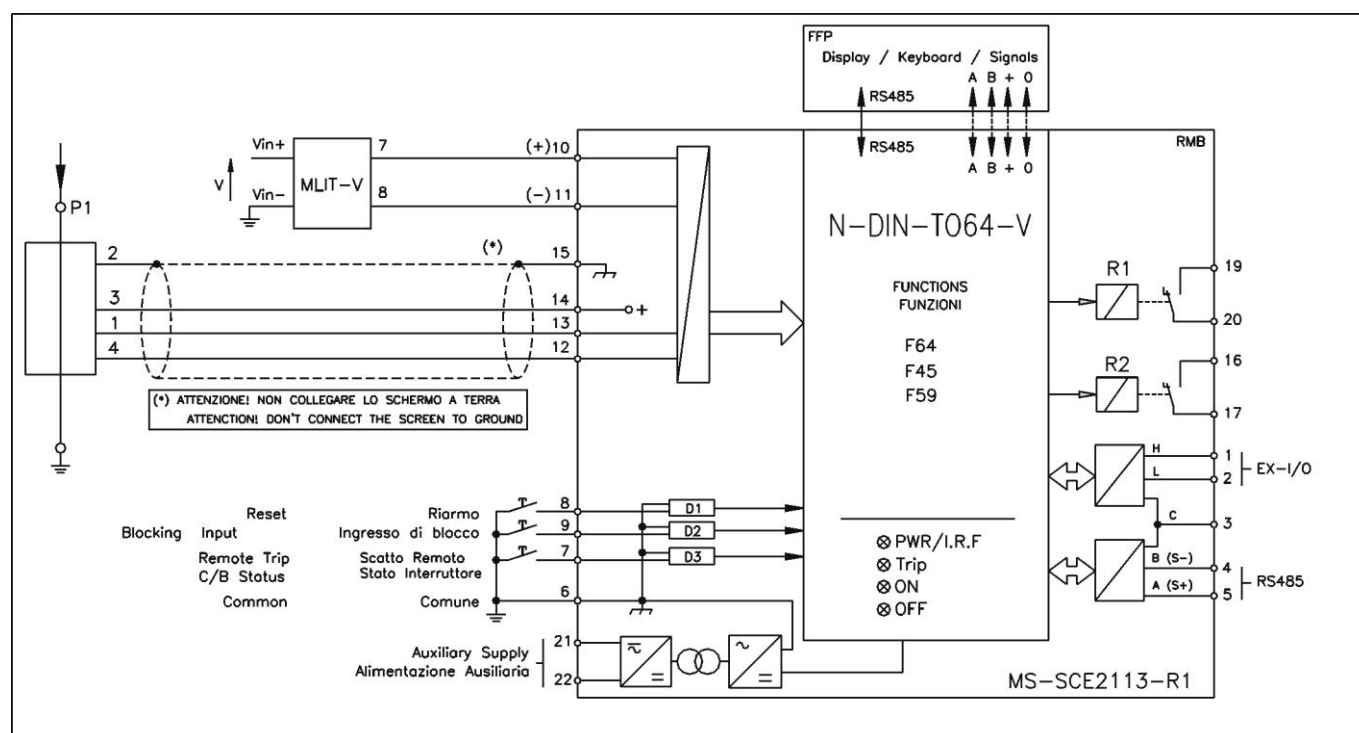
## 10. Power Frequency Insulation Test

Every relay individually undergoes a factory insulation test according to IEC255-5 standard at 2kV, 50Hz 1min. (Referred on the secondary TO64).

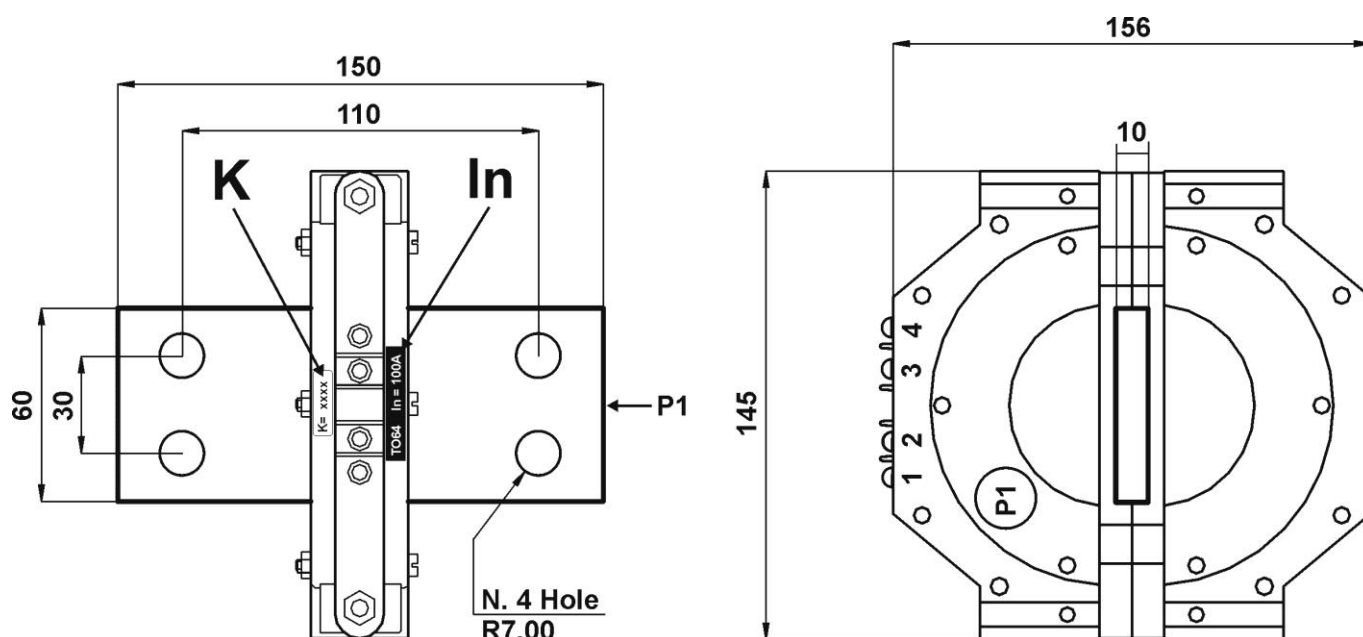
Insulation test should not be repeated to avoid stress in the dielectrics.

When doing the insulation test, the terminals relevant to serial output, digital inputs and RTD input must always be short circuited to ground. When relays are mounted in switchboards or relay boards that have to undergo the insulation tests, the relay should be isolated. This is extremely important as discharges eventually tacking place in other parts or components of the board can severely damage the relays or cause damages, not immediately evident to the electronic components.

## 11. Wiring Diagram



## 12. Overall Dimensions (mm) – Magnetic Detector TO64



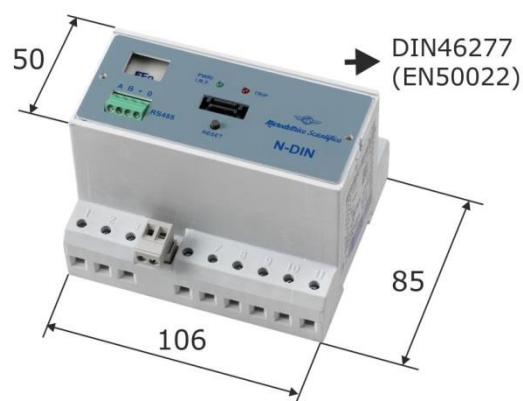
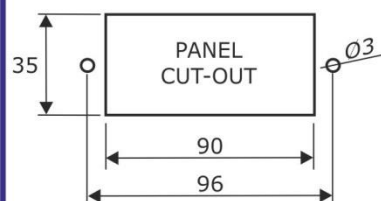
## 13. Overall Dimensions

TRANSPARENT COVER - Dimension = 45x108 - Height = 9

REMOVABLE  
FRONT FACE  
(FFP)

**FFP** - Height = 16

**RMB** - Height = 72



1) To mount FFP on RMB plug-in the connector and tighten the two screws.

2) To remove FFP from RMB loosen the two screws and pull-out.

Note: Before plugging in removing the FFP, the Auxiliary Power Supply must be switched OFF

### N.B.

A sealable transparent cover is also available for protection of the controls on the removable Front Panel.  
To remove the cover slightly pull the side fastening clips.

## 14. Electric Characteristics

### APPROVAL: CE

### REFERENCE STANDARD IEC 60255 - EN/IEC61000 - IEEE C37

|                          |                         |             |                                   |
|--------------------------|-------------------------|-------------|-----------------------------------|
| <input type="checkbox"/> | Dielectric test voltage | IEC 60255-5 | 2kV, 50/60Hz, 1 min.              |
| <input type="checkbox"/> | Impulse test voltage    | IEC 60255-5 | 5kV (c.m.), 2kV (d.m.) – 1,2/50µs |
| <input type="checkbox"/> | Insulation resistance   | > 100MΩ     |                                   |

### Environmental Std. Ref. (IEC 60068)

|                          |                               |                           |                                             |
|--------------------------|-------------------------------|---------------------------|---------------------------------------------|
| <input type="checkbox"/> | Operation ambient temperature | -10°C / +55°C             |                                             |
| <input type="checkbox"/> | Storage temperature           | -25°C / +70°C             |                                             |
| <input type="checkbox"/> | Environmental testing         | (Cold)                    | IEC60068-2-1                                |
|                          |                               | (Dry heat)                | IEC60068-2-2                                |
|                          |                               | (Change of temperature)   | IEC60068-2-14                               |
|                          |                               | (Damp heat, steady state) | IEC60068-2-78 RH Without Condensing AT 40°C |

### CE EMC Compatibility (EN61000-6-2 - EN61000-6-4 - EN50263)

|                          |                                                                                 |                               |                        |                                  |
|--------------------------|---------------------------------------------------------------------------------|-------------------------------|------------------------|----------------------------------|
| <input type="checkbox"/> | Electromagnetic emission                                                        | EN55022                       | industrial environment |                                  |
| <input type="checkbox"/> | Radiated electromagnetic field immunity test                                    | IEC61000-4-3                  | level 3                | 80-2000MHz 10V/m                 |
|                          |                                                                                 | ENV50204                      |                        | 900MHz/200Hz 10V/m               |
| <input type="checkbox"/> | Conducted disturbances immunity test                                            | IEC61000-4-6                  | level 3                | 0.15-80MHz 10V                   |
| <input type="checkbox"/> | Electrostatic discharge test                                                    | IEC61000-4-2                  | level 3                | 6kV contact / 8kV air            |
| <input type="checkbox"/> | Power frequency magnetic test                                                   | IEC61000-4-8                  |                        | 1000A/m 50/60Hz                  |
| <input type="checkbox"/> | Pulse magnetic field                                                            | IEC61000-4-9                  |                        | 1000A/m, 8/20µs                  |
| <input type="checkbox"/> | Damped oscillatory magnetic field                                               | IEC61000-4-10                 |                        | 100A/m, 0.1-1MHz                 |
| <input type="checkbox"/> | Immunità ai disturbi condotti in modo comune nella gamma di frequenza 0Hz-150Kz | IEC61000-4-16                 | level 4                |                                  |
| <input type="checkbox"/> | Electrical fast transient/burst                                                 | IEC61000-4-4                  | level 3                | 2kV, 5kHz                        |
| <input type="checkbox"/> | HF disturbance test with damped oscillatory wave (1MHz burst test)              | IEC60255-22-1                 | class 3                | 400pps, 2,5kV (m.c.), 1kV (d.m.) |
| <input type="checkbox"/> | Oscillatory waves (Ring waves)                                                  | IEC61000-4-12                 | level 4                | 4kV(c.m.), 2kV(d.m.)             |
| <input type="checkbox"/> | Surge immunity test                                                             | IEC61000-4-5                  | level 4                | 2kV(c.m.), 1kV(d.m.)             |
| <input type="checkbox"/> | Voltage interruptions                                                           | IEC60255-4-11                 |                        |                                  |
| <input type="checkbox"/> | Resistance to vibration and shocks                                              | IEC60255-21-1 - IEC60255-21-2 | 10-500Hz 1g            |                                  |

### CHARACTERISTICS

|                          |                                                    |                                                                                                                                                               |                                   |
|--------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <input type="checkbox"/> | Accuracy at reference value of influencing factors | 5%                                                                                                                                                            | For measurement with max 1% of FS |
|                          |                                                    | 2% +/- 20ms                                                                                                                                                   | for times                         |
| <input type="checkbox"/> | Rated Current                                      | from TO64                                                                                                                                                     |                                   |
| <input type="checkbox"/> | Rated Voltage                                      | from MLIT (0) / (10) / (20)mA ≡ (-Vn) / 0 / (+Vn)                                                                                                             |                                   |
| <input type="checkbox"/> | Average power supply consumption                   | ≤ 7 VA                                                                                                                                                        |                                   |
| <input type="checkbox"/> | Output relays                                      | rating 6 A; Vn = 250 V<br>A.C. resistive switching = 1500VA (400V max)<br>make = 30 A (peak) 0,5 sec.<br>break = 0.2 A, 110 Vcc,<br>L/R = 40 ms (100.000 op.) |                                   |

### COMMUNICATION PARAMETERS

|                          |     |                                                            |
|--------------------------|-----|------------------------------------------------------------|
| <input type="checkbox"/> | RMB | RS485 – 9600/19200bps – 8,N,1 – 8,E,1 – 8,O,1 – Modbus RTU |
| <input type="checkbox"/> | FFP | RS232 – 9600bps – 8,N,1 – Modbus RTU                       |

### CHARACTERISTICS – Magnetic detector - TO64

| Type               | In (A)<br>Rated<br>Input<br>Current | (*) Ith (A)<br>Max.admissible<br>continuous<br>overload | Vn (Vcc)<br>Rated<br>Input<br>Voltage | Measurement<br>Range<br>(A) | Dielectric<br>withstand<br>voltage<br>1' @ 50Hz<br>(kV) | Maximum Dynamic<br>Current<br>(kA for 1s) |
|--------------------|-------------------------------------|---------------------------------------------------------|---------------------------------------|-----------------------------|---------------------------------------------------------|-------------------------------------------|
| <b>TO64 - 100</b>  | 100                                 | 1000                                                    | 1000                                  | 4 - 100                     | 10                                                      | 100                                       |
| <b>TO64 - 500</b>  | 500                                 | 1000                                                    | 1000                                  | 20 - 500                    | 10                                                      | 100                                       |
| <b>TO64 - 100H</b> | 100                                 | 1000                                                    | 5000                                  | 4 - 100                     | 18.5                                                    | 100                                       |
| <b>TO64 - 500H</b> | 500                                 | 1000                                                    | 5000                                  | 20 - 500                    | 18.5                                                    | 100                                       |

- ☐ Frequency response 0 ÷ 100kHz
- ☐ Maximum distance "relay / magnetic detector" <10 meters (shielded cable)

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