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

TYPE

N-DIN-TO64

OPERATION MANUAL

CE

INDEX

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 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; dismounting the cards without proper cautions expose them to the risk of damage and voids any guarantee and relieves the Manufacture of any liability.

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” 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)%In (In = Rated Input Current of magnetic detector)

For magnetic detector “TO64” are available following versions:

Type			In (A) Rated Input Current	(*) Ith (A) Max.admissible continuous overload	Vn (Vcc) Rated Input Voltage	Measurement Range (A)	Dielectric withstand voltage 1' @ 50Hz (kV)	Maximum Dynamic Current (kA per 1s)
TO64	**-**	**100**	100	1000	1000	4 - 100	10	100
TO64	**-**	**500**	500	1000	1000	20 - 500	10	100
TO64	**-**	**100H**	100	1000	5000	4 - 100	18.5	100
TO64	**-**	**500H**	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≤3kΩ)

- 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).

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. ; 24V(-20%) / 90V(+20%) d.c. }

b) - { 80V(-20%) / 230V(+15%) a.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
In	100 (*)	**A**	Maximum current detectable from magnetic detector TO64	50	-	2500	1	A
K	360 (*)		Gain of the magnetic detector TO64	1	-	1000	1	-

(*) 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

FunctEnable	→	**Status**	Enable		[Disable / Enable]			
Options	→	**OUT**	R1		[R1, R2, R1 + R2, None]			
	→	**DIR**	None		[None / POS / NEG]			
	→	**BI**	Enable		[Disable / Enable]			
TripLev	→	**I>**	10	**%In**	(4 ÷ 100)	step	1	%In
Timers	→	**tI>**	0.10	**s**	(0.03 ÷ 60.00)	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:*
  [R1] = Trip on output relay R1.
  [R2] = Trip on output relay R2.
  [R1+R2] = Trip on output relay R1+R2.
  [None] = None.
- **DIR** : *Operation mode:*
  [None] = Bidirectional.
  [POS] = Positive.
  [NEG] = Negative.
- **BI** : Blocking Input (Digital Input D2)
- **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*	=	Push-button “Reset” is pressed or via serial command.	
		Automatic	=	The led “Trip” is memorized until push-button “Reset” is pressed or via serial command.	

2.2.3.2 - 2F64 (I>>) – Second overcurrent Element

FunctEnable	→	**Status**	Enable		[Disable / Enable]			
Options	→	**OUT**	R1		[R1, R2, R1 + R2, None]			
	→	**DIR**	None		[None / POS / NEG]			
	→	**BI**	Enable		[Disable / Enable]			
TripLev	→	***I>>***	100	**%In**	(4 ÷ 100)	step	1	%In
Timers	→	***tI>>***	0.10	**s**	(0.03 ÷ 60.00)	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:*
  [R1] = Trip on output relay R1.
  [R2] = Trip on output relay R2.
  [R1+R2] = Trip on output relay R1+R2.
  [None] = None.

  DIR : *Operation mode:*
  [None] = Bidirectional.
  [POS] = Positive.
  [NEG] = Negative.

  BI : Blocking Input (Digital Input D2)

- ❑ **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*	=	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*	=	Push-button “Reset” is pressed or via serial command.
		Automatic	=	The led “Trip” is memorized until push-button “Reset” is pressed or via serial command.

2.2.3.3 – BF - Breaker Failure

FunctEnable	→	**Status**	Enable		[Disable / Enable]			
Options	→	**OUT**	R2		[R2, None]			
TripLev	→		No Parameters		[No Parameters]			
Timers	→	***tBF***	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 ≥4%In, 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%In)

Led reset when	:		=	Push-button “Reset” is pressed or via serial communication

2.2.3.4 – RTD – Remote trip / C/B Status

Terminals 6-7 (D3) N-DIN.

FunctEnable	→ **Status**	Enable	[Disable / Enable]
Options	→ **OUT**	None	[R1, R2, R1 + R2, None]
TripLev	→	No Parameters	[No Parameters]
Timers	→	No Parameters	[No Parameters]

- ***FunctEnable*** : [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.

Trip when	:	When the digital input D3 is closed.

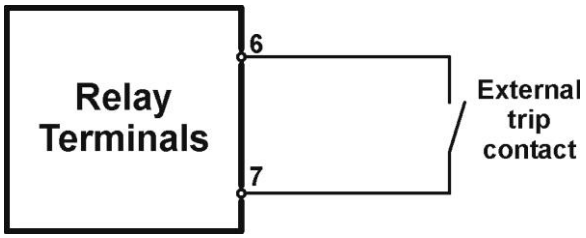
When the function is tripped	:	*Signalization*	=	*FFP*	Red Led "ON" illuminated.
					Green Led "OFF" not illuminated.
				RMB	Red Led “Trip” illuminated.
		Output Relay	=	Trips (when programmed)	
		Event Recording	=	Is recorded.	
		Counter	=	Is incremented	

Function reset when	:	*Manual (D1 open)*	=	“Reset” Push-button is pressed or via serial communication, when digital input is open
		Automatic (D1 close)	=	Digital input is open

Led reset when	:	*Manual*	=	Push-button “Reset” is pressed or via serial command.
		Automatic	=	The led “Trip” is memorized until push-button “Reset” is pressed or via serial command.

It is possible to use RTD input as a remote trip input, driven by a cold contact (Normally Open).

It is also possible to set OUT=None to use the contact for showing the position of the C/B.



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):

FunctEnable	→	**Status**	No Parameters	[No Parameters]
Options	→	**Op_R1**	N.E.	[N.E. – N.D.]
	→	**Op_R2**	N.E.	[N.E. – N.D.]
	→	**Ctrl**	Rsrvd	Reserved
TripLev	→		No Parameters	[No Parameters]
Timers	→		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

2.2.3.6 - Load Profile

FunctEnable	→ **Status**	Enable		[Disable / Enable]				
Options	→	No Parameters		[No Parameters]				
TripLev	→	No Parameters		[No Parameters]				
Timers	→ ***tLP***	1.00	**m**	(1 ÷ 650)	step	1	m	

- ***FunctEnable*** : [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.

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

FunctEnable	→ **Status**	Enable	[Enable]
Options	→ **OpIRF**	NoTrip	[Trip / NoTrip]
	→ **OUT**	None	[R1, R2, R1 + R2, None]
TripLev	→	No Parameters	[No Parameters]
Timers	→	No Parameters	[No Parameters]

- ***FunctEnable*** : [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.

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.

2.2.4 - 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^2P.
- 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^2P.
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 ".

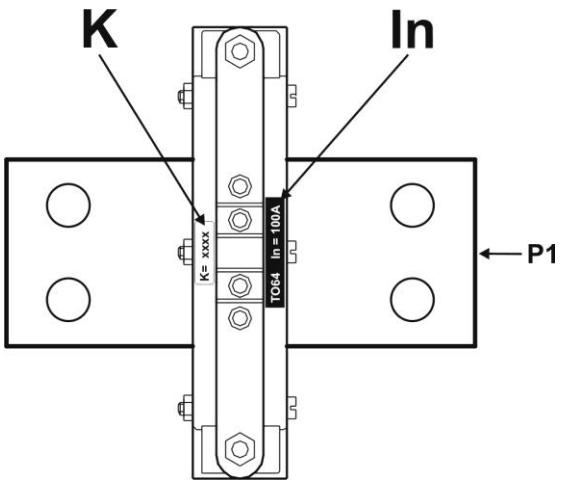
3. Installation Procedure

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.

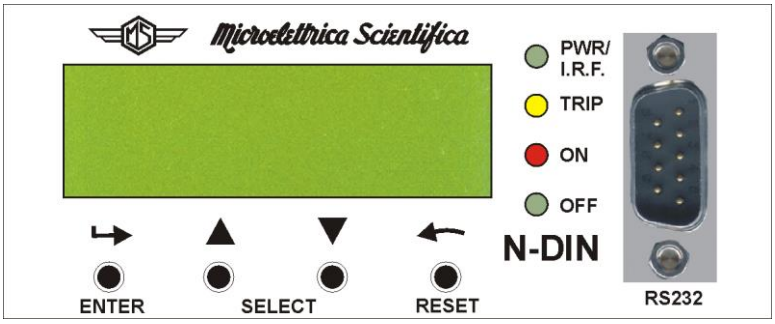
Use command “CT Offset” present in “Commands” menu, to clear the residual measure normally present on the first installation.

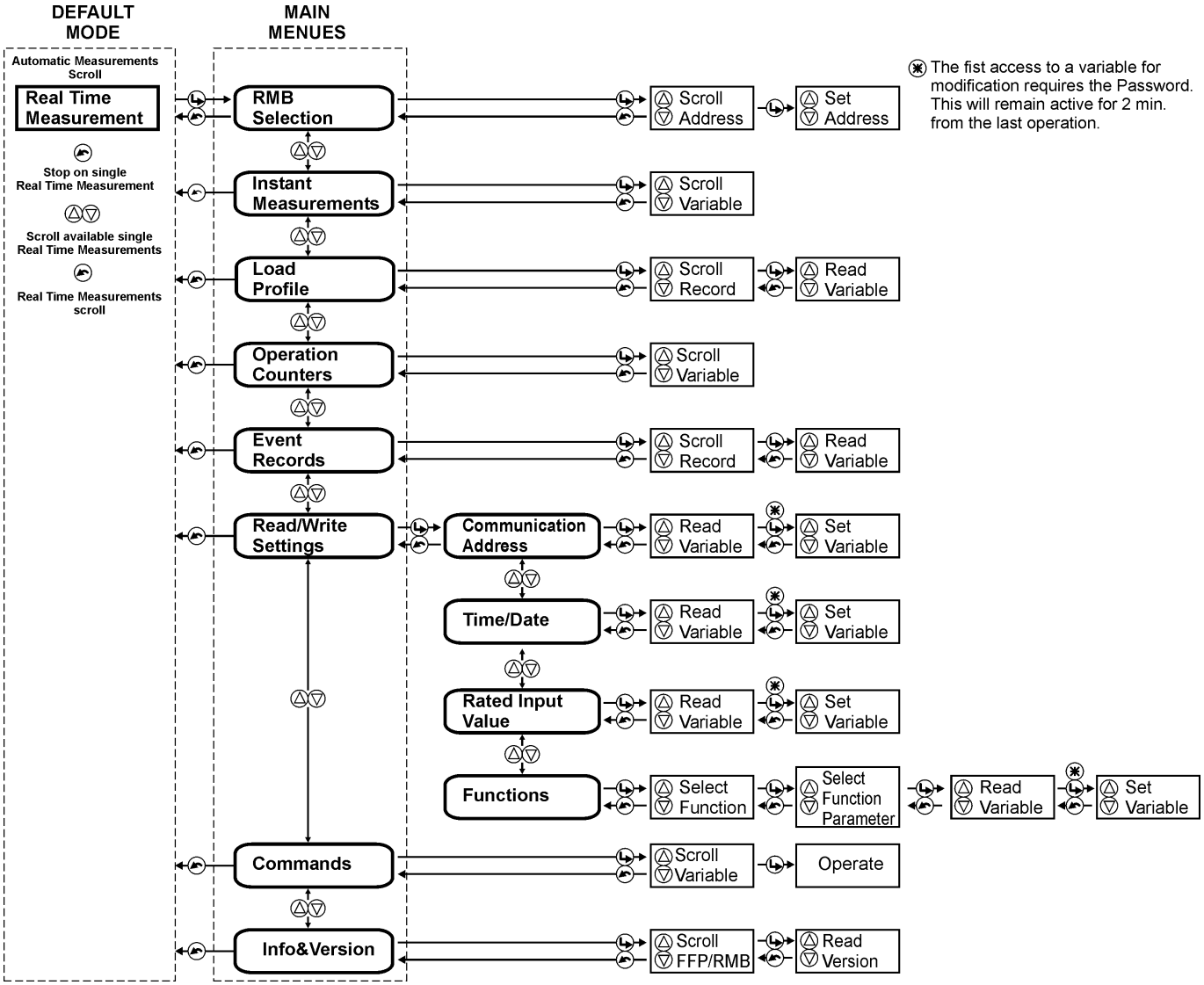
1	RTMeas I xxx A	
2	<Main menu> RMB Selection	• Press “***Enter***” for access to the main menu.
3	<Main menu> Commands	• Press the pushbutton “***Select***” (“***Increase***” or “***Decrease***”) and select “***Commands***”. • Press “***Enter***” for access.
4	Commands Clear	• Press “***Select***” (“***Increase***” or “***Decrease***”) and select “***Offset Toroide***”.
5	Commands Offset Toroide	• Press “***Enter***” 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.

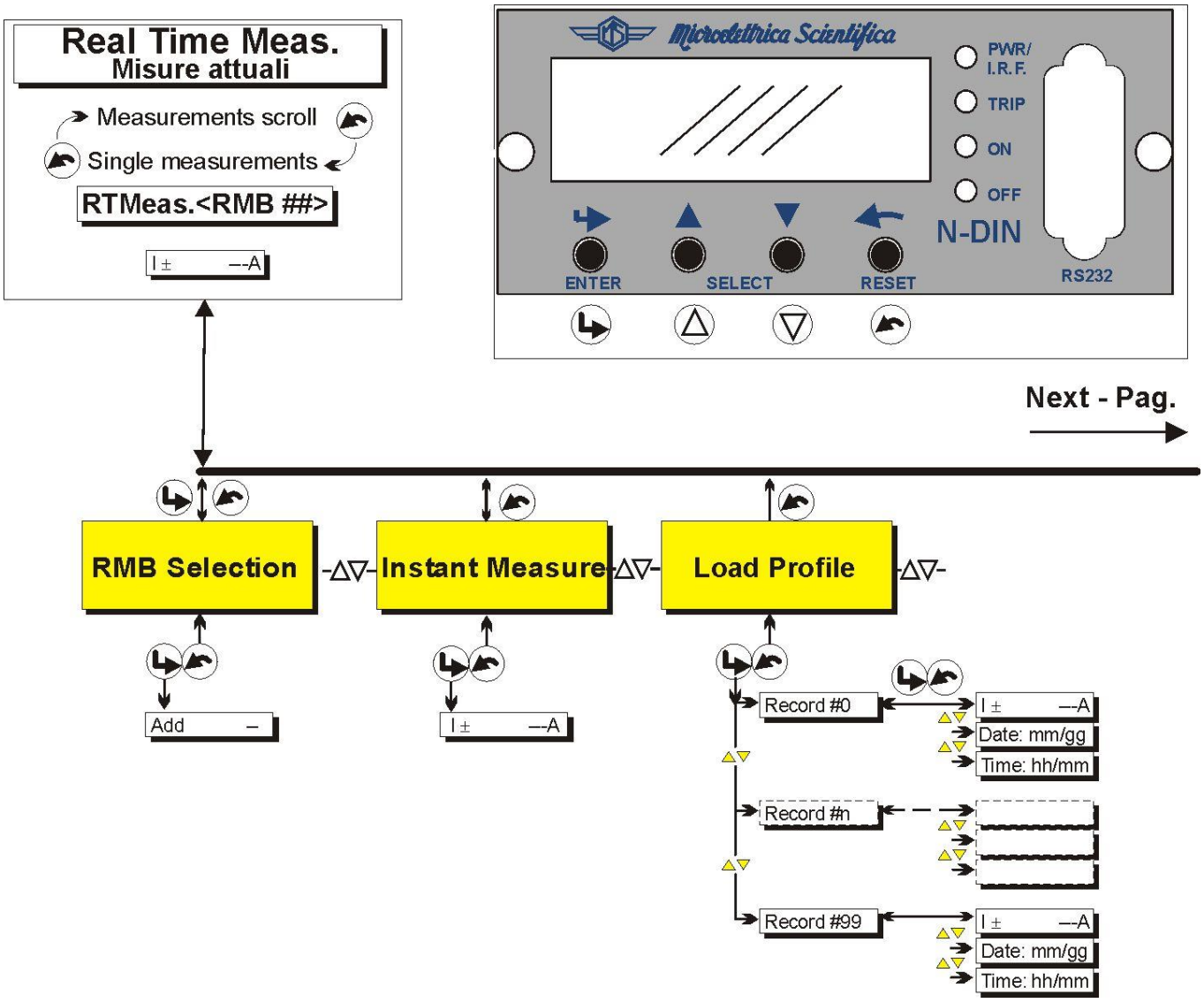
4. Relay Management

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 herebelow.





4.1 – Keyboard Operational Diagram



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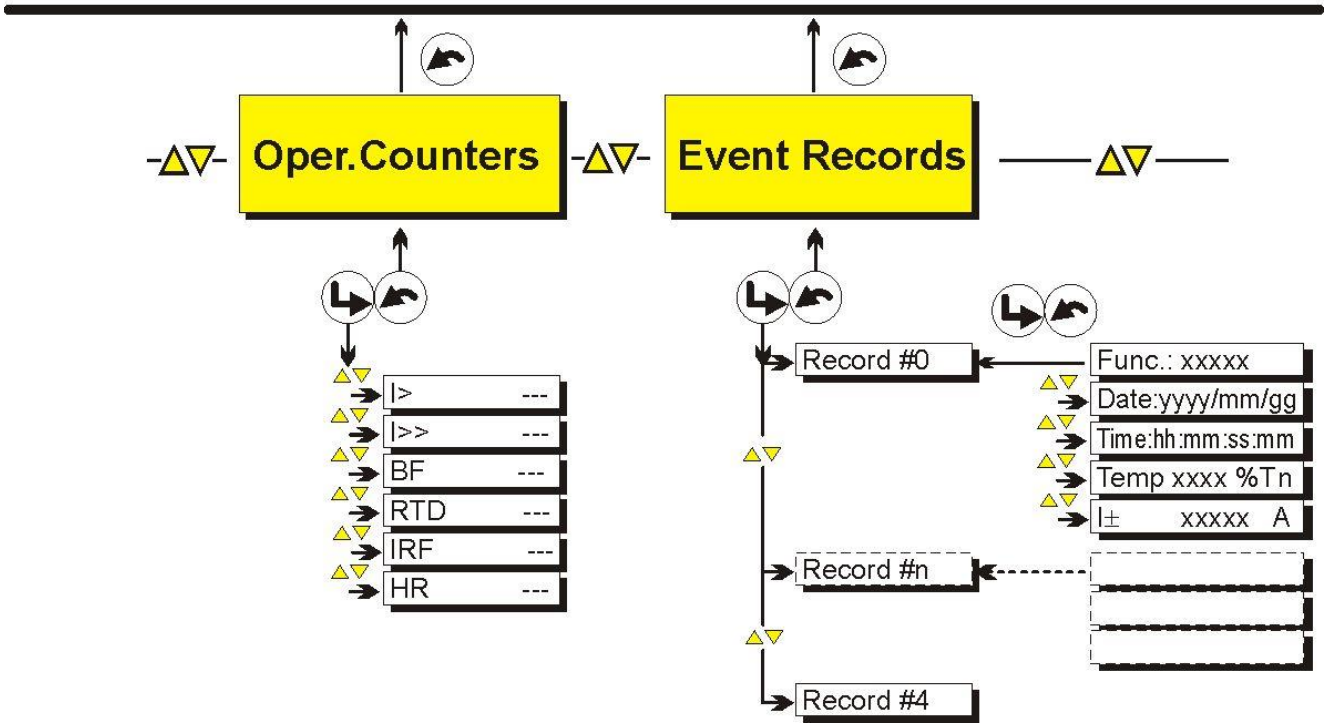

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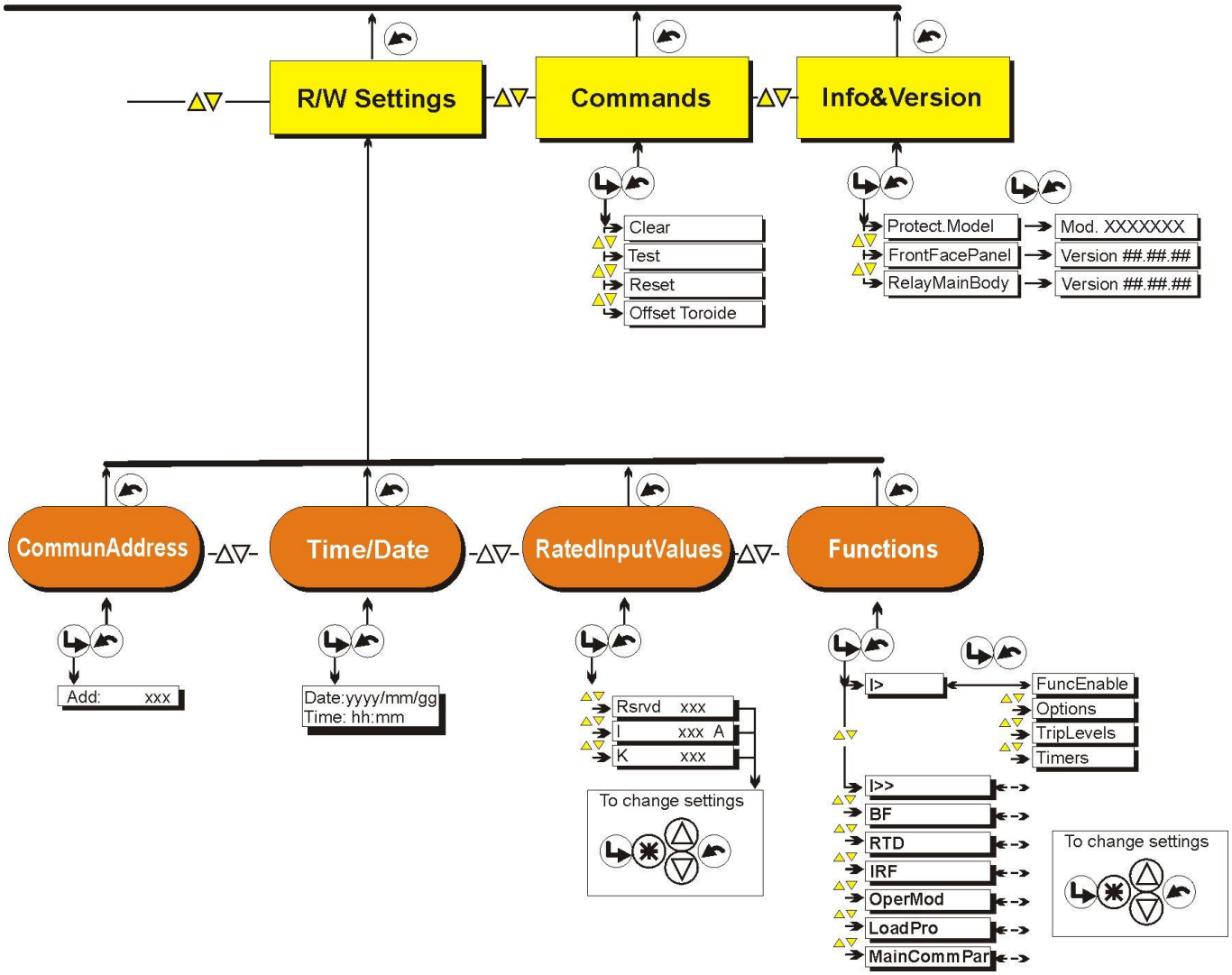
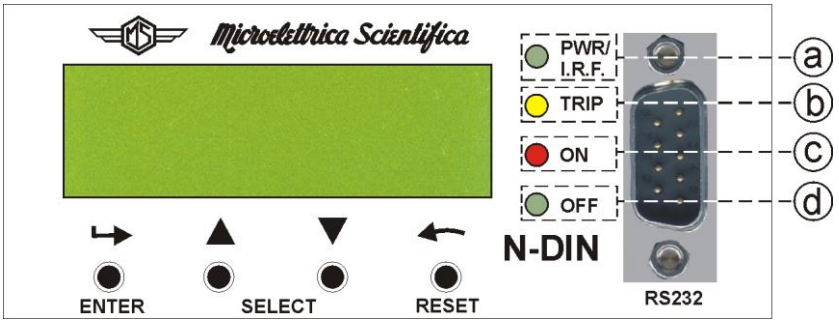

R/W Settings
Commands
Info&Version
Clear
Test
Reset
Offset Toroide
Protect.Model
FrontFacePanel
RelayMainBody
Mod. XXXXXXX
Version ##.##.##
Version ##.##.##
CommunAddress
Time/Date
RatedInputValues
Functions
Add: xxx
Date:yyyy/mm/gg
Time: hh:mm
Rsrvd xxx
I xxx A
K xxx
To change settings
I>
FuncEnable
Options
TripLevels
Timers
I>>
BF
RTD
IRF
OperMod
LoadPro
MainCommPar
To change settings

5. Signalization

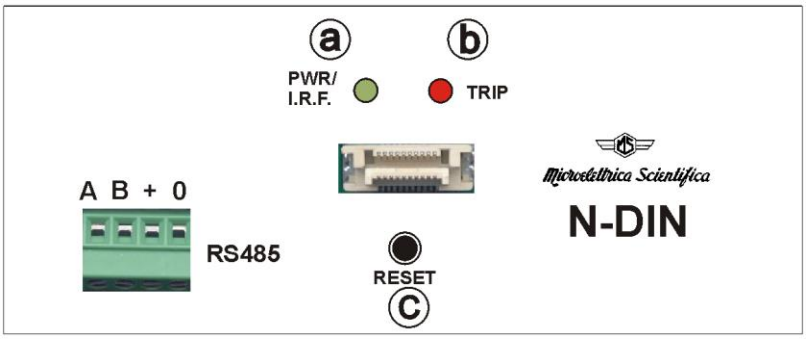
Four signal leds are available on the removable **F**ront **F**ace **P**anel (FFP):



a)	Green LED	**PWR/ I.R.F.**	❑ ❑	Illuminated during normal operation when Power Supply is ON. Flashing when a Relay Internal Fault is detected.
b)	Yellow LED	**TRIP**	❑ ❑	Flashing when a timed function has started to operate. Illuminated when any function was tripped, reset takes places either by pressing the “Reset” or via serial communication.
c)	Red LED	**ON**	❑ ❑	Illuminated when C/B close status is detected (D3 close). Flashing when function “BF2 is tripped.
d)	Green LED	**OFF**	❑	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 **R**elay **M**ain **B**ody (RMB) visible when the front face is removed

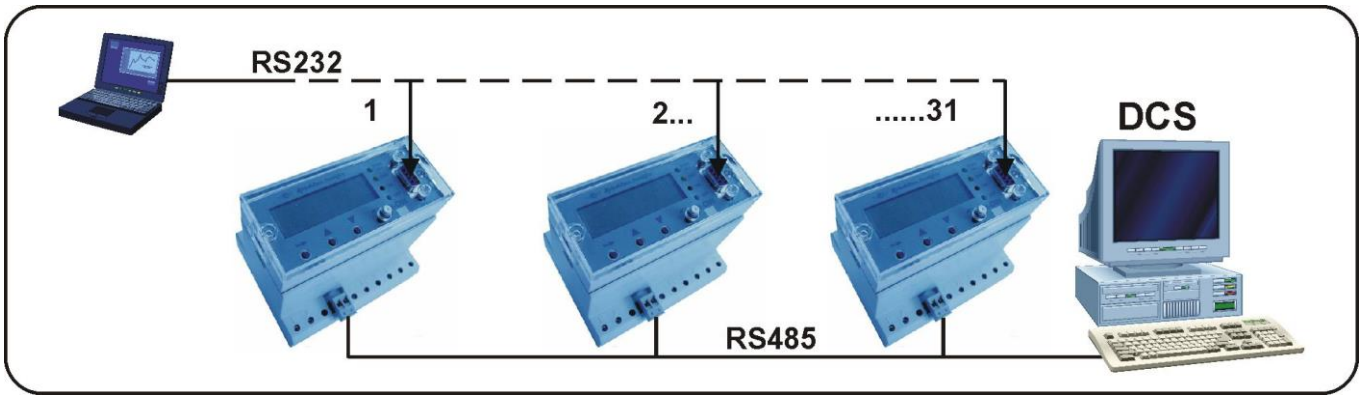


a)	Green LED	**PWR/ I.R.F.**	❑ ❑	Illuminated during normal operation when Power Supply is ON. Flashing when a Relay Internal Fault is detected.
b)	Red LED	**TRIP**	❑ ❑	Flashing when a timed function has started to operate. Illuminated when any function was tripped until Reset button is pressed or via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

6. System Configuration Options

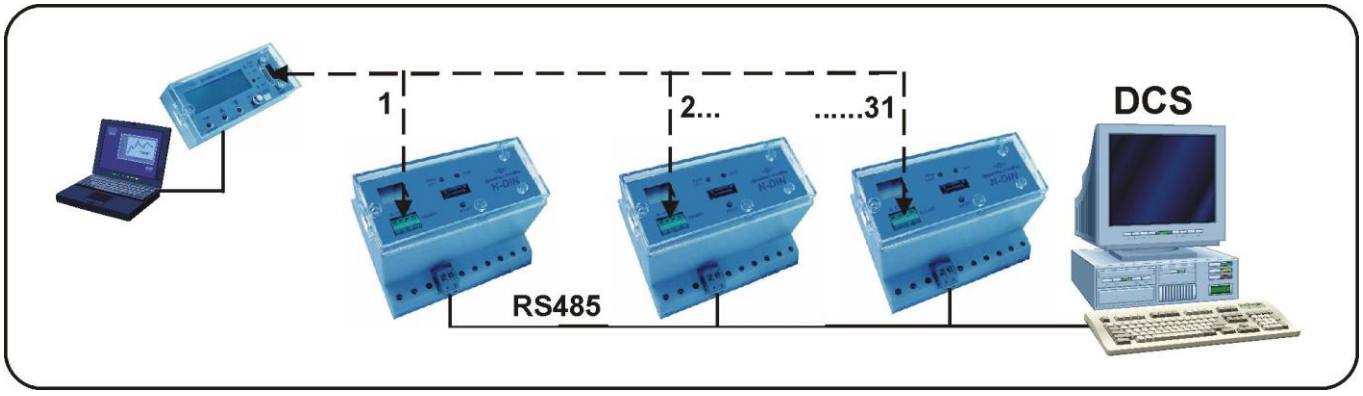
The relay N-DIN is constituted of two independent parts (**RMB** and **FFP**) that can be either used as stand-alone device or combined in different ways.
The FFP can be directly plug-in and fixed by two screws on one RMB or it can be remotely connected to one or more (up to 31) RMB by the relevant terminals.
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.

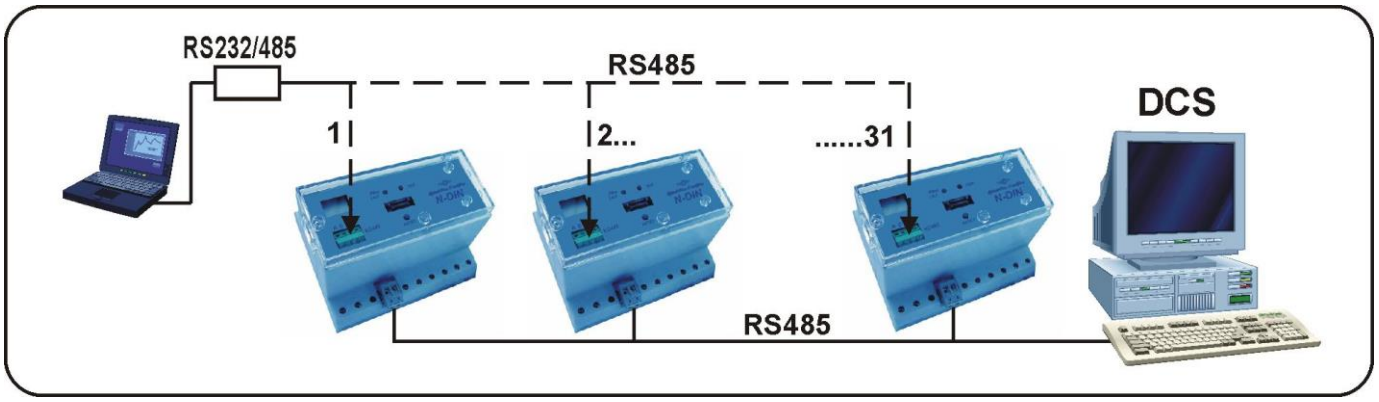


The **FFP** module can be mounted either directly on its **RMB** module or on the front panel of the board connected to the **RMB** by four wires (terminals A, B, +, 0).

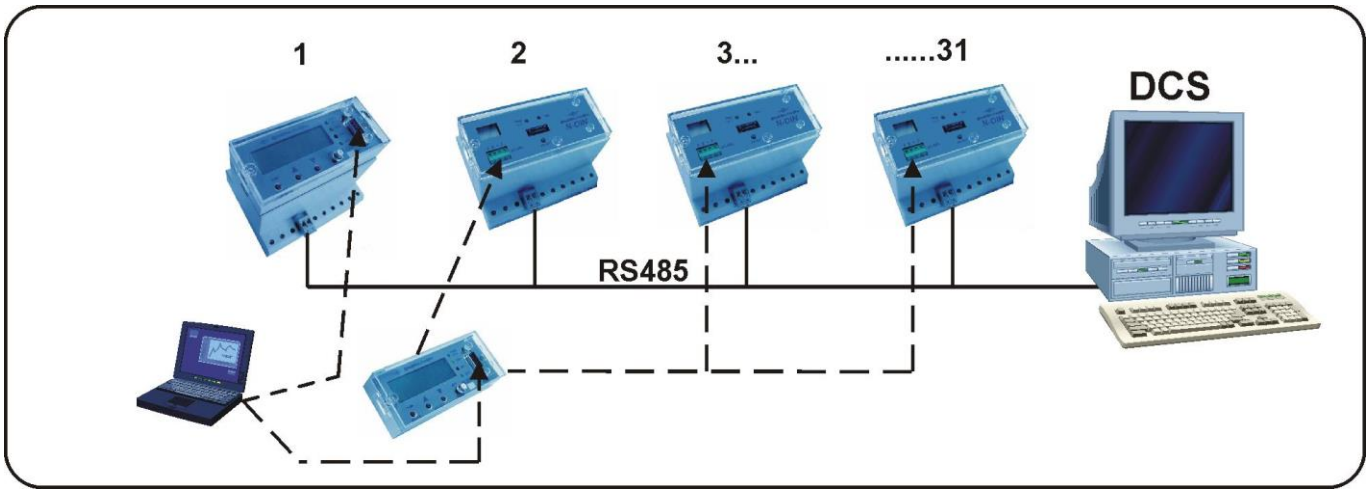
2) Use of up to 31 **RMB** modules managed by only one **FFP**.



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

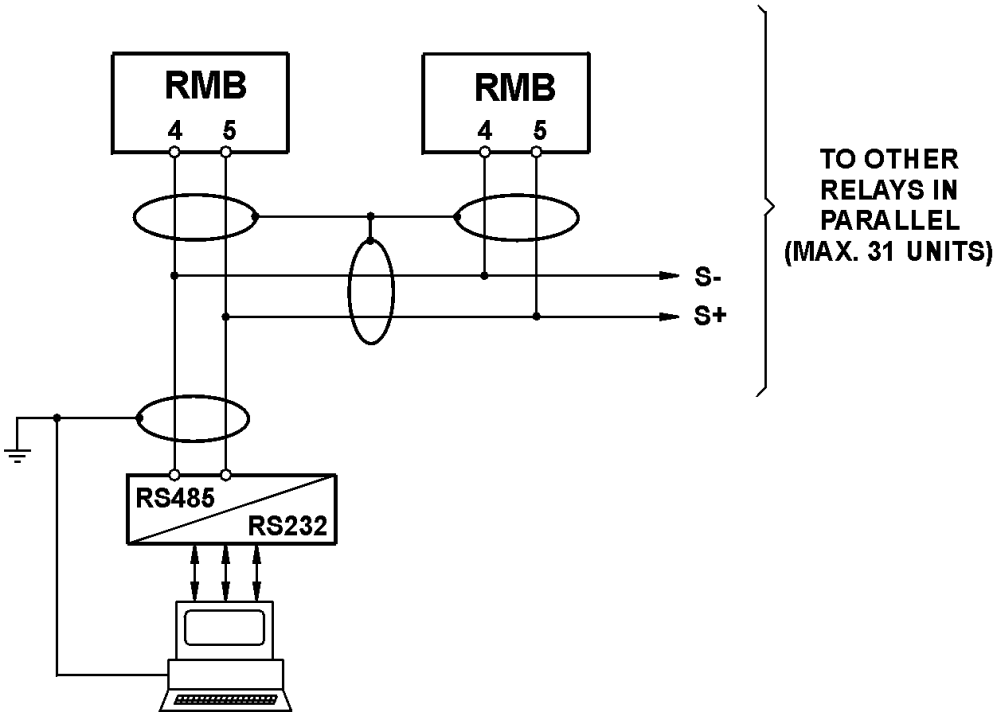
This port is accessible via the plug-in terminals " 4 – 5 " provided on the RMB.
It is used for connection to a serial bus interfacing up to 31 - N-DIN units with the Central Supervision System (SCADA, DCS, ecc).
The serial bus is a shielded pair of twisted cables connecting in parallel (Multi Drop) the different units (slaves) by the relevant terminals available on the " **R**elay **M**ain **B**ody ".
The physical link is RS485 and the Communication Protocol is MODBUS/RTU:
The configuration is selectable.

❑	Baud Rate	: 9600/19200 bps	9600/19200 bps	9600/19200 bps
❑	Start bit	: 1	1	1
❑	Data bit	: 8	8	8
❑	Parity	: None	Odd	Even
❑	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 (MSCom) for windows 95/98/NT4 SP3 (or later) is available.
Please refer to the MSCom instruction manual for more information.
Maximum length of the serial bus can be up to 200m.

CONNECTION TO RS485

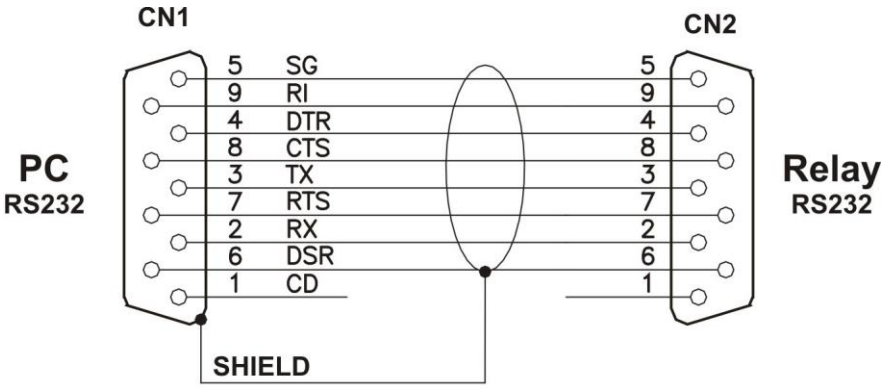


For longer distance and for connection of up to 250 Relays, optical interconnection is recommend.
(please ask Microelettrica for accessories)

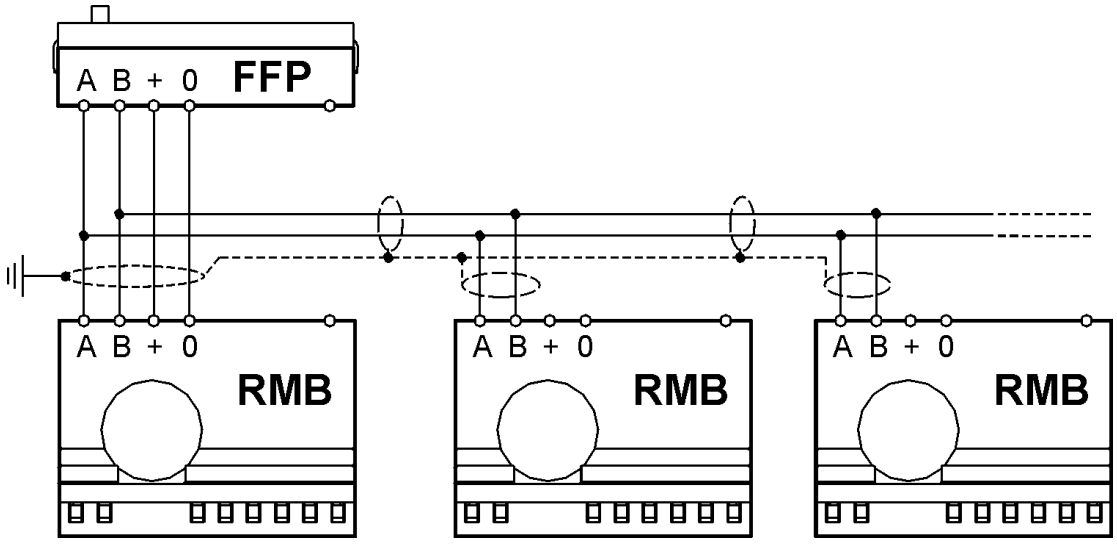
6.2 - Communication Port on Front Face Panel

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..



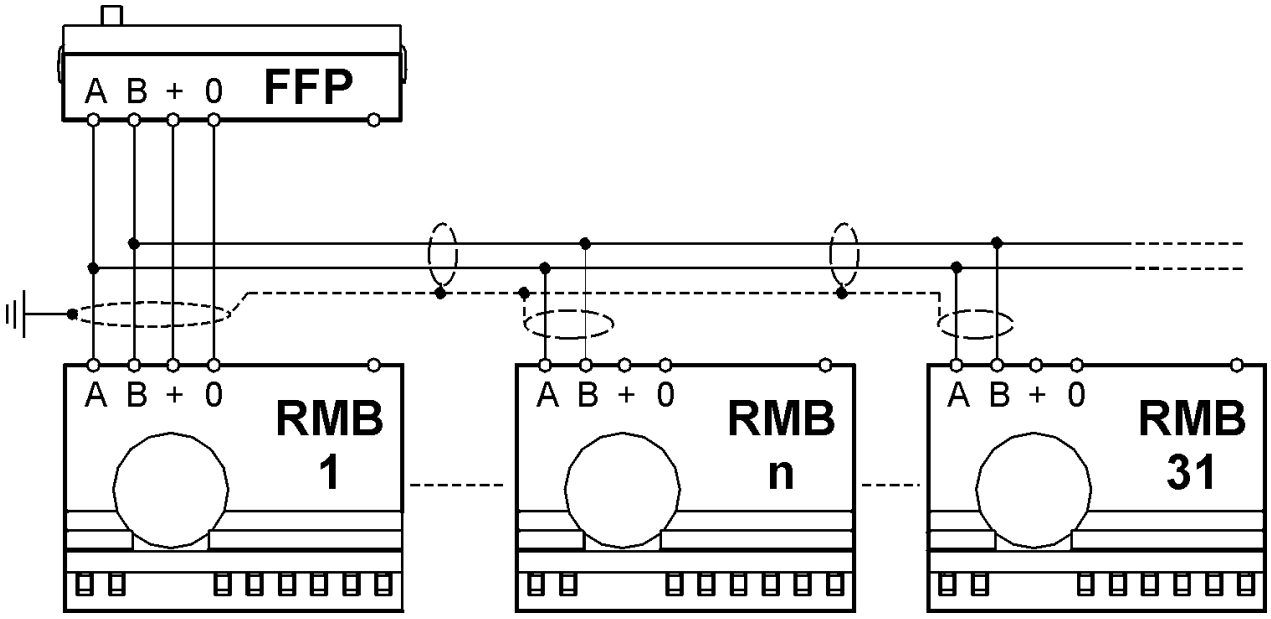
The connection between the " FFP " and the " RMB " (when FFP is removed) is made by four shielded twisted cables connected to the relevant terminals available on the back of the " FFP " and on the front of the " RMB ". All additional RMBs only need a pair of shielded twisted cables.



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
I	=	± 0.0 - 6553.5	**A**	Value of current 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
Add	=	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 “ ↳
- “ 1st Measurement △▽ other measurements
- ↩ to go back to “ Real Time Meas “.

Display				Description
I	=	± 0.0 - 6553.5	**A**	Value of current 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 " →
- → 1st 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
I	= 0 – 65535	**%In**	Value of current measured
Date:	= MM/GG		Record Date
Time:	= 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 " →
- " 1st counters △▽ other counters
- ↶ to go back to " Real Time Meas ".

Display			Description
I>	=	0 – 65535	Number of 1st Overcurrent element.
I>>	=	0 – 65535	Number of 2nd Overcurrent element.
BF	=	0 – 65535	Number of operation of Breaker Failure
RTD	=	0 – 65535	Number of operation remote trip / C/B status
I.R.F.	=	0 – 65535	Number of Internal Relay Faults
HR	=	0 – 65535	Number of Hardware Restore (see § self-diagnostic)

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 " →
- → 1st event,
- ↑↓ to scroll available events,
- → to " Record # " selected,
- ↑↓ to select the different fields;

Display				Description
Func		**xxxxx**		Indication of the protection function which caused the relay tripping. For indication of the TRIP Cause the following acronyms are used:
				- **I>** = 1st Overcurrent element
				- **I>>** = 2nd Overcurrent element
				- **RTD** = Remote trip
				- **IRF** = 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	**A**	Value of current measured

- ← 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
Add:	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 "
- ↳ 1st Variable
- ▲▼ to scroll variables
- ↳ to modify selected variable
- " Password ???? " (if not yet entered; see § Password)
- ▲▼ to set variable value,
- ↳ to validate.

Display			Description	Setting Range			Step	Unit
In	100 (*)	**A**	Maximum current detected from magnetic detector TO64	50	-	2500	1	A
K	360 (*)		Gain magnetic detector TO64	1	-	1000	1	-

7.7.4 - Functions

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

Display						Description	Setting Range	Step
Function	Type		Variable	Default	Unit			
Password		=	0000-9999	1111	-	Password for programming enable (see § Password)		
I>(1F64)	FuncEnable	→	Status:	Enable		Enable of the protection function	Enable/Disable	-
	Options	→	OUT	R1		Selection of the output relay operated at the end of trip time delay	R1, R2, R1 + R2, None	-
		→	Dir	None		Operation mode	Pos - Neg - None	
		→	BI	Enable		Blocking Input	Enable/Disable	-
	TripLevels	→	I>	10	%In	Minimum operation level	4 – 400	1
	Timers	→	tI>	0.1	s	Trip time delay *	0.03 – 60.00	0.01
I>>(2F64)	FuncEnable	→	Status:	Disable		Enable of the protection function	Enable/Disable	-
	Options	→	OUT	R1		Selection of the output relay operated at the end of trip time delay	R1, R2, R1 + R2, None	-
		→	Dir	None		Operation mode	Pos - Neg - None	
		→	BI	Enable		Blocking Input	Enable/Disable	-
	TripLevels	→	I>>	100	%In	Minimum operation level	4 – 400	1
	Timers	→	tI>>	0.1	s	Trip time delay *	0.03 – 60.00	0.01
BF	FuncEnable	→	Status:	Enable		Enable of the protection function	Enable/Disable	-
	Options	→	OUT	R2		Selection of the output relay operated at the end of trip time delay	R2, None	-
	TripLevels	→	No Parameters					
	Timers	→	tBF	0.75	s	Trip time delay	0.05 - 0.75	0.01
RTD	FuncEnable	→	Status:	Enable		Enable of the protection function	Enable/Disable	-
	Options	→	OUT	None		Selection of the output relay operated at the end of trip time delay	R1, R2, R1 + R2, None	-
	TripLevels	→	No Parameters					
	Timers	→	No Parameters					
IRF	FuncEnable	→	No Parameters					
	Options	→	OpIRF	NoTrip		Internal Relay Failure	NoTrip – Trip	-
		→	OUT	R2		Selection of output relay	R1, R2, R1 + R2, None	-
	TripLevels	→	No Parameters					
	Timers	→	No Parameters					
OperMod	FuncEnable	→	No Parameters					
	Options	→	Op_R1	N.D.		Per la selezione di differenti modi operativi	N.E./N.D.	-
			Op_R2	N.D.		Per la selezione di differenti modi operativi	N.E./N.D.	-
			Ctrl	Rsrvd		Reserved		
	TripLevels	→	No Parameters					
	Timers	→	No Parameters					
LoadPro	FuncEnable	→	Status:	Enable		Enable of the oscillographic recording	Enable/Disable	-
	Options	→	No Parameters					
	TripLevels	→	No Parameters					
	Timers	→	tLP	1	m	Time Interval	1-650	1
Main Comm Par	FuncEnable	→	No Parameters					
	Options	→	Mode	8,n,1		RMB main RS485 port configuration (see §5.1) ***Note**: any change of this setting became valid at the next power on*	8,n,1 8,o,1 8,e,1	-
			BaudR	9600		Communication speed	9600 - 19200	-
	TripLevels	→	No Parameters					
	Timers	→	No Parameters					

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		Description
Clear	:	Erase memory of Trip Counters, Event Records, Load Profile
Test	:	Starts a relay diagnostic test
Reset	:	Reset output relay R1&R2.
CT Offset	:	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 1st digit (1-9) ↳ to validate
- △▽ to select 2nd digit (1-9) ↳ to validate
- △▽ to select 3rd digit (1-9) ↳ to validate
- △▽ to select 4th 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 (see §7.3) 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.

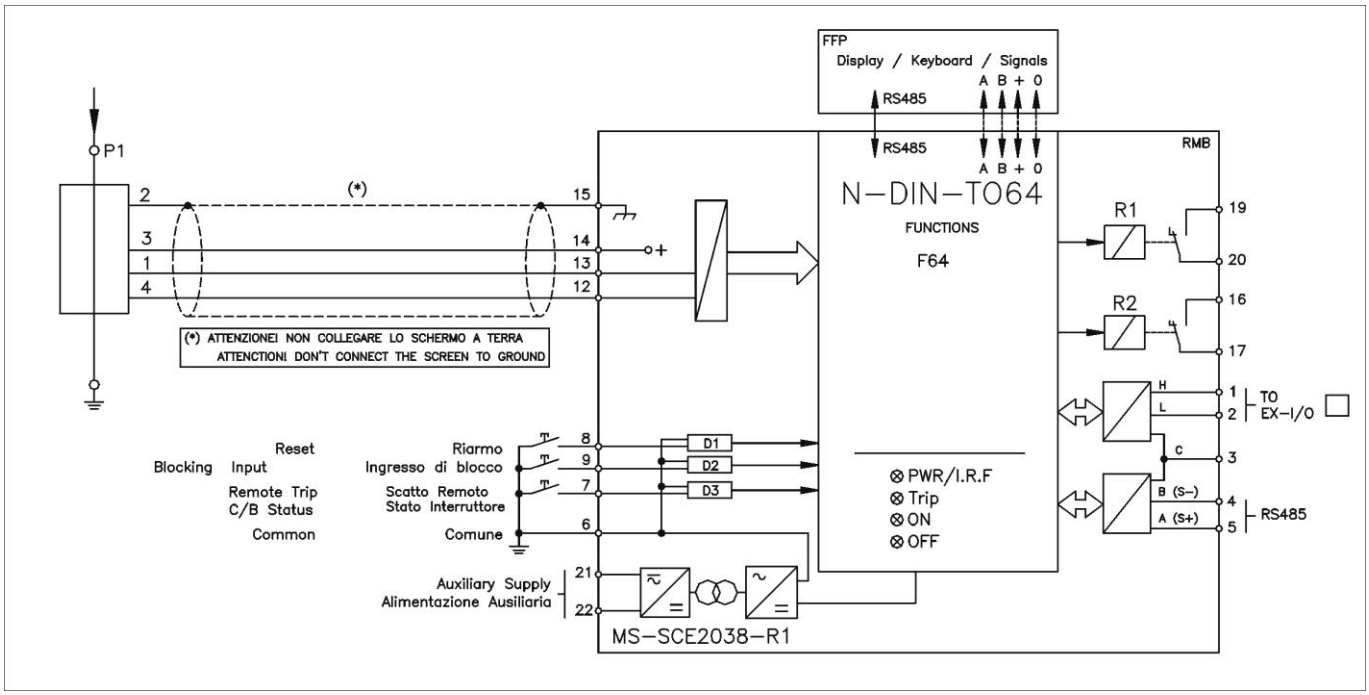
9. Maintenance

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.

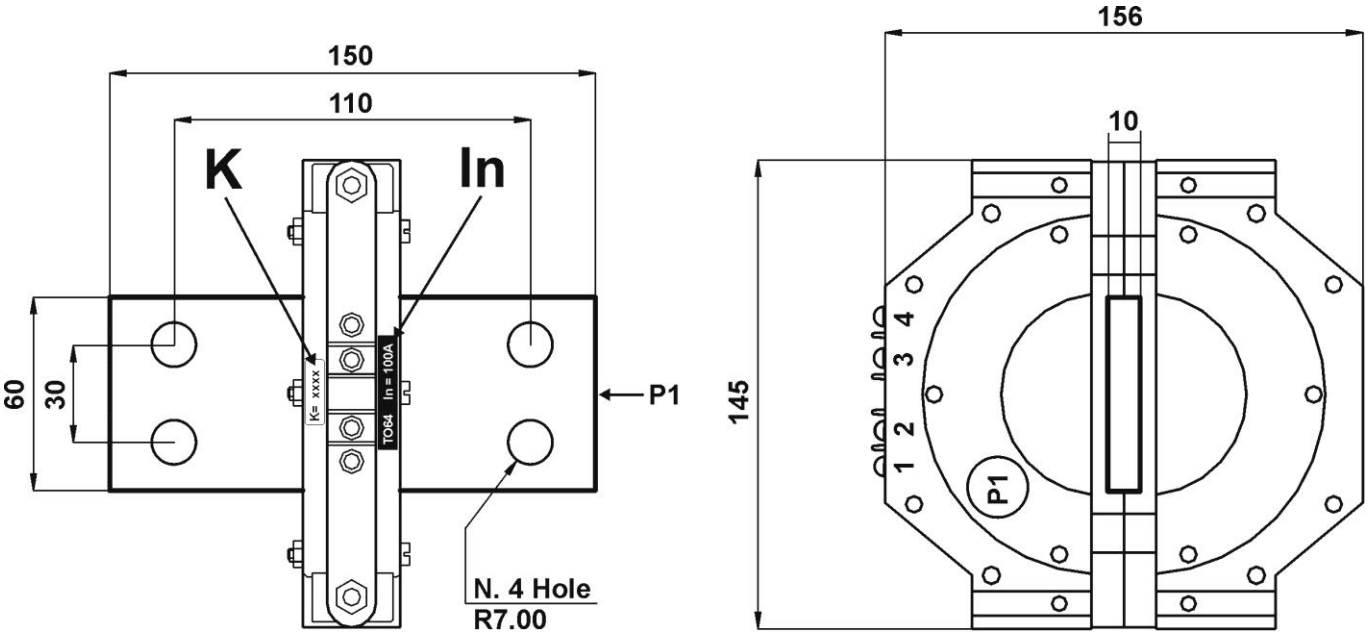
10. Power Frequency Insulation Test

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 as it unusefully stresses 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.

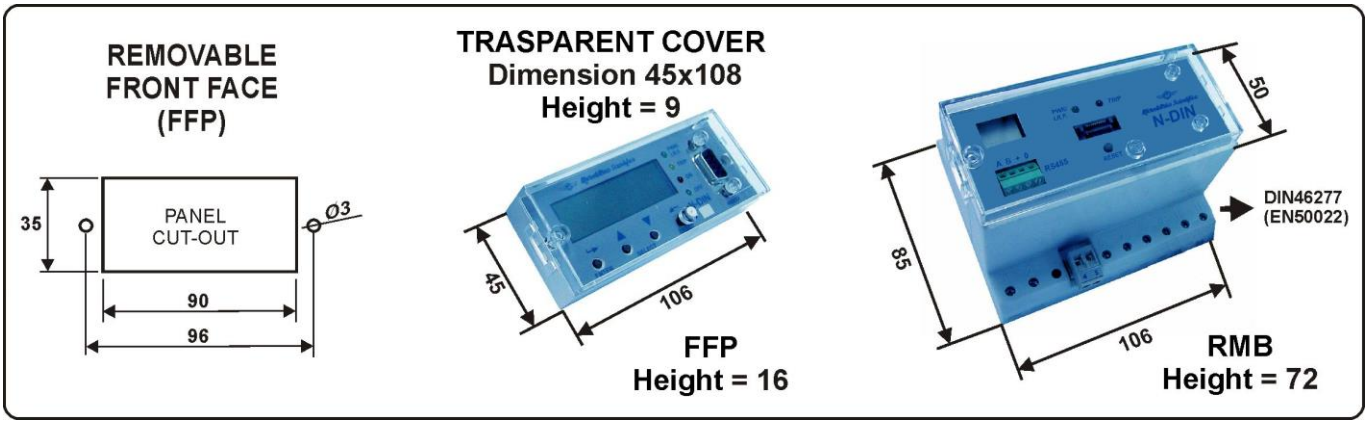
11. Wiring Diagram



12. Overall Dimensions (mm) – Magnetic Detector TO64



13. Overall Dimensions



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

N-DIN-TO64

APPROVAL: CE					
REFERENCE STANDARDS	**IEC 60255 - CE Directive - EN/IEC61000 - IEEE C37**				
❑ Dielectric test voltage	IEC 60255-5	2kV, 50/60Hz, 1 min.			
❑ Impulse test voltage	IEC 60255-5	5kV (c.m.), 2kV (d.m.) – 1,2/50μs			
❑ Insulation resistance	> 100MΩ				
Environmental Std. Ref. (IEC 68-2-1 - 68-2-2 - 68-2-33)					
❑ Operation ambient temperature	-10°C / +55°C				
❑ Storage temperature	-25°C / +70°C				
❑ Humidity	IEC68-2-3 RH 93% Without Condensing AT 40°C				
CE EMC Compatibility (EN61000-6-2 - EN61000-6-4 - EN50263)					
❑ Electromagnetic emission	EN55011		industrial environment		
❑ Radiated electromagnetic field immunity test	IEC61000-4-3 ENV50204	level 3	80-1000MHz 900MHz/200Hz	10V/m 10V/m	
❑ Conducted disturbances immunity test	IEC61000-4-6	level 3	0.15-80MHz	10V	
❑ Electrostatic discharge test	IEC61000-4-2	level 3	6kV contact / 8kV air		
❑ Power frequency magnetic test	IEC61000-4-8		1000A/m	50/60Hz	
❑ Pulse magnetic field	IEC61000-4-9		1000A/m, 8/20μs		
❑ Damped oscillatory magnetic field	IEC61000-4-10		100A/m, 0.1-1MHz		
❑ Electrical fast transient/burst	IEC61000-4-4	level 3	2kV, 5kHz		
❑ HF disturbance test with damped oscillatory wave (1MHz burst test)	IEC60255-22-1	class 3	400pps, 2,5kV (m.c.), 1kV (d.m.)		
❑ Oscillatory waves (Ring waves)	IEC61000-4-12	level 4	4kV(c.m.), 2kV(d.m.)		
❑ Surge immunity test	IEC61000-4-5	level 4	2kV(c.m.), 1kV(d.m.)		
❑ Voltage interruptions	IEC60255-4-11		50ms		
❑ Resistance to vibration and shocks	IEC60255-21-1 - IEC60255-21-2 10-500Hz 1g				
Electric Rated Value - N-DIN					
❑ Accuracy at reference value of influencing factors	5% 2% +/- 20ms		For measurement with max 1% of FS For time		
❑ Rated Current	from TO64				
❑ Average power supply consumption	≤ 7 VA				
❑ Output relays	rating 6 A; Vn = 250 V A.C. resistive switching = 1500VA (400V max) make = 30 A (peak) 0,5 sec. break = 0.2 A, 110 Vcc, L/R = 40 ms (100.000 op.)				
Communication Parameter					
❑ RMB	RS485 – 9600/19200bps – 8,N,1 - 8,E,1 - 8,O,1 – Modbus RTU				
❑ FFP	RS232 – 9600bps – 8,N,1 – Modbus RTU				

Magnetic Detector - TO64

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

* on request other value

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

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