MICROPROCESSOR
RELAY FOR
PERMANENT INSULATION SUPERVISION
OF D.C. SYSTEMS

TYPE

N-DIN-MSG

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 - Waste Disposal of Electrical & Electronic Equipment

(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.

1.12 - Fault Detection And Repair

Internal calibrations and components should not be alterated 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

N-DIN is a very versatile and complete Insulation Supervision Relay capable to control two independent Systems. N-DIN relay is designed for surface mounting inside switchboards or panels on standard DIN-EN 50022 rail, but its Front-Face-Panel (FFP) can be removed (by simply unscrewing the two fastening screws) and flush mounted on the front panel of the Switchboard or on the front of a Power Control Center bay. Connection between the MAIN RELAY BODY (MRB) mounted inside the switchboard and the FFP mounted on the front panel, is made by a shielded double pair of twisted cables connected to the relevant screw terminals available on the front of the MRB and on the back of the FFP.
The max distance between the two parts can be up to 2 meters; for longer distance the connection cables must be laid in proper shielding conduits.
Connection between the two parts when assembled together is made by a plug-in connector provided on each of the two parts (see § 5.3).
This unique feature allows to have all controls and measurements available on the switchboard front panel including local connection to a Lap-top PC, while the part connected to the Power Circuit remains inside the panel closed to the C.Ts and to the control devices.
Moreover, where local display of measurements and data is not required, the RMB part can be used as a stand alone relay featuring all protection and communication functions, saving the cost of the FFP.

- A CANBUS output is also available to control optional slave expansion module and to transfer the measurement to other apparatus.
- Input currents are supplied from the AC injection Unit MSG to 2 current transformers measuring the fault current.
- Another input measures the test voltage applied to the supervised D.C. system by the AC injection Unit.

The measuring inputs have the following ratings:

- Rated continuous current : 1A
- Overload : 2A continuous – 50A for 1s
- Ground Current measuring dynamic : (2-500)mA
- Voltage measuring dynamic : (0.5-66)V

- Three optoisolated, selfpowered digital inputs (D1, D2, RTD) are provided.
  The digital inputs D1 and D2 are activated when their input terminals (6-8, 6-9) are shorted by a cold contact ($R \leq 3k\Omega$); The input RTD is activated when the resistance connected across its terminals below 2900Ω.

- Two output relays (R1, R2), each with one Normally Open 6A rating contact, are available.

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 an 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
Freq	50	Hz	System rated frequency	50	-	60	10	Hz

2.2.2 – Input quantities

2.2.2.1 – Frequency (Freq) of the test voltage

The relay can operate either with 50Hz or 60Hz.
The rated Frequency " Freq " must be set accordingly.

2.2.2.2 – Current inputs

The relay directly displays the r.m.s. "mA" value of the Fault Currents " **Is** " and " **Id** " flowing in each of the section under supervision.
(In cable monitoring "Is" = fault current between Screen and Ground, "Id" = Fault current between Conductor and Screen)

2.2.2.3 – Voltage input

The relay monitors the A.C. test voltage applied by the Main Injection Unit to the D.C. systems under supervision.
This voltage is also used as reference for measuring the Power Factor of the injected current flowing through a fault as well as through the capacitance to earth of the D.C. cables.
The value of the Power Factor allows to discriminate between the Fault Current (Resistive) and the normal leakage current (Capacitive).

2.2.2.4 – Earth Fault Resistance

The relay measures the resistive component of the earth current and computes the Resistance of the ground fault of the two supervised circuits:

$$RGs = \frac{V_{input}}{I_s \cos s} - Ri \qquad RGd = \frac{V_{input}}{I_d \cos d} - Ri$$

Where "Ri" is the internal resistance of MSG (normally 150Ω).

On the Display the measurements of "cos s" and "cos d" are also available.
"s" and "d" are the phase displacement respectively of the current "Is" and Id" from the reference voltage V. Below 0.30, "cos s" and "cos d" are considered as zero and the Resistance value is reported as overflow (ovf)

2.2.3 – Functions and Settings

*2.2.3.1 – **1RGs, 1RGd** – First trip level for minimum insulation resistance*

- **Function Enable**	:	***Status***	(Disable/Enable) if disable the function is disactivated.
- **Options**	:	***OUT***	*Selection of the output relay operated at the end of trip time delay*: **R1, R2, R1 + R2, None**
- **Trip Level**	:	**1RGs** = (100-5000)Ω, step 100Ω **1RGd** = (100-5000)Ω, step 100Ω	
- **Timers**	:	*Trip time delay:* **1ts** = (0.1-100)s, step 0.1s. **1td** = (0.1-100)s, step 0.1s.	

*2.2.3.2 - **2RGs, 2RGd** – Second trip level for minimum insulation resistance*

- **Function Enable**	:	***Status***	(Disable/Enable) if disable the function is disactivated.
- **Options**	:	***OUT***	*Selection of the output relay operated at the end of trip time delay*: **R1, R2, R1 + R2, None**
- **Trip Level**	:	**2RGs** = (100-5000)Ω, step 100Ω **2RGd** = (100-5000)Ω, step 100Ω	
- **Timers**	:	*Trip time delay:* **2ts** = (0.1-100)s, step 0.1s. **2td** = (0.1-100)s, step 0.1s.	

Each element trips at the and of the set trip time delay if the insulation Resistance to ground is below the set trip level. The programmed output relay is operated and the “Trip” signal led keeps flashing during the trip time delay and lits-on steadly after tripping.

The reset after tripping takes place as follows:

- *Output Relays*:

If the trip cause has disappeared, the relay R1 or R2 is reset operating the digital input D1 or D2 respectively; reset is also operated via the Reset Push button on the N-DIN front face.

If the digital input D1 or D2 is permanently shot-circuited, the reset takes place automatically as soon as the insulation Resistance detected exceeds the set trip level.

- *Trip Signal Led*:

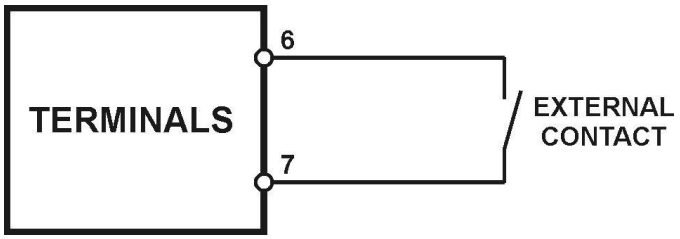
The trip signal led keeps the memory of tripping until the reset button on N-DIN front is operated.

*2.2.3.3 – **OperMod** - Operation Mode*

The N-DIN-MSG 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 N-DIN-MSG functions 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 N-DIN-MSG functions 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 "D2".
- **D1** (Terminals 6-8)	Operates the reset after tripping cause is cleared If "D1" terminals are permanently shorted, reset of "R1" after tripping takes place automatically as soon as the tripping cause disappears.
- **D2** (Terminals 6-9)	Operates the reset after tripping cause is cleared If "D2" terminals are permanently shorted, reset of "R2" after tripping takes place automatically as soon as the tripping cause disappears.
- **RTD** (Terminals 6-7)	Operates to lock-out the tripping of the relay function "RGs" and "RGd"

For correct operation, the RTD input must be configured by as shown in the figure below.



If the resistance measured across the terminals "6-7" is less than 2900Ω, the input is activated and the tripping of the functions is inhibited.

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

- **Function Enable**	:	No Parameters	
- **Options**	:	**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 "R2".* **N.E.** (Normally energized, deenergized on trip). **N.D.** (Normally deenergized, energized on trip).
		Ctrl	*For selection between Local/Remote relay control:* **Local** : Not used in this version **Remote** : Not used in this version
- **Trip Levels**	:	No Parameters	
- **Timers**	:	No Parameters	

*2.2.3.4 – **I.R.F.** – Internal Relay Failure*

- **Function Enable**	:	***Status***	(**Disable/Enable**) if disable the function is disactivated.
- **Options**	:	**OpIRF** = Trip/NoTrip	
		OUT	*Selection of the output relay operated on tripping* : **R1, R2, R1 + R2, None**
- **Trip Levels**	:	No Parameters	
- **Timers**	:	No Parameters	

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 make the " IRF " signal led flashing without tripping the output relays (OpIRF = NoTRIP).

2.2.4 – Selfdiagnostic

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

- A/D conversion
- Checksum of the settings stored into E^2P.
- DSP general operation (Power, Routines, etc.)
- Lamp test (only on manual test).

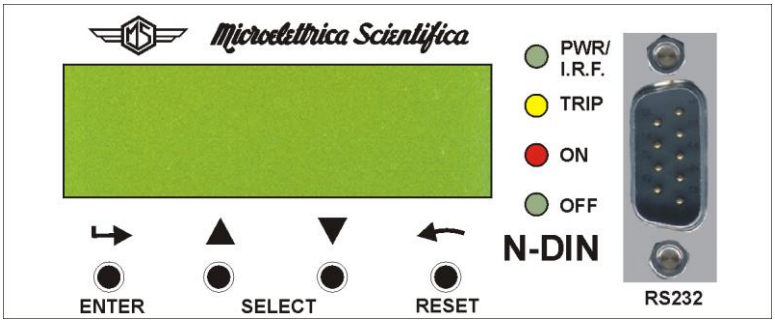
Any time Power is switched on, a complete test is run; then, during normal operation, the test is run continuously and the checksum is done any time a parameter is stored into E^2P.
If during the test any Relay Internal Failure (I.R.F) is detected:

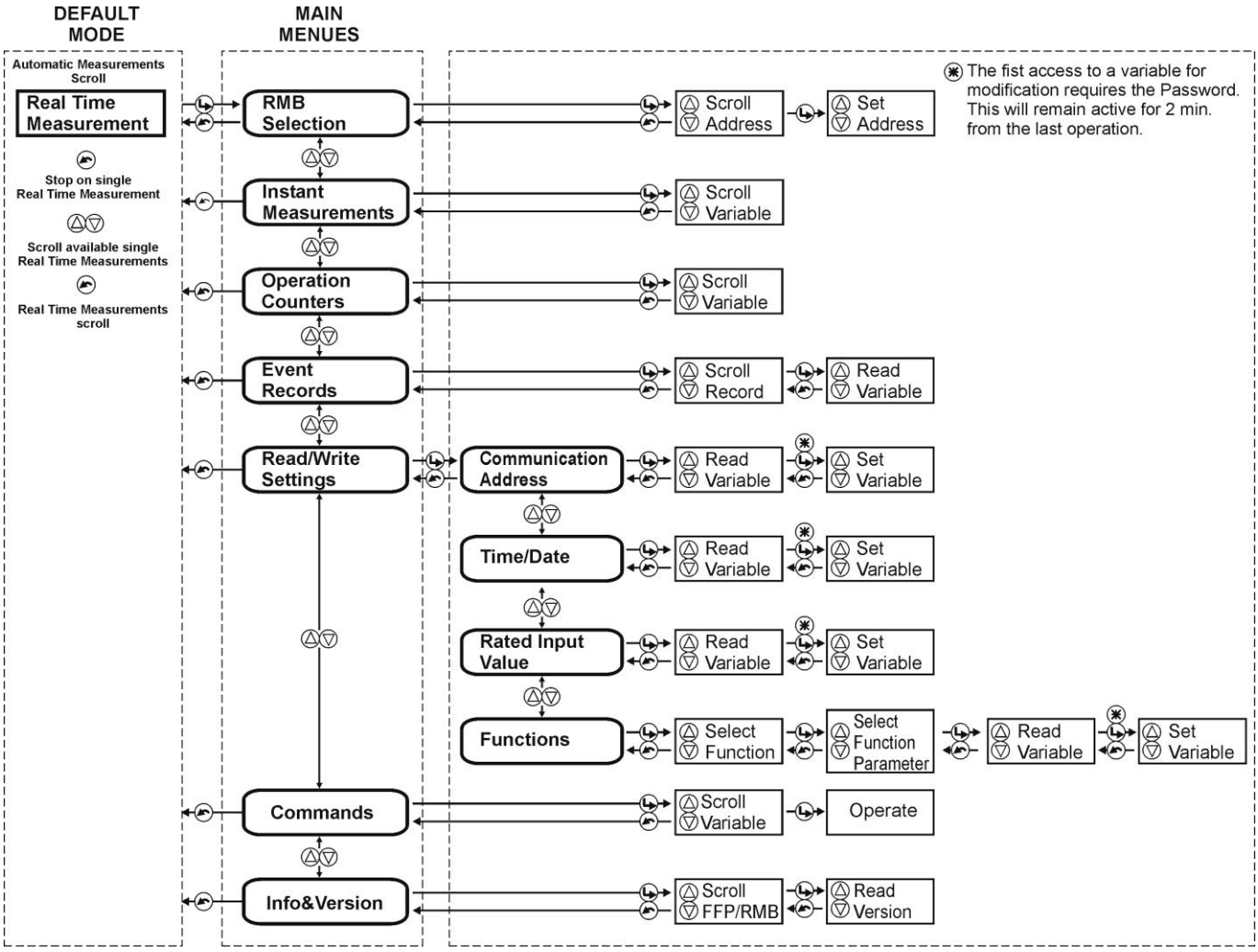
- If " I.R.F. " is programmed to " Trip " (see § 2.2.3.5) the output relays are operated same as on tripping of any protection function
- If " I.R.F. " is programmed "NO Trip", operation is memorized in the " Event Records ".

If is also present a supervision circuit that, in case a transient anomaly of the DSP is detected, produces a Reset to restore the normal operation and increments the counter HR (see § 3.1).

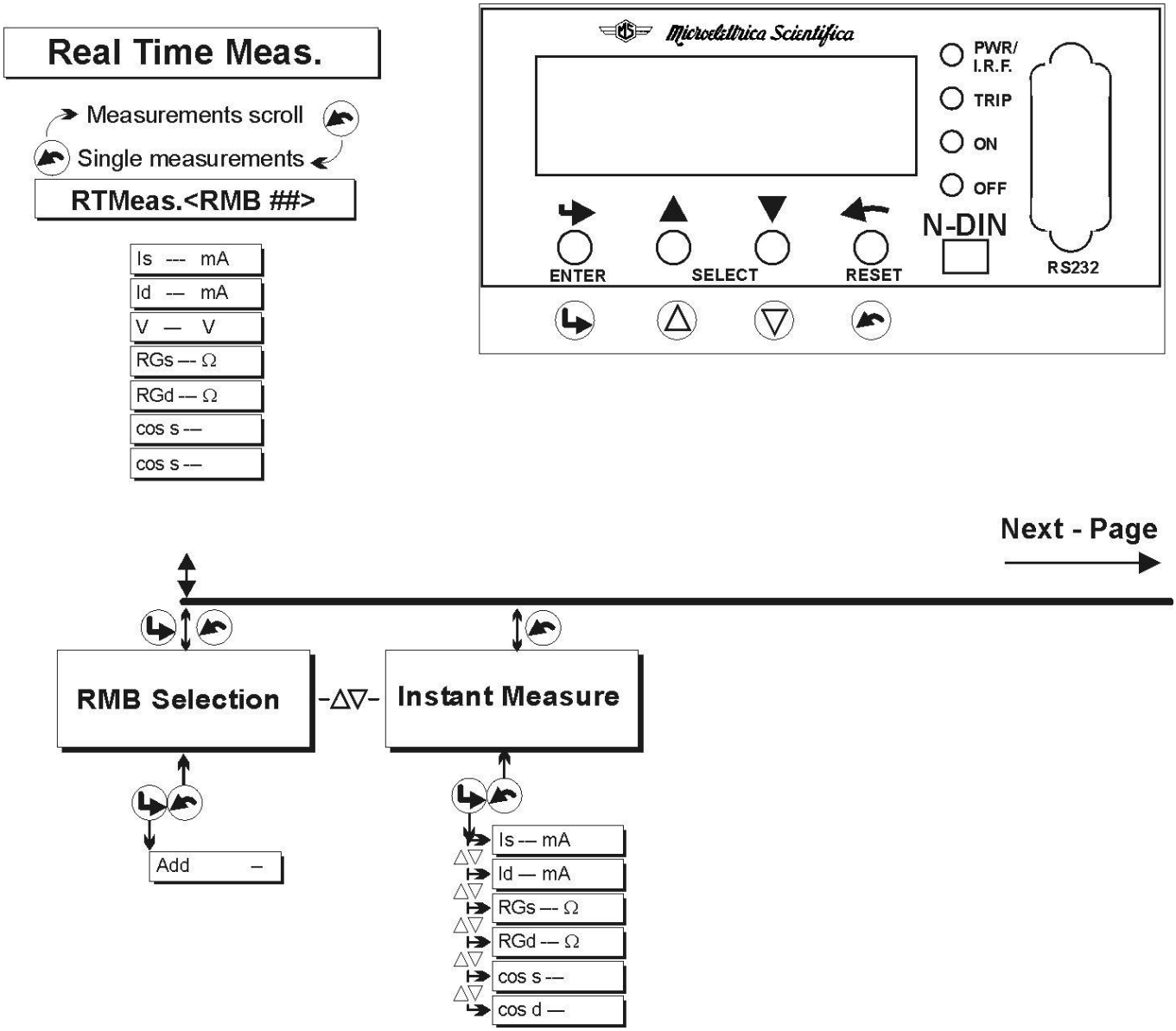
3. RELAY MANAGEMENT

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 (see §8).
The 2 line x 16 characters LCD display shows the available information.
Key buttons operate according to the flow-chart herebelow.



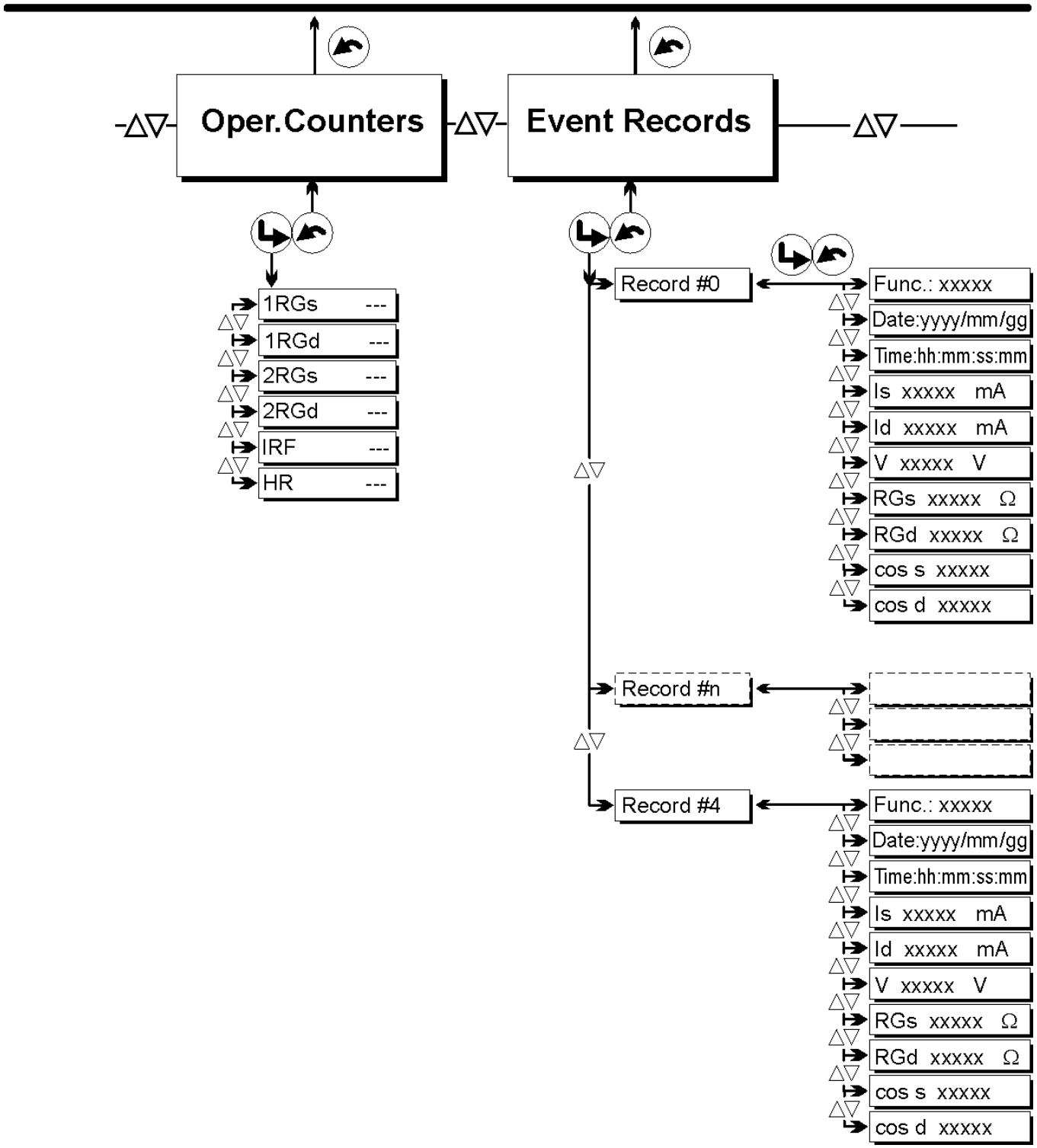


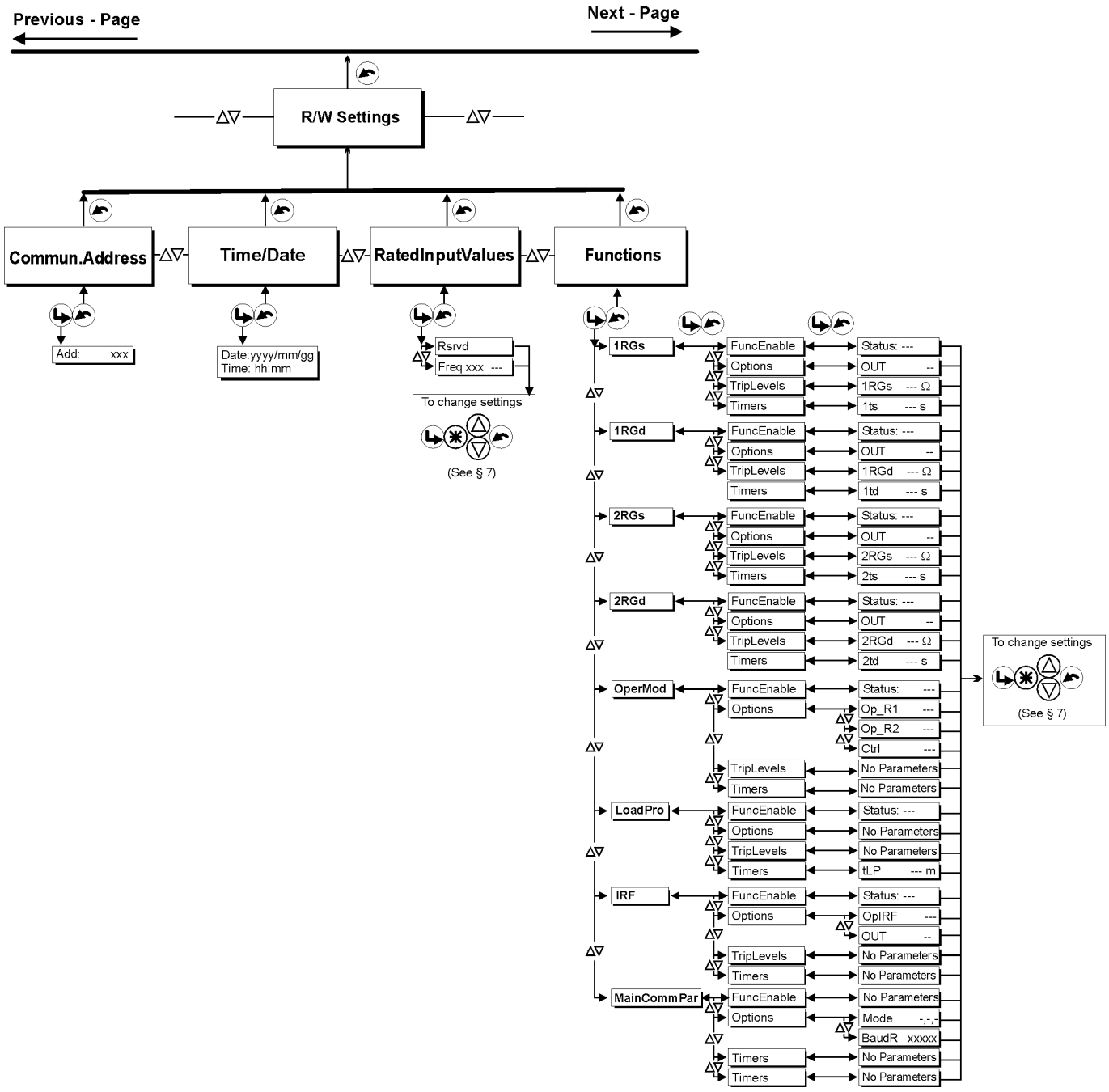
3.1 - Keyboard Operational Diagram

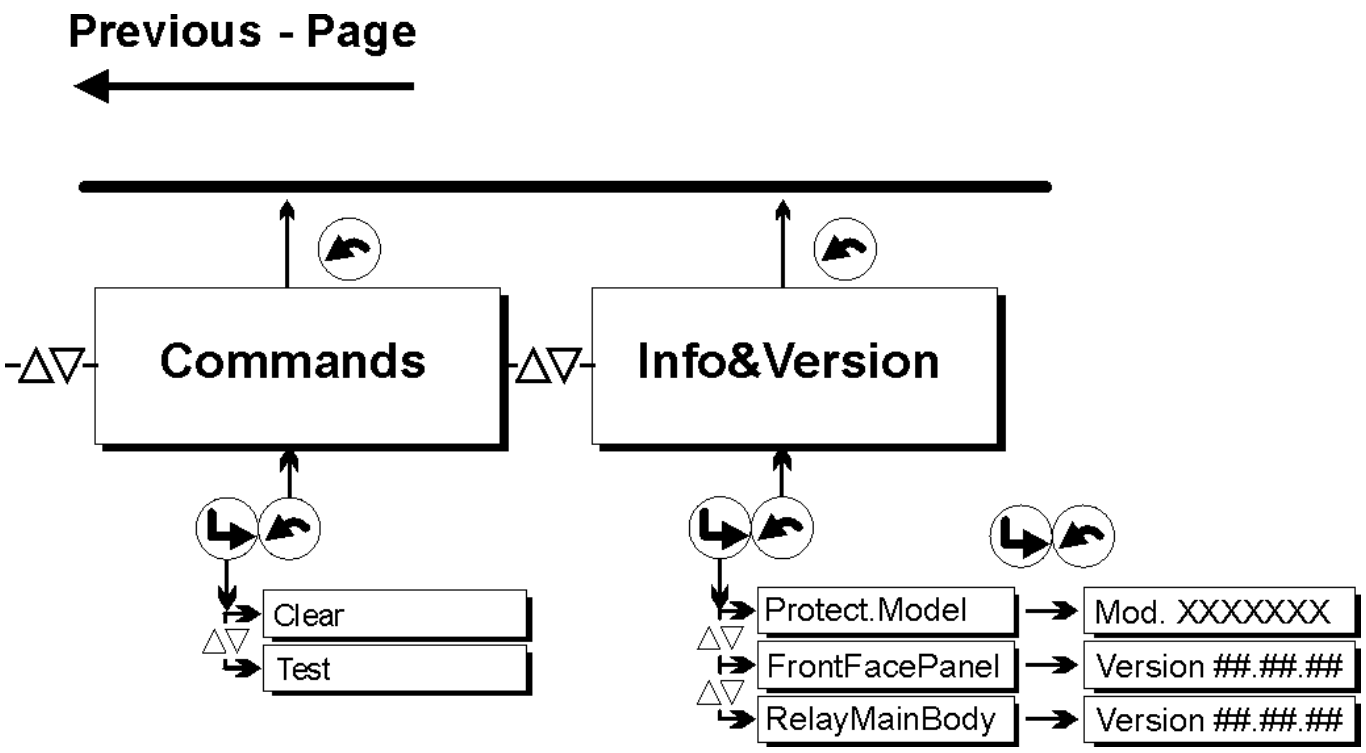


Previous - Page

Next - Page

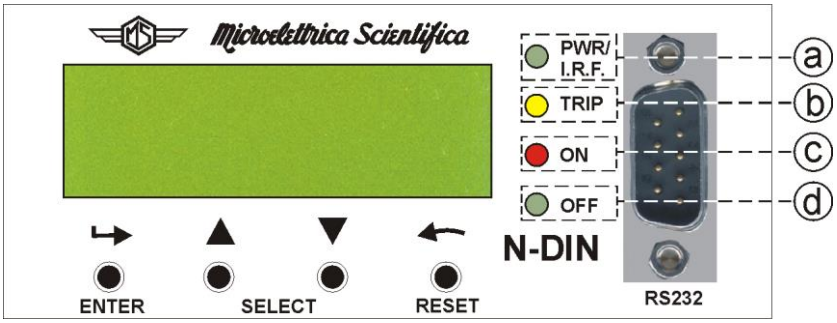



Previous - Page
Next - Page
R/W Settings
Commun.Address
Time/Date
RatedInputValues
Functions
Add: xxx
Date:yyyy/mm/gg
Time: hh:mm
Rsrvd
Freq xxx ---
To change settings
(See § 7)
1RGs
1RGd
2RGs
2RGd
OperMod
LoadPro
IRF
MainCommPar
FuncEnable
Options
TripLevels
Timers
Status: ---
OUT --
1RGs --- Ω
1ts --- s
1RGd --- Ω
1td --- s
2RGs --- Ω
2ts --- s
2RGd --- Ω
2td --- s
Status:
Op_R1 ---
Op_R2 ---
Ctrl ---
No Parameters
tLP --- m
OpIRF ---
Mode -,-,-
BaudR xxxxx
To change settings
(See § 7)


Previous - Page
Commands
Info&Version
Clear
Test
Protect.Model
FrontFacePanel
RelayMainBody
Mod. XXXXXXX
Version ##.##.##
Version ##.##.##

4. SIGNALIZATIONS

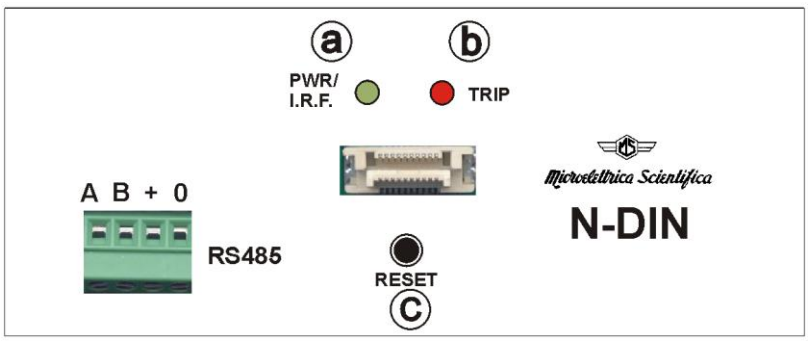
Four signal leds are available on the removable **F**ront **F**ace **P**anel (FFP):



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 button.
c)	Red LED	**ON**	❑ Illuminated when the input voltage is present.
d)	Green LED	**OFF**	❑ Illuminated when the input voltage is not present.

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

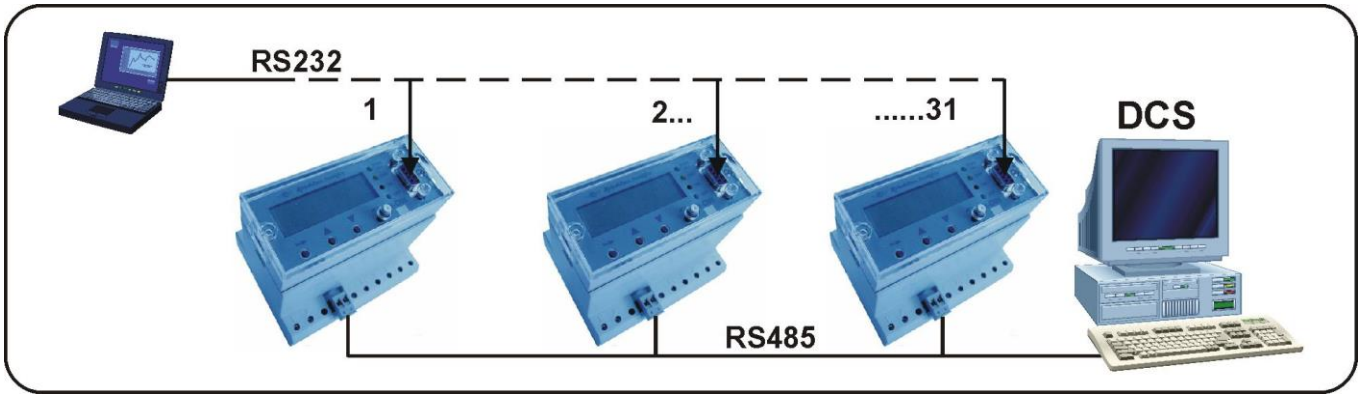


a)	Green LED	**PWR/ I.R.F.**	❑ Illuminated during normal operation when Power Supply is ON. ❑ Flashing when a Relay Internal Fault is detected.
b)	Red LED	**TRIP**	❑ Flashing when a timed function has started to operate. ❑ Illuminated when any function was tripped until Reset button is pressed.
c)	Button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

5. SYSTEM CONFIGURATION OPTIONS

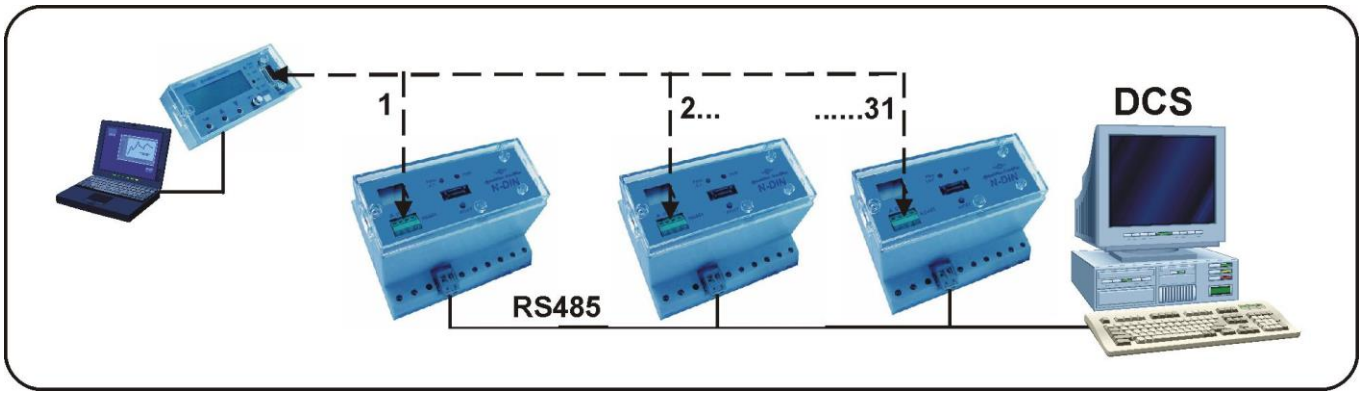
The relay N-DIN is constituted of two independent parts (**RMB** and **FFP**) that can be either used as stand-alone device or combined in different ways.
The FFP can be directly plug-in and fixed by two screws on one RMB or it can be remotely connected to one or more (up to 31) RMB by the relevant terminals (see § 11).
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.

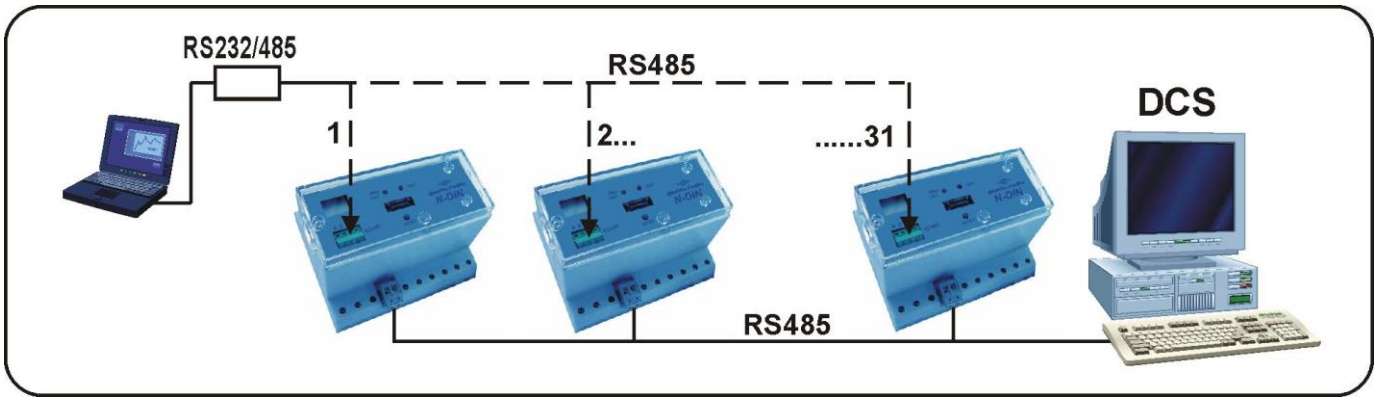


The **FFP** module can be mounted either directly on its **RMB** module or on the front panel of the board connected to the **RMB** by four wires (terminals A, B, +, 0, see §5.2).

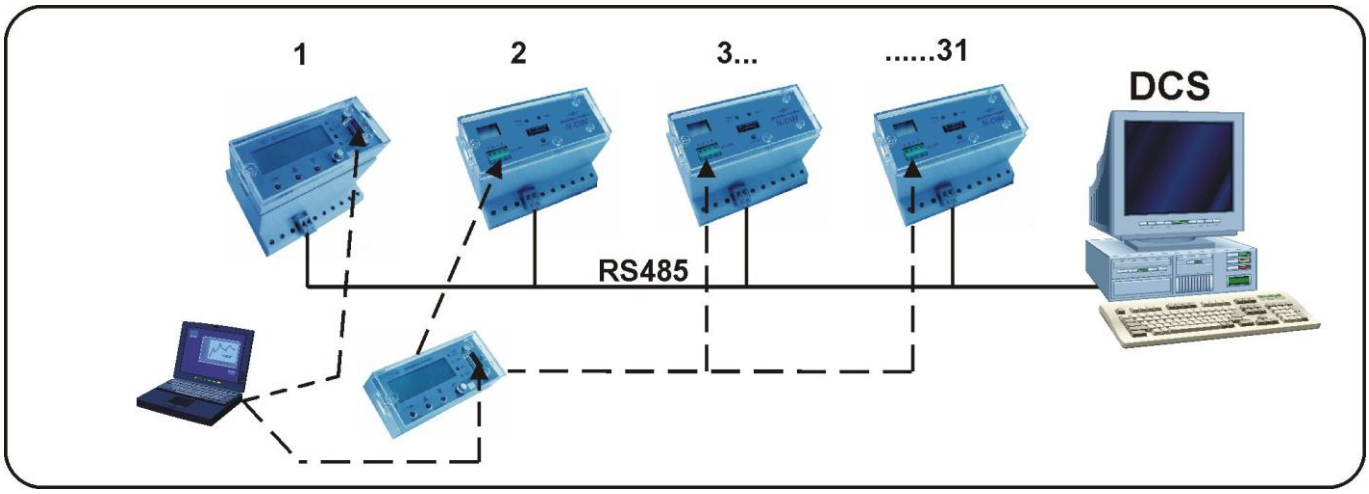
2) Use of up to 31 **RMB** modules managed by only one **FFP**.



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



4) combination of configuration 1 – 2 – 3.



5.1 - Main communication serial port on the Relay Main Body

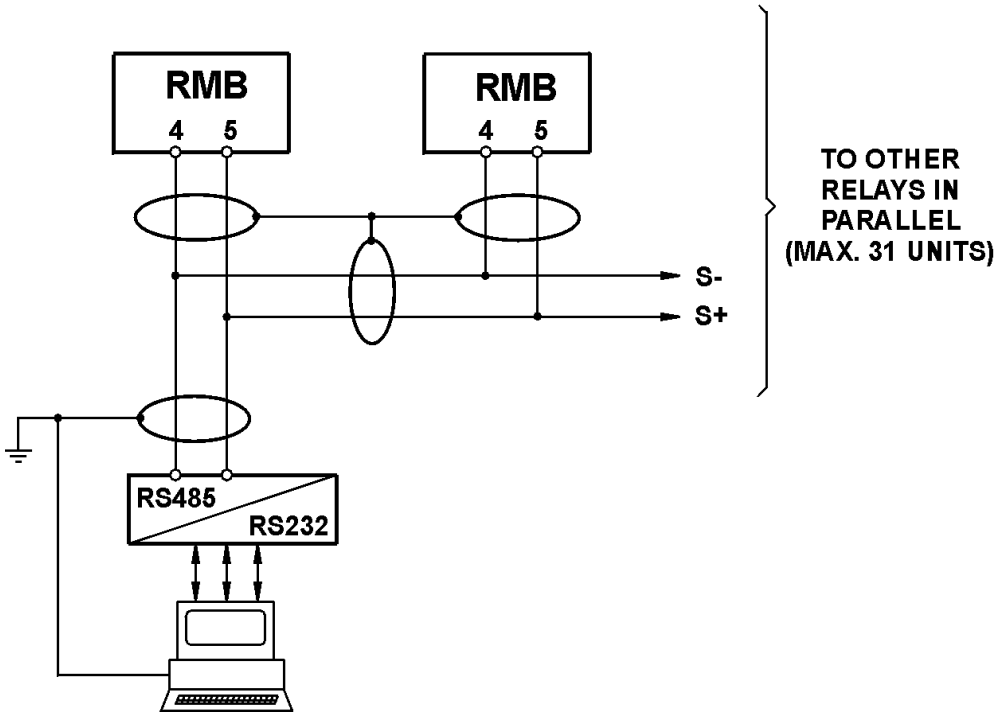
This port is accessible via the plug-in terminals (4 - 5) provided on the RMB.
It is used for connection to a serial bus interfacing up to 31 - N-DIN units with the Central Supervision System (SCADA, DCS, ecc).
The serial bus is a shielded pair of twisted cables connecting in parallel (Multi Drop) the 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 (see § 6.7.4)

❑	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

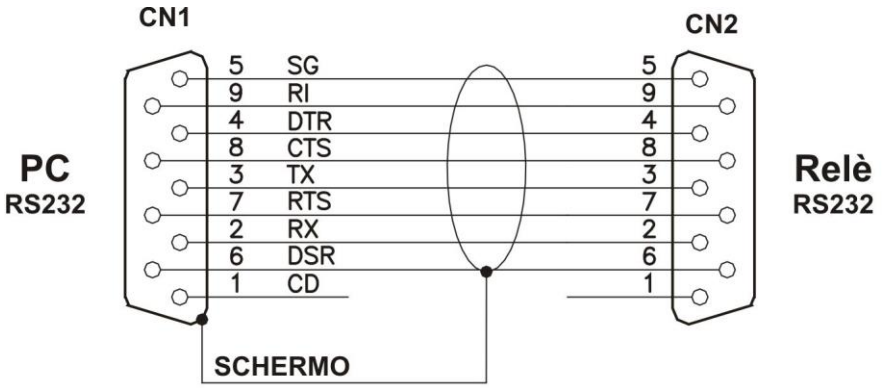


For longer distance and for connection of up to 250 Relays, optical interconnection is recommend.
(please ask Microelettrica for accessories)

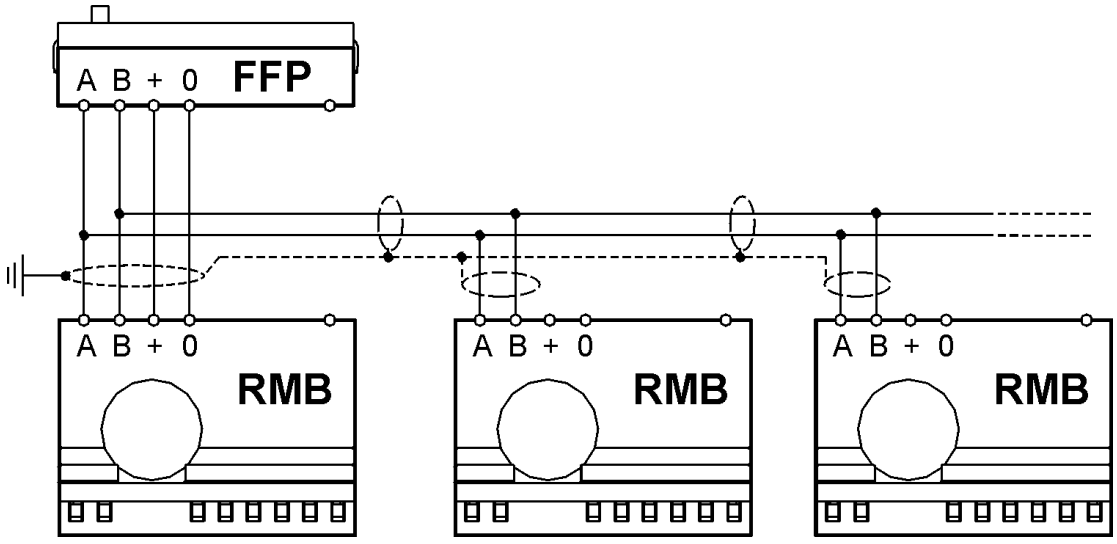
5.2 – Communication Port on Front Face Panel

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.



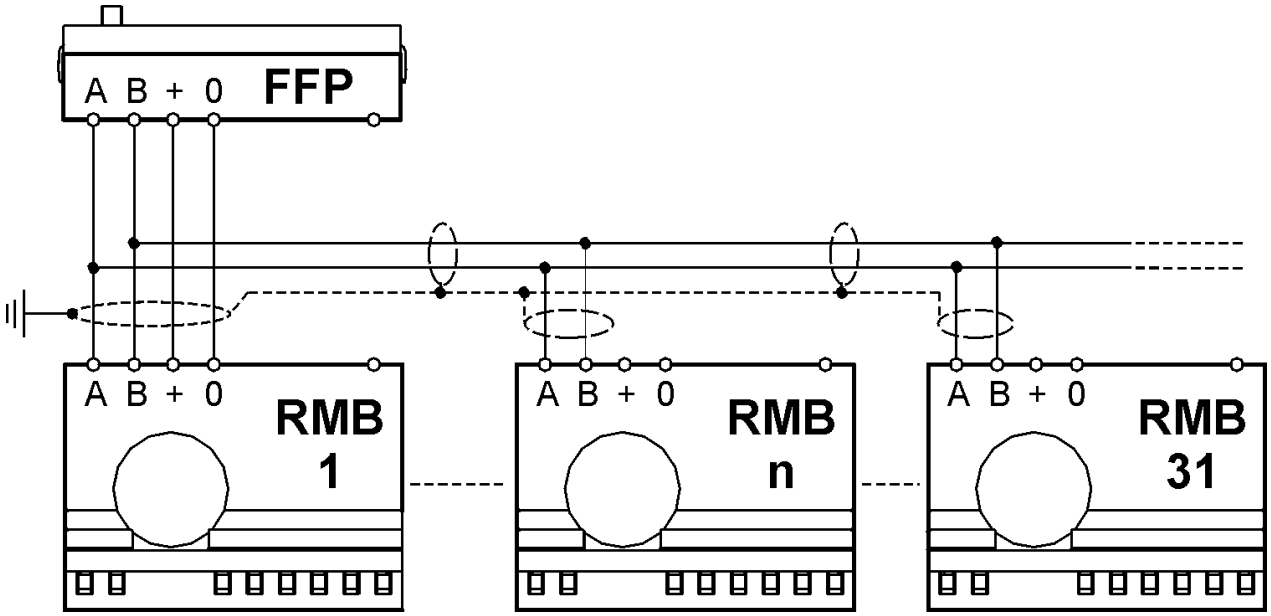
The connection between the " FFP " and the " RMB " (when FFP is removed) is made by four shielded twisted cables connected to the relevant terminals available on the back of the " FFP " and on the front of the " RMB ". All additional RMBs only need a pair of shielded twisted cables.



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 N° (see § 3.1 and § 6.2).

6. MENU AND VARIABLES

6.1 – 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
Is	=	0 – 600	mA	RMS value of the fault or leakage current of the systems “S”
Id	=	0 – 600	mA	RMS value of the fault or leakage current of the systems “D”
V	=	0.00 – 66.00	V	RMS value of the monitoring voltage applied by the Main Injection Unit to the systems under supervision.
RGs	=	0 – 65000	Ω	Insulation resistance of the section “S”
RGd	=	0 – 65000	Ω	Insulation resistance of the section “D”
cos s	=	0.0 – 1.00	-	Power factor of the fault current of the section “S”
cos d	=	0.0 – 1.00	-	Power factor of the fault current of the section “D”

6.2 – 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

6.3 – 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
Is	=	0 – 600	mA	RMS value of the fault or leakage current of the systems “S”
Id	=	0 – 600	mA	RMS value of the fault or leakage current of the systems “D”
V	=	0.00 – 66.00	V	RMS value of the monitoring voltage applied by the Main Injection Unit to the systems under supervision.
RGs	=	0 – 65000	Ω	Insulation resistance of the section “S”
RGd	=	0 – 65000	Ω	Insulation resistance of the section “D”
cos s	=	0.0 – 1.00	-	Power factor of the current of the section “S”
cos d	=	0.0 – 1.00	-	Power factor of the current of the section “D”

6.4 – 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
1RGs	=	0 – 65535	Number of trippings of the first element of system "S"
1RGd	=	0 – 65535	Number of trippings of the first element of system "D"
2RGs	=	0 – 65535	Number of trippings of the second element of system "S"
2RGd	=	0 – 65535	Number of trippings of the second element of system "D"
IRF	=	0 – 65535	Number of Internal Relay Fault
HR	=	0 – 65535	Number of DSP W.D. resets

6.5 – 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:
				- **1RGs** = 1st element of system "S" - **1RGd** = 1st element of system "D" - **2RGs** = 2nd element of system "S" - **2RGd** = 2nd element of system "D"
Date	:	YYYY/MM/GG		Date: Year/Month/Day
Time	:	hh:mm:ss:cc		Time: hours/minutes/second/hundredths of seconds
Is	:	0 – 600	**mA**	RMS value of the fault or leakage current of the systems "S"
Id	:	0 – 600	**mA**	RMS value of the fault or leakage current of the systems "D"
V	:	0.00 – 66.00	**V**	RMS value of the monitoring voltage applied by the Main Injection Unit to the systems under supervision.
RGs	:	0 – 65000	**Ω**	Insulation resistance of the section "S"
RGd		0 – 65000	**Ω**	Insulation resistance of the section "D"
cos s	:	0.0 – 1.00	**-**	Power factor of the current of the section "S"
cos d	:	0.0 – 1.00	**-**	Power factor of the current of the section "D"

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

6.6 – Programming / Reading the Relay Settings (R/W Setting)

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

6.6.1 – Communication Address

- △▽ " Communication Address " ↳
- " Add: # " ↳
- " Password ???? " (if not yet entered; see § 7)
- △▽ 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	-

6.6.2 – 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

6.6.3 – Rated Input Values

- △▽ " Rated Input Value "
- ↳ 1st Variable
- △▽ to scroll variables
- ↳ to modify selected variable
- " Password ???? " (if not yet entered) or #??? (if not yet entered; see § 10)
- △▽ to set variable value,
- ↳ to validate.

Display	Description	Setting Range	Step	Unit
Rsrvd	Reserved			
Freq 50 **Hz**	System rated frequency	50 - 60	10	Hz

6.6.4 – 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 Value	Unit			
Password		=	0000-9999	1111	-	Password for programming enable (see §7)		
1RGs	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	-
	TripLevels	→	1RGs	1000	Ω	First trip level for system "S"	100 – 5000	100
	Timers	→	1ts	1	s	Trip time delay	0.1 – 100	0.1
1RGd	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	-
	TripLevels	→	1RGd	1000	Ω	First trip level for system "D"	100 – 5000	100
	Timers	→	1td	1	s	Trip time delay *	0.1 – 100	0.1
2RGs	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	-
	TripLevels	→	2RGs	200	Ω	Second trip level for system "S"	100 – 5000	100
	Timers	→	2ts	0.1	s	Trip time delay	0.1 – 100	0.1
2RGd	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	-
	TripLevels	→	2RGd	200	Ω	Second trip level for system "D"	100 – 5000	100
	Timers	→	2td	0.1	s	Trip time delay *	0.1 – 100	0.1
OperMod	FuncEnable	→	No Parameters					
	Options	→	Op_R1	N.D.		For selection of different operation	N.E./N.D.	-
			Op_R2	N.D.		For selection of different operation	N.E./N.D.	-
			Ctrl	Local		Control mode Local / Remote (via serial)	Local – Remote	-
	TripLevels	→	No Parameters					
	Timers	→	No Parameters					
IRF	FuncEnable	→	No Parameters					
	Options	→	OpIRF	NoTrip		Trip on detection of relay internal fault	NoTrip – Trip	-
			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					
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)

6.7 – Commands

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

Display		Description
Clear	:	Erase memory of Trip Counters, Event Records.
Test	:	Starts a relay diagnostic test
Reset	:	Reset after trip of R1&R2

6.8 – 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 ".

7. PASSWORD

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

7.1 - 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

Fig

Fig

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.

7.2 - 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.

7.3 - 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 MS-Com Operational Manual) or keeping the password disabled just clicking on the OK button when the password is requested.

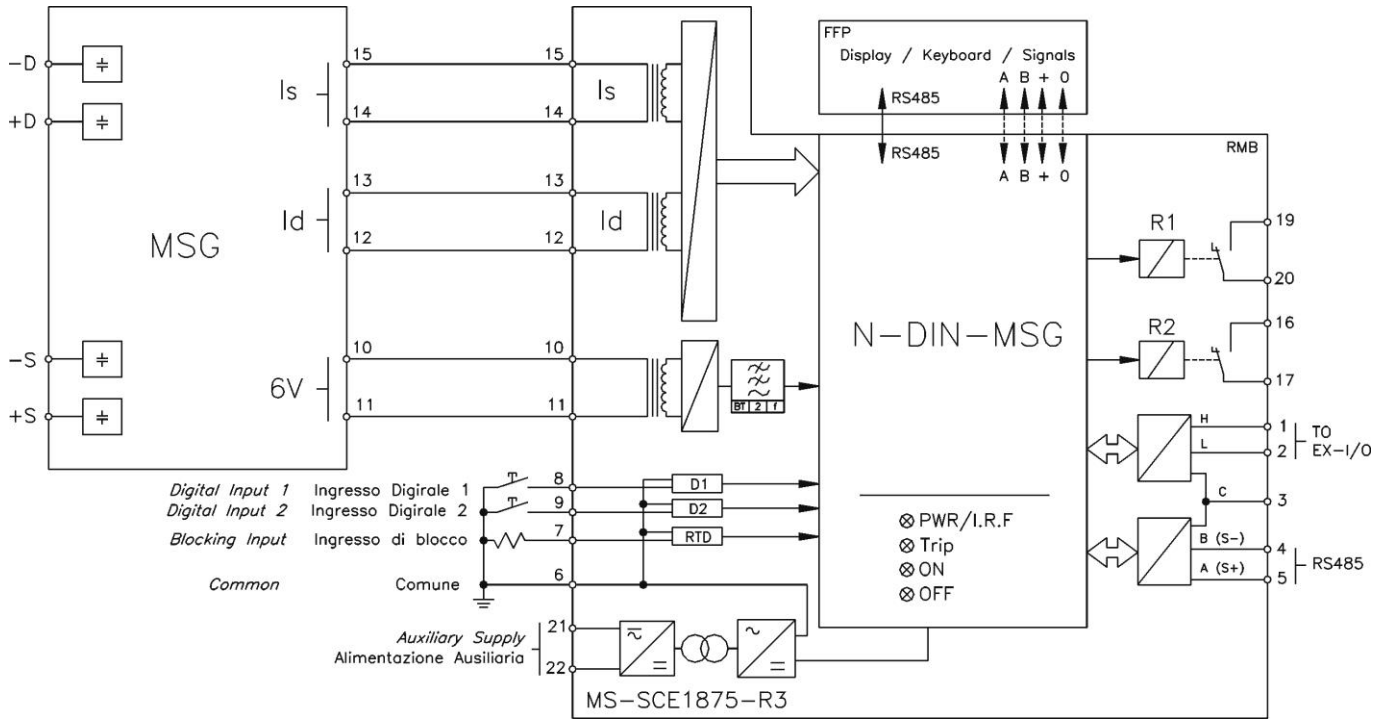
8. MAINTENANCE

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.

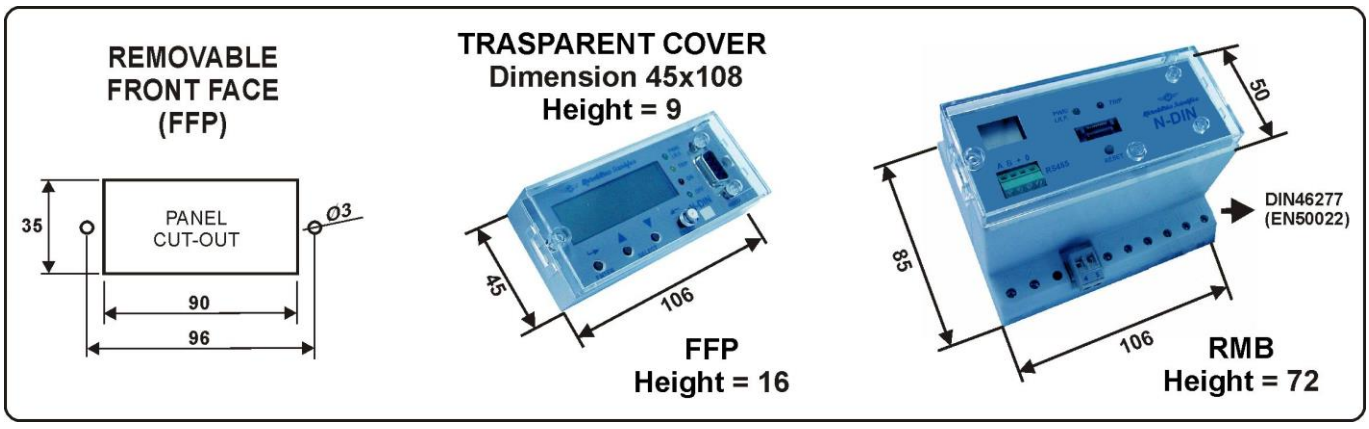
9. POWER FREQUENCY INSULATION TEST

Every relay individually undergoes a factory insulation test according to IEC255-5 standard at 2 kV, 50 Hz 1min. 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.

10. CONNECTION DIAGRAM



11. 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 selalable 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.

12. ELECTRICAL CHARACTERISTICS

APPROVAL: CE
REFERENCE STANDARDS IEC 60255 - EN50263 - 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 60068)					
❑	Operation ambient temperature		-10°C / +55°C		
❑	Storage temperature		-25°C / +70°C		
❑	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 93% Without Condensing AT 40°C	
CE EMC Compatibility (EN50081-2 - EN50082-2 - EN50263)					
❑	Electromagnetic emission		EN55022		industrial environment
❑	Radiated electromagnetic field immunity test		IEC61000-4-3	level 3	80-2000MHz 10V/m
			ENV50204		900MHz/200Hz 10V/m
❑	Conducted disturbances immunity test		IEC61000-4-6	level 3	0.15-80MHz 10V
❑	Electrostatic discharge test		IEC61000-4-2	level 4	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
❑	Immunity to conducted common mode disturbance 0Hz-150KHz		IEC61000-4-16	level 4	
❑	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					
❑	Accuracy at reference value of influencing factors		2%		for measurements of current
			5%		for measurements of resistance
			2% +/- 20ms		for times
❑	Rated Current		In = 1A		
❑	Current overload		50 A for 1 sec; 2A continuous		
❑	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 – 9600/19200 bps – 8,N,1 - 8,E,1 - 8,O,1 – Modbus RTU		
❑	FFP		RS232 – 9600bps – 8,N,1 – Modbus RTU		

Microelettrica Scientifica S.p.A. - 20089 Rozzano (MI) - Italy - Via Alberelle, 56/68
Tel. (++39) 02 575731 - Fax (++39) 02 57510940
http://www.microelettrica.com **e-mail :** ute@microelettrica.com