

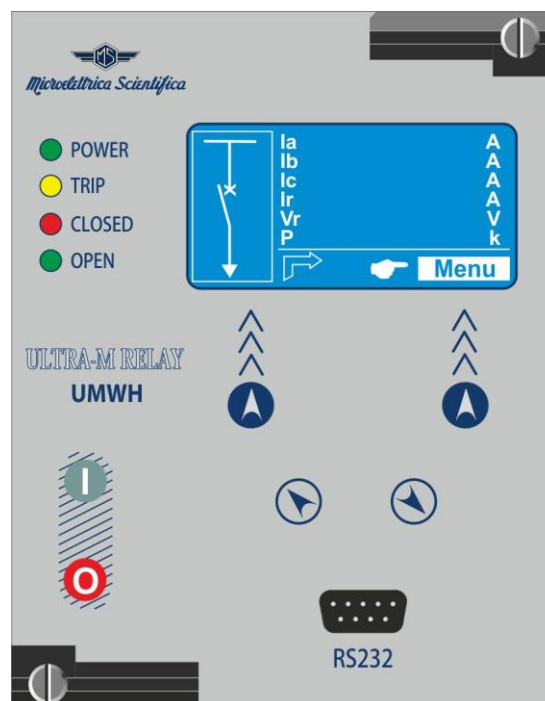
EARTH FAULT MANAGER RELAY

TYPE

UMWH
(Multiple I/O Boards)

ULTRA Line

OPERATION MANUAL



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1. General Utilization and Commissioning Directions

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

1.1 - Storage and Transportation

Must comply with the environmental conditions stated in the product's specification 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 effectiveness.

1.7 - Setting and Calibration

Carefully check the proper setting of the different functions according to the configuration of the protected system, the safety regulations and the co-ordination with other equipment.

1.8 - Safety Protection

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

1.9 - Handling

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

The damage caused by electrostatic discharge may not be immediately apparent but the design reliability and the long life of the product will have been reduced. The electronic circuits produced by M.S. are completely safe from electrostatic discharge (8 kV IEC 255.22.2) when housed in their case; withdrawing the modules without proper cautions expose them to the risk of damage.

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 altered or replaced.
For repair please ask the Manufacturer or its authorized Dealers.

Misapplication of the above warnings and instruction relieves the Manufacturer of any liability.

2. General

Input voltage are supplied to 4 Potential Transformers: three measuring phase-to-neutral voltage and one measuring the zero sequence voltage supplied by the secondary of three system P.Ts. Y/Open Delta connected.

The Measuring Ranges of the different inputs respectively are:

Phase Voltage : (0.01 - 2)Un
Neutral Voltage : (0.01 - 2)Un

Make electric connection in conformity with the diagram reported on relay's enclosure.

Check that input currents and voltages are same as reported on the diagram and on the test certificate.

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

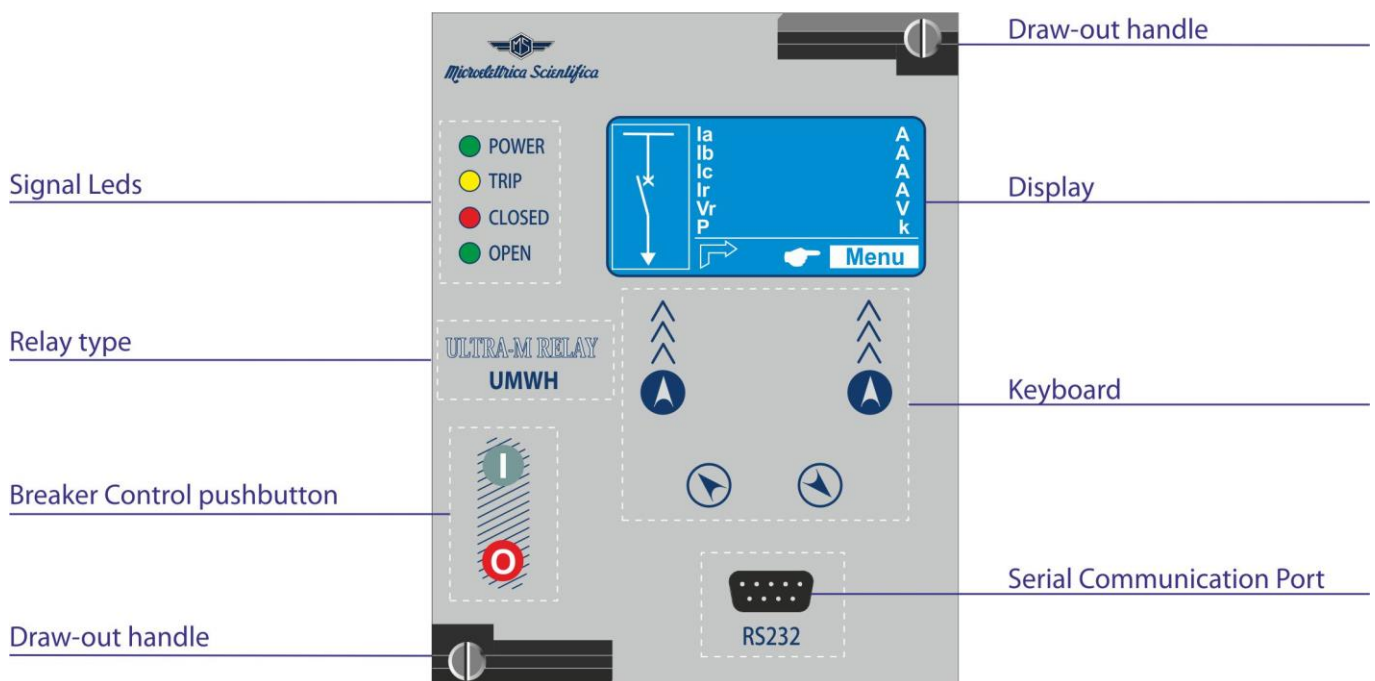
2.1 - Power Supply

The relay can be fitted with two different types of **power supply**:

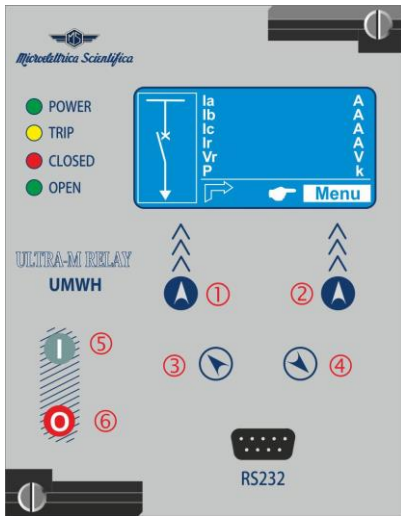
Type 1) - {	24V(-20%) / 110V(+15%) a.c.	Type 2) - {	80V(-20%) / 220V(+15%) a.c.
	24V(-20%) / 125V(+20%) d.c.		90V(-20%) / 250V(+20%) d.c.

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

3. Front Panel



4. Keyboard and Display



Navigation menu

By these buttons the options showed in correspondence on the display are selected.



Increase

These buttons are used to scroll the items of the different menus (Local Control, Measurements, Energy metering etc).



Decrease



Open

these buttons (when enabled) operate Circuit Breaker Open/Close control (see § C/B Mnng)

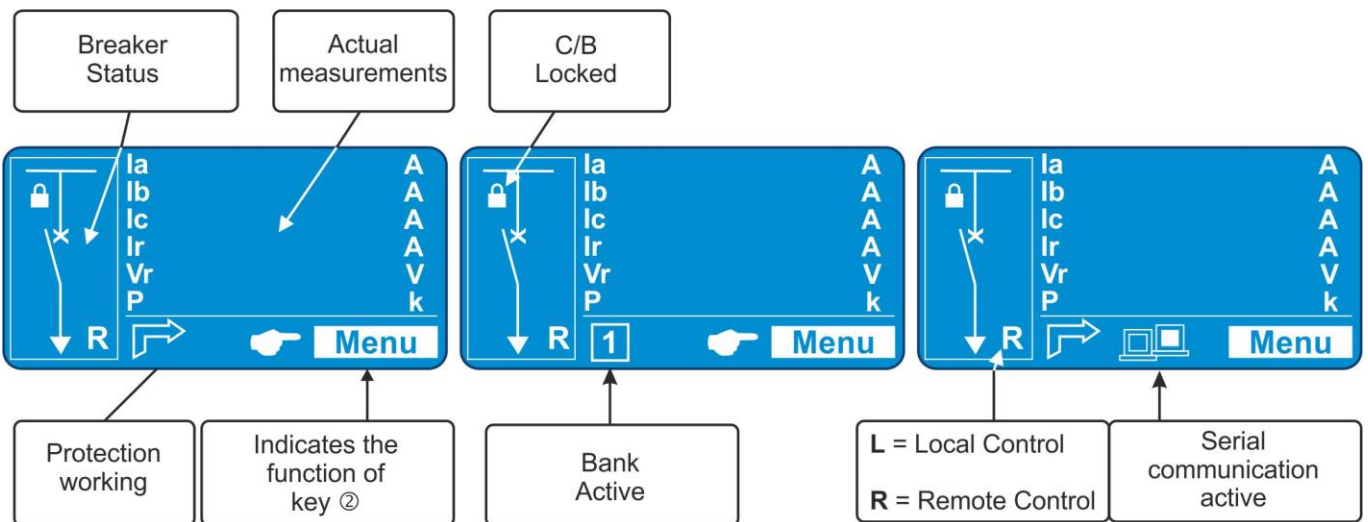


Close

- ❑ By the key ② select the windows showing the ICONS of the available menus.
- ❑ By the key ③, ④ select the desired icon and enter by key ①
- ❑ The different elements can be selected by the key ③ and ④.
The details of the individual menus are given in the following paragraphs.

4.1 - Display

The 128x64 pixel LCD display the available information (menu, etc.).

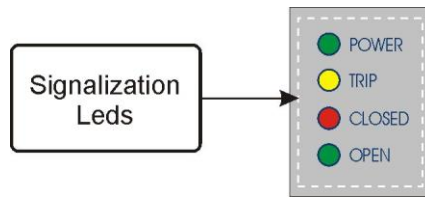


5. Icons of Display

	LocalCmd	Local Commands
	Measure	Actual Measurements
	TripTrec	Trip Recording
	Counter	Partial Counters (Resettable Counter)
	Event	Event Recording
	Setting	Function Settings
	System	System Settings
	TimeDate	Time and Date
	Healthy	Diagnostic Information
	Info	Info Device

6. Signalization

Four signal leds are provided:



Green Led	 POWER	☐ Illuminated - Relay working properly. ☐ Flashing - Internal Relay Fault
Yellow Led	 TRIP	☐ Off - No Trip ☐ Illuminated - Trip occurred ☐ Flashing - Function Timing Reset from Illuminated status is manual
Red Led	 CLOSED	☐ Off - C/B Open ☐ Illuminated - C/B Close
Green Led	 OPEN	☐ Off - C/B Close ☐ Illuminated - C/B Open

Both Flashing

Operation of Trip Circuit Supervision element.

- ☐ In case of auxiliary power supply failure the status of the leds is recorded and reproduced when power supply is restored.

6.1 - Leds Manual Reset

For Leds' manual reset operate as follows:

- 
 - Press "**Menu**" for access to the main menu with icons.
- 
 - Select icon "**Cmd**".
 - Press "**Select**",
- 
 - Select "**LedClear**".
 - Press "**Select**" to execute the command. (See § Password).
- 
 - When command has been executed the display shows "**! Command Done**";

6.2 - Display of the last trip

Beside the signalization of the yellow led "Trip", indicating a generic function trip, the display shows a window indicating the last function that was tripped and the number of events that are stored in the memory. The display will show this window until the reset button or external reset are operated.

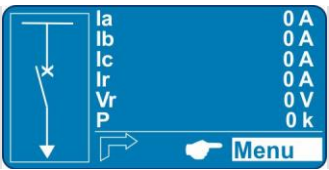
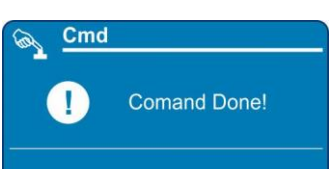
- 
 - Press "**Menu**" to access to the main menu with icons. Press "**Res.**" to erase visualization. Ex. "t1I>" (flashing) is the last trip.

7. Cmd (Local Command)

"**Cmd**" allow to operate from relay front face controls like Thermal Memory reset, Leds reset, etc.

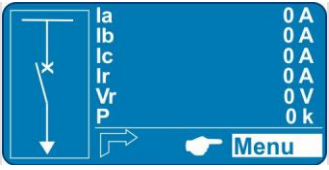
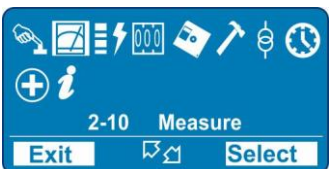
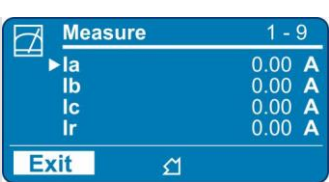
Menu	Description	Password
→ Led Clear	Reset of signal Leds	No
→ Relays Clear	Manual reset of output relays	No
→ Breaker Close	Manual C/B closing <i>(conditioned by Password)</i>	Yes
→ Breaker Open	Manual C/B opening <i>(conditioned by Password)</i>	Yes
→ Event Clear	Reset of all Events recorded	Yes
→ HistFail Clear	Reset of Internal Failure Historic records	Yes
→ Leds Test	Signal Leds test	No

To operate one command by the Front Face Keyboard, proceed as follows (Led Reset in the present example).

- 
 - Press "**Menu**" for access to the main menu with icons.
- 
 - Select "**Cmd**" icon with pushbutton "**Increase**" or "**Decrease**".
 - Press "**Select**" for access.
- 
 - Select with pushbutton "**Increase**" or "**Decrease**" the menu "**LedClear**".
 - Press "**Select**" to execute the command.
(if Password is request, see § Password).
- 
 - When command has been executed the display shows "**! Command Done**"; go to "3".

9. Measure

Real time values as measured during the normal operation.

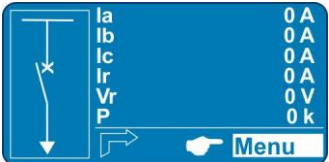
- 1 
 - Press "**Menu**" for access to the main menu with icons.
- 2 
 - Select "**Measure**" icon with pushbutton "**Increase**" or "**Decrease**".
 - Press "**Select**" for access.
- 3 
 - Scroll the menu "**Measure**" with pushbutton "**Increase**" or "**Decrease**" to display the measurement.
 - Press "**Exit**" to go to the main menu.

→ Ia	(0 ÷ 999999)	A	Phase A current	(R.M.S. ampere)
→ Ib	(0 ÷ 999999)	A	Phase B current	(R.M.S. ampere)
→ Ic	(0 ÷ 999999)	A	Phase C current	(R.M.S. ampere)
→ Ir	(0 ÷ 999999)	A	Residual Current filter + Harm	
→ Vr	(0 ÷ 999999)	V	Residual Voltage filter + Harm	
→ P	(0 ÷ 999999)	kW	Active Power	
→ Q	(0 ÷ 999999)	kVAr	Reactive Power	
→ S	(0 ÷ 999999)	kVA	Apparent Power	
→ Pm	(0 ÷ 999999)	kW	3 period average Active Power	

10. Trip Recording (TripRec)

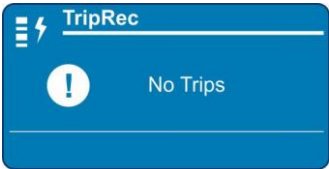
Display of the function which caused the tripping of the relay plus values of the measurement at the moment of tripping. The last 10 events are recorded.
The memory buffer is refreshed at each new relay tripping (FIFO logic).

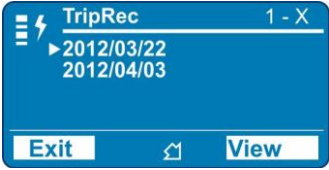
Display	→	Reading of recorded Trips.
Erase	→	Clear all Trip recorded.

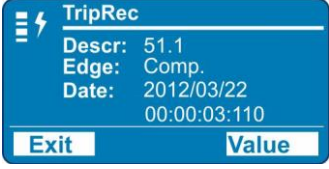
- 

- Press "**Menu**" for access to the main menu with icons.
- 

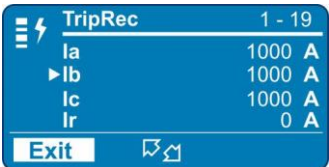
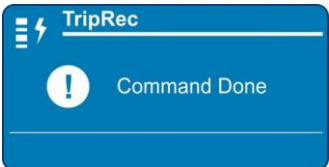
- Select "**LTrip**" icon with pushbutton "**Increase**" or "**Decrease**".
 - Press "**Select**" for access.
- 

- Select "**Display**" with pushbutton "**Increase**" or "**Decrease**".
 - Press "**Select**" for access.
 - For "**Erase**" go to "8"
- 

- If no trip is recorded the display shows "**! No Trips**".
- 

- If any trip was recorded, select "**View**" to display the chronological list of the records.
 - By the keys "**Increase**" or "**Decrease**" select the date of the record to be checked.
- 

- Will be shown:
 - "**Descr**" the function that caused the event (Example: t1I> = Trip)
 - "**Edge**" if the function was tripped (Rise) or reset (Fall)
 - "**Date**", date of trip, year/month/day, hour:minutes:seconds:milliseconds
 - Press "**Value**", for reading the value of input quantities on tripping.

- 7**
- 
- Scroll with pushbuttons "**Increase**" or "**Decrease**" the available measurements.
 - Select "**Exit**" to go back to "5" for another selection, or "2" go back to the main menu.
- 8**
- 
- Select "**Erase**" with button "**Decrease**".
 - Press "**Select**" to execute the commands; **All** Trips recorded are erased. (if Password is request, see § Password).
- 9**
- 
- When command has been executed the display shows "**! Command Done**";
 - Press "**Exit**" to go back to the main menu.

→ Date	<i>Date</i> : Year/Month/Day	
	<i>Time</i> : hours/minutes/second/hundredths of seconds	
→ Cause	Indication of the protection function which caused the relay tripping.	
→ Ia	Phase A current	A
→ Ib	Phase B current	A
→ Ic	Phase C current	A
→ Ir	Residual Current filter	A
→ Vr	Residual Voltage filter	V
→ P	Active Power	kW
→ Q	Reactive Power	kVAr
→ S	Apparent Power	kVA
→ Pm	3 period average Active Power	kW

11. Counters

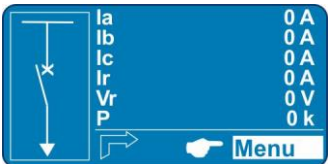
Counters of the number of operations for each of the relay functions.

By the interface program "MScCom2" it is possible to individually reset the counters and set an initial starting number.

Display	→	AVT	0	Operations counters	Timed forward fault
	→	AnVr	0	Operations counters	Fault Vr
	→	51.1	0	Operations counters	<i>First</i> overcurrent element
	→	51.2	0	Operations counters	<i>Second</i> overcurrent element
	→	51.3	0	Operations counters	<i>Third</i> overcurrent element
	→	50.1	0	Operations counters	<i>First</i> short circuit overcurrent element
	→	50.2	0	Operations counters	<i>Second</i> short circuit overcurrent element
	→	50.3	0	Operations counters	<i>Third</i> short circuit overcurrent element
	→	51N.1	0	Operations counters	<i>First</i> time delay earth fault element
	→	51N.2	0	Operations counters	<i>Second</i> time delay earth fault element
	→	51N.3	0	Operations counters	<i>Third</i> time delay earth fault element
	→	50N.1	0	Operations counters	<i>First</i> instantaneous earth fault element
	→	50N.2	0	Operations counters	<i>Second</i> instantaneous earth fault element
	→	50N.3	0	Operations counters	<i>Third</i> instantaneous earth fault element
	→	IRF	0	Operations counters	Internal Relay Fault
	→	Aut Op	0	Operations counters	Automatic C/B Openings
	→	Aut CL	0	Operations counters	Automatic C/B Closings
	→	Man Op	0	Operations counters	Manual C/B Openings
	→	Man CL	0	Operations counters	Manual C/B Closings
	→	OvrOp	0	Operations counters	Overall C/B Openings total (Man+Aut)
	→	OvrCL	0	Operations counters	Overall C/B Closings total (Man+Aut)
	→	BrkF	0	Operations counters	Breaker failure to open

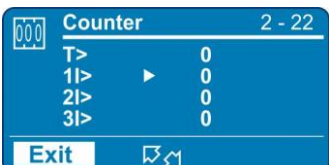
Erase → Reset all Counters
(By the interface program "MScCom 2" it is possible to individually reset the counters and set an initial starting number)

- 1**

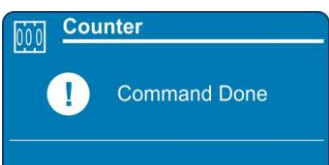

 - Press "**Menu**" for access to the main menu with icons.
- 2**


 - Press "**Counter**" for access.
- 3**


 - Press "**Display**" for access.
- 4**


 - Display of the number of operations of each individual function.
 - With pushbuttons "**Increase**" or "**Decrease**" scroll the parameters
 - Press "**Exit**" go back to "3".
- 5**


 - Select "**Erase**" with pushbutton "**Decrease**".
 - Press "**Select**".
 - (if Password is request, see § Password).
- 6**


 - When command has been executed the display shows "**! Command Done**"; and return to "5".
 - With pushbutton "**Exit**" to go back to the main menu.

13. EVENTS (Recorder Chronologic Events)

Display of the function which caused any of the following events: - *Status change of digital Inputs/Outputs.* - *Start of protection functions – Trip of protection function – Function reset.*

The last 100 events are recorded.

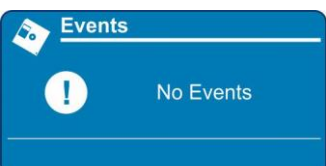
The memory buffer is updated at each new event.

Display	→	Reading events recorded.
Erase	→	Clear all events recorded.

- 

 - Press "**Menu**" for access to the main menu with icons.
- 

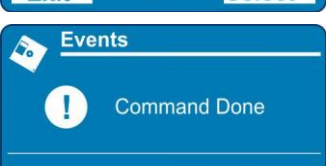
 - Select "**Events**" icon with pushbutton "**Increase**" or "**Decrease**".
 - Press "**Select**" for access.
- 

 - Select "**Display**" with pushbutton "**Increase**" or "**Decrease**".
 - Press "**Select**" for access.
 - For "**Erase**" go to "7"
- 

 - If no event is recorded the display shows message "**! No Events**".
- 

 - If any event was recorded, select "**View**" to display the chronological list of the records.
 - By the keys "**Increase**" or "**Decrease**" select the date of the record to be checked.
- 

 - Will be shown:
 - "**Descr**" the function that caused the event (Example: 1I> = Start, t1I> = Trip)
 - "**Edge**" if the function was tripped (Rise) or reset (Fall)
 - "**Date**", date of trip, year/month/day, hour:minutes:seconds:milliseconds
- 

 - Select "**Erase**" with button "**Decrease**".
 - Press "**Select**" to execute the commands; **All** Events recorded are erased. (if Password is request, see § Password).
- 

 - When command has been execute the display shows "**! Command Done**";
 - Press "**Exit**" to go back to the main menu.

13.1 – Events on display

Functions	Events Displayed	Events Description MScom2	Status	
DPN-DPP	Sw α TMDN TMDP	Power threshold Sw constructor factor adjust DPNM hold time DPPM hold time		
AVAL / AMONT	TAV	AVT hold time		
Inhib.I	SVr TMDP	Internal Inhibition Vr level IIM hold time		
Inhib.E		External Inhibition		
AnVr	AnVr	Anomaly Vrr level	Rise	Fall
51.1	51.1 t51.1	Start Trip First overcurrent element	Rise	Fall
51.2	51.2 t51.2	Start Trip Second overcurrent element	Rise	Fall
51.3	51.3 t51.3	Start Trip Third overcurrent element	Rise	Fall
50.1	50.1 t50.1	Start Trip First short circuit overcurrent element	Rise	Fall
50.2	50.2 t50.2	Start Trip Second short circuit overcurrent element	Rise	Fall
50.3	50.3 t50.3	Start Trip Third short circuit overcurrent element	Rise	Fall
51N.1	51N.1 t51N.1	Start Trip First time delay earth fault element	Rise	Fall
51N.2	51N.2 t51N.2	Start Trip Second time delay earth fault element	Rise	Fall
51N.3	51N.3 t51N.3	Start Trip Third time delay earth fault element	Rise	Fall
50N.1	50N.1 t50N.1	Start Trip First instantaneous earth fault element	Rise	Fall
50N.2	50N.2 t50N.2	Start Trip Second instantaneous earth fault element	Rise	Fall
50N.3	50N.3 t50N.3	Start Trip Third instantaneous earth fault element	Rise	Fall
IRF	IRF tIRF	Start Trip Internal Relay Failure	Rise	
	BF	Circuit Breaker failure	Rise	Fall
	L/Rdisc.	Local/Remote signal Discrepancy	Rise	
	manOpKey	Circuit Breaker intentional open by Key	Rise	
	manOpLocC	Circuit Breaker intentional open by local command	Rise	
	manOpRemC	Circuit Breaker intentional open by remote command	Rise	
	manOpExtIn	Circuit Breaker intentional open by external input	Rise	
	ExterManOp	Circuit Breaker intentional external open	Rise	
	manCIKey	Circuit Breaker intentional close by Key	Rise	
	manCILOC	Circuit Breaker intentional close by local command	Rise	
	manCIRemC	Circuit Breaker intentional close by remote command	Rise	
	manCIExtIn	Circuit Breaker intentional close by external input	Rise	
	ExterManCh	Circuit Breaker intentional external close	Rise	
	0.D0 ----	Digital Input	Rise	Fall
	0.D4 1.D1 ----	Digital input	Rise	Fall
	1.D15 2.D1 ----	Digital input	Rise	Fall
	2.D15 0.R1 ----	Output relay	Rise	Fall
	0.R6 1.R1 ----	Output relay	Rise	Fall
	1.R14 2.R1 ----	Output relay	Rise	Fall
	2.R14			
	UpDateMon	Update Monitor	Rise	Fall
	IPU boot	IPU boot	Rise	
	TimeSynchro	Time Synchronization	Rise	

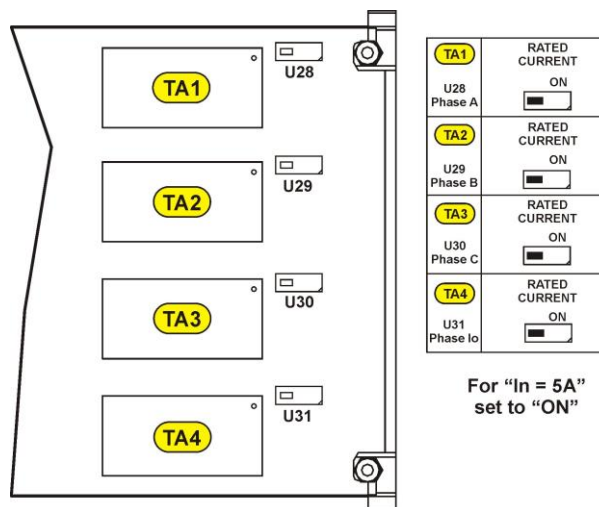
14. System (System parameters)

Setting of system parameters.

CT&PTs	Phase CT	Prim.	→	1000	A	(1 ÷ 9999)	step	1	A	(1)
		Sec.	→	1	A	(1 / 5)				
	PT (Ph-Ph)	Prim.	→	10.00	kV	(0.10 ÷ 500.00)	step	0.01	kV	(2)(3)
		Sec.	→	100	V	(50 ÷ 150)	step	1	V	
	Neut. CT	Prim.	→	1000	A	(1÷9999)		1	A	(1)
		Sec.	→	1	A	(1 / 5)				
Nom.Val. (System Rated Values)			→	Freq.	50	Hz				
			→	In	500	A	(1÷9999)	1	A	
			→	Un	10.00	kV	(0.10 ÷ 500.00)	0.01	kV	
Setup Group			→	Group	1	(1 / 2)				

- ☐ **Fn** : Nominal Frequency
- ☐ **In** : Nominal Current
- ☐ **Un** : Nominal Voltage
- ☐ **Group** : Setting group active

(1) Move the switch in the corresponding founding to the required input current as herebelow shorted.



(2) Set the value of the phase-to-phase PT voltage.

$$\text{Example: Example :TV} \quad \frac{10000 : \sqrt{3}}{100 : \sqrt{3}} \rightarrow \text{set} \quad \frac{\text{Prim.}=10000}{\text{Sec.}=100}$$

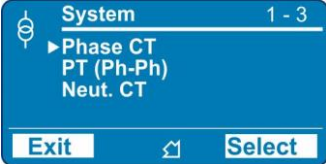
(3) Zero sequence voltage input is to be supplied by three system P.Ts. Y/Open Delta connected; the open delta connected secondary are rated 1/3 of the phase-to-phase secondary voltage (Example: 10000 / 100:√3 / 100:3).

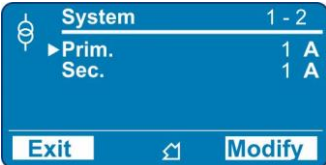
- 1**

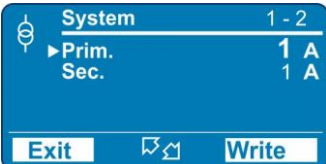

 - Press "**Menu**" for access to the main menu with icons.
- 2**


 - Select "**Sys**" icon with pushbuttons "**Increase**" or "**Decrease**".
 - Press "**Select**" for access.
- 3**

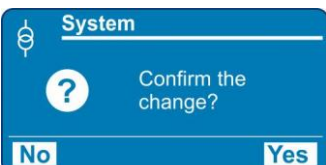

 - Select "**CT&PTs**".
 - Press "**Select**" for access.
- 4**


 - Select "**Phase CT**".
 - Press "**Select**" for access.
- 5**


 - Select "**Prim.**" to modify the primary value of Phase CT, or press "**Decrease**" and select "**Sec.**" to modify the secondary value of Phase CT.
 - Press "**Modify**" to modify the parameter.
(if Password is request, see § Password).
- 6**

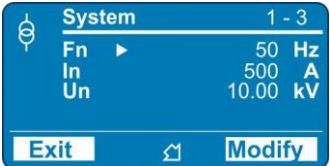

 - The value appear as bold figure.
 - Use pushbuttons "**Increase**" or "**Decrease**" to set the value.
 - Press "**Write**" to confirm the value
- 7**


 - The value is now set.
 - To set a new value return to the point "5".
 - Press "**Exit**".
- 8**


 - The display show "**Confirm the change?**".
 - Choose "**Yes**" to convalidate the changes.
 - Choose "**No**" to **not** confirm the changes.
 - After set confirmation (or non confirmation) the display goes back to point "4".

- 9**


 - To modify the input quantities, select with pushbutton "**Decrease**", "**Sys.Rating**".
 - Press "**Select**" for access.
- 10**


 - To set the input quantities see points "5-6-7-8" .
- 11**


 - To select the Active Bank of setting press "**SetUp Group**".
- 12**


 - Select with pushbuttons "**Increase**" or "**Decrease**", the Bank to be Active.

15. Settings

Two complete Group of settings of the programmable variables are available in the "**SETTING**" menu. Both "Group #1" and "Group #2" include the hereunder listed variables.

- 1   Indicates the Setting Group that is actually being modified.
-  This symbol indicates that the function is enabled; symbol missing indicates that the function is disabled.

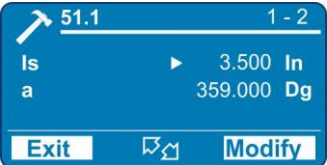
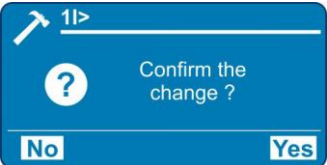
→ Comm.	Serial communication parameters	
→ HMI	Visualization parameters	
→ DNP-DPP	Detection module	
→ AVAL/AMONT	Signal Forward/Reverse fault elaboration module	
→ Inhib.I	Internal inhibition	
→ Inhib.E	External inhibition	
→ AnVr	Fault Vr	
→ 51.1	<i>First</i>	overcurrent element
→ 51.2	<i>Second</i>	overcurrent element
→ 51.3	<i>Third</i>	overcurrent element
→ 50.1	<i>First</i>	short circuit overcurrent element
→ 50.2	<i>Second</i>	short circuit overcurrent element
→ 50.3	<i>Third</i>	short circuit overcurrent element
→ 51N.1	<i>First</i>	time delay earth fault element
→ 51N.2	<i>Second</i>	time delay earth fault element
→ 51N.3	<i>Third</i>	time delay earth fault element
→ 50N.1	<i>First</i>	instantaneous earth fault element
→ 50N.2	<i>Second</i>	instantaneous earth fault element
→ 50N.3	<i>Third</i>	instantaneous earth fault element
→ ExtReset	Configuration for external reset input	
→ IRF	Internal Relay Fault	
→ CB Mngr	C/B command Local / Remote setting	
→ Oscillo	Setting variables for Oscillographic recording	
→ BrkFail	Setting variables for Breaker Failure detection	



15.1 - Modifying the setting of variables

To modify any variable setting by the keyboard proceed as follows:

(example: change setting of element "51.1", from "Is 4.000 In" to "Is 3.500 In")

- | | | | |
|--|---|--|---|
| 1  | <ul style="list-style-type: none"> Press "Menu" for access to the main menu with icons. | 6  | <ul style="list-style-type: none"> The value appear as bold figure. |
| 2  | <ul style="list-style-type: none"> Select icon "Setting" by pushbuttons "Increase" or "Decrease". Press "Select". | 7  | <ul style="list-style-type: none"> Set new values pushbuttons "Increase" or "Decrease" buttons. Press "Write". |
| 3  | <ul style="list-style-type: none"> Select by pushbuttons "Increase" or "Decrease" the parameter "51.1". Press "Select". | 8  | <ul style="list-style-type: none"> If the change of parameters is completed, press "Exit". |
| 4  | <ul style="list-style-type: none"> Select by buttons "Increase" or "Decrease" the menu "Oper.Levels". Press "Select". | 9  | <ul style="list-style-type: none"> "Yes" confirm all changes. "No" voids all the changes. |
| 5  | <ul style="list-style-type: none"> The arrow aside "Is" shows the parameter selected for changing Press "Modify". If Password is request, see § Password | 10  | <ul style="list-style-type: none"> The relay returns to point "4". |

15.2 - Password

The password is requested any time the user wishes to modify any password protected parameter (example "51.1" menu "Setting").

The factory default password is "1111".

The password is only modifiable with "MCom 2" software (see Manual "MCom 2").

When password is requested, proceed as follows:

- | | | | |
|--|--|---|---|
| 1  | <ul style="list-style-type: none"> Use the key "Increase" and "Decrease" and set the first digit of password. | 5  | <ul style="list-style-type: none"> Use the key "Increase" or "Decrease" to set the third digit. |
| 2  | <ul style="list-style-type: none"> Press "Next" to validate and go to the next digit. | 6  | <ul style="list-style-type: none"> Press "Next" to validate and go to the next digit. |
| 3  | <ul style="list-style-type: none"> Use the key "Increase" or "Decrease" to set second digit. | 7  | <ul style="list-style-type: none"> Use the key "Increase" or "Decrease" to set the fourth digit. |
| 4  | <ul style="list-style-type: none"> Press "Next" to validate and go to the next digit. | 8  | <ul style="list-style-type: none"> Press "Next" to validate and go to modify the next parameter. |



By key "**Prev**" go back to previous digit.



The password validity expires 60 sec after the last setting modification or as soon as you go back to the main menu



- | | | | |
|--|--|---|---|
| 1  | <ul style="list-style-type: none"> If set the incorrect password the display shows "! Wrong code". | 2  | <ul style="list-style-type: none"> The display will repeat the initial interrogation |
|--|--|---|---|



15.3 – Menu: **Comm.** (Communication parameters)

Options	→ BRLoc	38400	[9600 / 19200 / 38400 / 57600]
	→ BRRem	19200	[9600 / 19200 / 38400]
Node Address	→ Indir.	1	[1 ÷ 255]

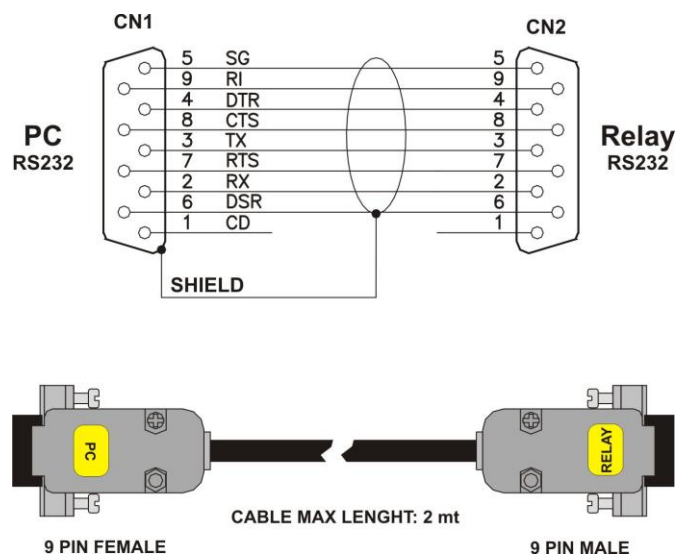
15.3.1 – Description of variables

- ☐ **BRLoc** : RS232 local (Front Panel) serial communication speed
- ☐ **BRRem** : RS485 remote (Rear terminal block) serial communication speed
- ☐ **Indir.** : Identification number for the connection on serial communication bus

15.3.2 – Front Panel serial communication port (RS232)

A D-Sub, pin female socket is available on Relay's front face for connection to the local RS232 serial communication line. Through this port - and by the interface program available from Microelettrica Scientifica S.p.A. (MCom 2 for Windows XP/7) - it is possible to connect a Personal Computer to download all available information, operate any control and program the relay; the protocol used is "Modbus RTU".

15.3.3 – Cable for direct connection of Relay to Personal Computer



15.3.4 – Main serial communication port (RS485)

From the Relay's back terminal board, a RS485 ports is available for communication with SCADA system with Protocol Modbus RTU or IEC60870-5-103 (selectable).

The communication interface allows to program all settings, operate all commands and download all information and records.

The physical connection can be via a normal pair of wires (RS485) or, on request, via fiber optic.



15.4 - Menu: **HMI**

Options	→	Lang	English	[English / Loc.Lang]
	→	Light	Autom.	[Autom. / On]
	→	Menu	Standard	[Standard / Extended]

15.4.1 – Description of variables

☐ Lang	:	Set Language
☐ Light	:	Set Display backlight
☐ Menu	:	Set Descriptions
		<i>Extended</i> = complete
		<i>Standard</i> = short

This menu allows to customize the Language and the Display's backlight.

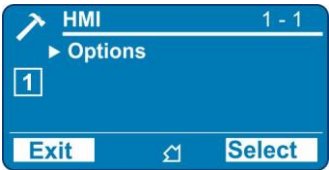
The standard languages are English and Italian. On request, other languages can be loaded (French, German, etc..).

The Display backlight can be programmed always on "ON" or switched-on "Automatically" for a few second at any operation of the keyboard "Auto".

Example: set Local Language.

- 

 - Press "**Menu**" for access to the main menu with icons.
- 

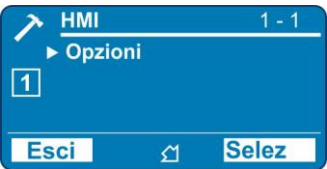
 - Select icon "**Setting**" by pushbuttons "**Increase**" or "**Decrease**".
 - Press "**Select**".
- 

 - Select "**Group 1**" or "**Group 2**".
 - Select "**LCD**".
 - Select "**Options**".
 - Press "**Select**".
- 

 - Select "**Lang**".
 - Press "**Modify**".
- 

 - Select "**Loc.Lang**".
 - Press "**Write**".
 - If Password is requested, see § Password
- 

 - Press "**Exit**".
- 

 - "**Yes**" confirms all changes.
 - "**No**" void all changes.
- 

 - After set confirmation the display shows "**Please Wait**".



15.5 - Function: **DPN-DPP** (Detection module)

Status	→	Enab.	No		[No / Yes]			
Oper.Levels	→	Sw	120	kW	[20 ÷ 120]	step	1.000	kW
	→	α	0.9		[0.5 ÷ 0.9]	step	0.001	
Timers	→	TMDN	0.2	s	[0.1 ÷ 10]	step	0.05	s
	→	TMDP	0.2	s	[0.1 ÷ 10]	step	0.05	s

15.5.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **Sw** : Power threshold
- ☐ **α** : Sw constructor factor adjust
- ☐ **TMDN** : DPNM hold time
- ☐ **TMDP** : DPPM hold time

15.6 - Function: **AVAL/AMONT** (Signal Forward/Reverse fault elaboration module)

Status	→	Enab.	No		[No / Yes]			
Timers	→	TAV	0.4	s	[0.1 ÷ 10]	step	0.01	s

15.6.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **TAV** : AVT hold time, timed forward fault

15.7 - Function: **Inhib.I** (Internal Inhibition)

Status	→	Enab.	No		[No / Yes]			
Oper.Levels	→	SVr	0.120	Vn	[0.01 ÷ 1]	step	0.01	Vn
Timers	→	TMI	0.55	s	[0.1 ÷ 10]	step	0.01	s

15.7.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **SVr** : Internal Inhibition Vr level
- ☐ **TMI** : IIM hold time

15.8 - Function: **Inhib.E** (External Inhibition)

Status	→	Enab.	No		[No / Yes]			
---------------	---	--------------	----	--	------------	--	--	--

15.8.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)

15.9 - Function: **AnVr** (Fault Vr)

Status	→	Enab.	No		[No / Yes]			
Oper.Levels	→	AnVr	1	Vn	[0.1 ÷ 1]	step	0.1	Vn

15.9.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **AnVr** : Anomaly Vrr level



15.10 - Function: **51.1** (First Overcurrent Element)

Status	→ Enab.	No		[No / Yes]
Options	→ tBI	Off		[Off / 2tBO]
Oper. Levels	→ Is	4	In	(0.1 ÷ 4) step 0.01 In
Timers	→ ts	100	s	(0.02 ÷ 100) step 0.01 s
	→ tBO	0.75	s	(0.05 ÷ 0.75) step 0.01 s

15.10.1 - Description of variables

☐	Enab.	:	Function enabling (No = Disable / Yes = Enable)
☐	tBI	:	Blocking input reset time Off = Permanent block 2tBO = Set 2xtBO.
☐	Is	:	Minimum operation level
☐	ts	:	Trip time delay
☐	tBO	:	Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.

15.10.2 - Blocking Logic (BO-BI)

For each Protection Function it is possible to activate a Blocking Logic allowing for inhibiting their operation by external signals supplied to the Digital Input.

15. 10.2.1 - Output Blocking signal "BO"

All the protection functions that can be programmed to operate in the blocking logic mode, element, have an instantaneous element (beside the time delayed) which is operated as soon as the controlled quantity exceeds the set trip level ($I > [Is]$ for current, etc..) and is instantaneously reset when the input quantity drops below the reset level (normally $0.95Is$).

The instantaneous element can control one of the user programmable output relays that, by its contacts, makes the signal available for blocking an external element (BO = Blocking Output).

In case, "tBO" sec after the set trip time "ts" has expired, the Protection function is still in operation (current above trip level), the Blocking Output relay (instantaneous element) is anyhow reset to eventually remove the Blocking signal from a back-up protection.

15. 10.2.2 - Blocking Input "BI"

For all the functions controllable by the Blocking Logic, it is possible to inhibit the time delayed tripping by an external signal that activates a Digital Input programmed for this functionality.

The programmed Digital Input gets activated by an external cold contact closing across its terminals.

With the variable "tBI" set to "OFF" ($tBI=OFF$), the tripping of the delayed function is blocked as long as the Blocking Input signal is present at the terminals of the Digital Input.

With the variable "tBI" set to "2xtBI" ($tBI=2xtBI$), 2xtBI seconds after the set trip time delay of the function has expired the blocking input is anyhow ignored and the function enabled to trip.

15.10.3 - Automatic doubling of Overcurrent thresholds on current inrush

For some of the phase Overcurrent functions it is possible to have the set trip level $[Is]$ automatically doubled when strong inrush current is detected.

If at circuit Breaker switch-on (i.e. when the input current rises from zero to a minimum measurable value) the current increases from 0 to 1.5 times the rated value $[In]$ in less than 60ms, the set minimum pick-up level $[Is]$ is dynamically doubled ($[Is] \rightarrow [2Is]$) and keeps this value until the input current drops below $1.25 \times In$ or the set time $[t2xI]$ has elapsed.

This functionality is very useful to avoid spurious tripping of the instantaneous, or short-time delayed Overcurrent elements, that could be experienced at switch-on of reactive loads like Transformer or Capacitors.



15.11 - Function: **51.2** (Second Overcurrent Element)

Status	→	Enab.	No		[No / Yes]			
Options	→	tBI	Off		[Off / 2tBO]			
Oper. Levels	→	Is	4	In	(0.1 ÷ 4)	step	0.01	In
Timers	→	ts	100	s	(0.02 ÷ 100)	step	0.01	s
	→	tBO	0.75	s	(0.05 ÷ 0.75)	step	0.01	s

15.11.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.

15.12 - Function: **51.3** (Third Overcurrent Element)

Status	→	Enab.	No		[No / Yes]			
Options	→	tBI	Off		[Off / 2tBO]			
Oper. Levels	→	Is	4	In	(0.1 ÷ 4)	step	0.01	In
Timers	→	ts	100	s	(0.02 ÷ 100)	step	0.01	s
	→	tBO	0.75	s	(0.05 ÷ 0.75)	step	0.01	s

15.12.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.



15.13 - Function: **50.1** (First short circuit overcurrent element)

Status	→	Enab.	No		[No / Yes]			
Options	→	tBI	Off		[Off / 2tBO]			
Oper. Levels	→	Is	20	In	(0.1 ÷ 20)	step	0.01	In
Timers	→	ts	100	s	(0.02 ÷ 100)	step	0.01	s
	→	tBO	0.75	s	(0.05 ÷ 0.75)	step	0.01	s

15.13.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.

15.14 - Function: **50.2** (Second short circuit overcurrent element)

Status	→	Enab.	No		[No / Yes]			
Options	→	tBI	Off		[Off / 2tBO]			
Oper. Levels	→	Is	20	In	(0.1 ÷ 20)	step	0.01	In
Timers	→	ts	100	s	(0.02 ÷ 100)	step	0.01	s
	→	tBO	0.75	s	(0.05 ÷ 0.75)	step	0.01	s

15.14.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.

15.15 - Function: **50.3** (Third short circuit overcurrent element)

Status	→ Enab.	No		[No / Yes]
Options	→ tBI	Off		[Off / 2tBO]
Oper. Levels	→ Is	20	In	(0.1 ÷ 20) step 0.01 In
Timers	→ ts	100	s	(0.02 ÷ 100) step 0.01 s
	→ tBO	0.75	s	(0.05 ÷ 0.75) step 0.01 s

15.15.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.



15.16 - Function: **51N.1** (First time delay earth fault element Overcurrent Element)

Status	→	Enab.	No		[No / Yes]				
Options	→	tBI	Off		[Off / 2tBO]				
Oper. Levels	→	Is	1	On	(0.005 ÷ 1)	step	0.001	On	
Timers	→	ts	100	s	(0.1 ÷ 100)	step	0.01	s	
	→	tBO	0.75	s	(0.05 ÷ 0.75)	step	0.01	s	

15.16.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.

15.17 - Function: **51N.2** (Second time delay earth fault element Overcurrent Element)

Status	→	Enab.	No		[No / Yes]				
Options	→	tBI	Off		[Off / 2tBO]				
Oper. Levels	→	Is	1	On	(0.005 ÷ 1)	step	0.001	On	
Timers	→	ts	100	s	(0.1 ÷ 100)	step	0.01	s	
	→	tBO	0.75	s	(0.05 ÷ 0.75)	step	0.01	s	

15.17.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.



15.17 - Function: **51N.3** (Third time delay earth fault element Overcurrent Element)

Status	→ Enab.	No	[No / Yes]				
Options	→ tBI	Off	[Off / 2tBO]				
Oper. Levels	→ Is	1	On (0.005 ÷ 1)	step	0.001	On	
Timers	→ ts	100	s (0.1 ÷ 100)	step	0.01	s	
	→ tBO	0.75	s (0.05 ÷ 0.75)	step	0.01	s	

15.17.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.

15.18 - Function: **50N.1** (First instantaneous overcurrent element)

Status	→ Enab.	No	[No / Yes]				
Options	→ tBI	Off	[Off / 2tBO]				
Oper. Levels	→ Is	3	On (0.005 ÷ 3)	step	0.001	On	
Timers	→ ts	100	s (0.1 ÷ 100)	step	0.01	s	
	→ tBO	0.75	s (0.05 ÷ 0.75)	step	0.01	s	

15.18.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.



15.19 - Function: **50N.2** (Second instantaneous overcurrent element)

Status	→ Enab.	No	[No / Yes]				
Options	→ tBI	Off	[Off / 2tBO]				
Oper. Levels	→ Is	3	On (0.005 ÷ 3)	step	0.001	On	
Timers	→ ts	100	s (0.1 ÷ 100)	step	0.01	s	
	→ tBO	0.75	s (0.05 ÷ 0.75)	step	0.01	s	

15.19.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.

15.20 - Function: **50N.3** (Third instantaneous overcurrent element)

Status	→ Enab.	No	[No / Yes]				
Options	→ tBI	Off	[Off / 2tBO]				
Oper. Levels	→ Is	3	On (0.005 ÷ 3)	step	0.001	On	
Timers	→ ts	100	s (0.1 ÷ 100)	step	0.01	s	
	→ tBO	0.75	s (0.05 ÷ 0.75)	step	0.01	s	

15.20.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBI** : Blocking input reset time
Off = Permanent block
2tBO = Set 2xtBO.
- ☐ **Is** : Minimum operation level
- ☐ **ts** : Trip time delay
- ☐ **tBO** : Time to reset of the Blocking Output after expiring of the Trip time delay. "tBO" is also the trip time delay of the Breaker Failure function.



15.21 - Function: **ExtReset** (External Reset Configuration)

This menu allows to configure the edge polarity of the digital input associated to the trip reset function.

Options	→ ActOn	RiseEdge	[RiseEdge / FallEdge]
----------------	----------------	----------	-----------------------

15.35.1 - Description of variables

- ☐ **ActOn** : RiseEdge Active on Rise Edge (Digital Input close).
FallEdge Active on Fall Edge (Digital Input open).

15.28 - Function: **IRF** (Internal Relay Fault)

In this menu it is possible to configure the operation of the Relay Internal Fault detection element

Status	→ Enab.	No	[No / Yes]
Timers	→ tIRF	5.00 s	(5÷200) step 0.01 s

15.28.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tIRF** : Trip time delay

15.28.2 - Operation

Tripping of the function operates a user programmable output relay.



15.29 - Function: **Oscillo** (Oscillographic Recording)

Status	→ Enab.	No		[No / Yes]
Options	→ Trig	Start		[Start / Trip / OnCmd / REUserLg / REUserLg]
Timers	→ tPre	0.50	s	(0.01÷0.50) step 0.01 s
	→ tPost	0.50	s	(0.01÷1.50) step 0.01 s

15.29.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **Trig** : Selection of the Trigger command source (start recording):
 - Start* = Trigger on time start of protection functions
 - Trip* = Trigger on trip (time delay end) of protection functions
 - OnCmd* = On Asynchronous Force trigger command
 - REUserLg* = On rising edge of "User Logic" (see § "User Trigger Oscillo")
 - FEUserLg* = On falling edge of "User Logic"
- ☐ **tPre** : Recording time before Trigger
- ☐ **tPost** : Recording time after Trigger

15.29.2 - Operation

In the options: "Trig = Start" and "Trig = Trip", the oscillographic recording starts respectively when any protection function starts operating or trip (provided the function was programmed "Enab = Yes").

The "Oscillo" Function includes the wave Form Capture of the input quantities and can totally store a record of 3 seconds.

The number of events recorded depends on the duration of each individual recording (tPre + tPost).

In any case the number of event stored can not exceed ten (10 x 0.3 sec).

Any new event beyond the 3 sec capacity of the memory, cancels and overwrites the former records (FIFO Memory).

15.29.3 – Available on MScOm2

	PFR<-Sw		Permanent fault, PFR<-Sw (Active Power < -Sw)
	PFR>αSw		Permanent fault, PFR>αSw (Active Power > αSw)
	S/P<3		Permanent fault, (SFr/PFr) <3 (Apparent Power/Active Power)
	S/P>5		Permanent fault, (SFr/PFr) >5 (Apparent Power/Active Power)
	P<-2.5Sw		Fault discontinuous / self-extinguishing, average active power under -2.5Sw.
	P>-0.85Sw		Fault discontinuous / self-extinguishing, average active power under -0.85Sw.
	P>2.5αSw		Fault discontinuous / self-extinguishing, average active power over -2.5Sw.
	P<0.85αSw		Fault discontinuous / self-extinguishing, average active power over -0.85Sw.
	DPN (Pem)		Permanent fault, POWER NEGATIVE (PFR<-Sw)&&((SFr/PFr) <3)
	DPP (Pem)		Permanent fault, POWER POSITIVE (PFR>αSw))&&((SFr/PFr) <3)
	DPN (Disc)		Fault discontinuous / self-extinguishing, POWER NEGATIVE
	DPP (Disc)		Fault discontinuous / self-extinguishing, POWER POSITIVE
	DPN		POWER NEGATIVE (permanent OR discontinuous / self-extinguishing)
	DPP		POWER POSITIVE (permanent OR discontinuous / self-extinguishing)
	DPNM		POWER NEGATIVE hold on dropoff (permanent OR discontinuous / self-extinguishing)
	DPPM		POWER POSITIVE hold on dropoff (permanent OR discontinuous / self-extinguishing)
	AMI		Instant reverse fault
	AVI		Instant forward fault
	AVT		Timed forward fault
	DPNMT		Negative power hold & timed
	SVrStart		Internal inhibition module Start SVr
	SVrTrip		Internal inhibition module Trip SVr
	II		Internal inhibition module II
	IIM		Internal inhibition module IIM
	EIPO		External Protection inhibition out signal (Istantaneous inhibition)
	EITO		External Time inhibition out of signal (Istantaneous inhibition)
	AnVrStart	Start	Start Fault Vr
	AnVrTrip	Trip	Trip Fault Vr
	AnVrRsvr1		Reserved
	AnVrRsvr2		Reserved
51.1	51.1-I4	Start	Phase Ia
	51.1-I8	Start	Phase Ib
	51.1-I12	Start	Phase Ic
	t51.1	Trip	First overcurrent element
	51.1	Start	
51.2	51.2-I4	Start	Phase Ia
	51.2-I8	Start	Phase Ib
	51.2-I12	Start	Phase Ic
	t51.2	Trip	Second overcurrent element
	51.2	Start	
51.3	51.3-I4	Start	Phase Ia
	51.3-I8	Start	Phase Ib
	51.3-I12	Start	Phase Ic
	t51.3	Trip	Third overcurrent element
	51.3	Start	
50.1	50.1-I4	Start	Phase Ia
	50.1-I8	Start	Phase Ib
	50.1-I12	Start	Phase Ic
	t50.1	Trip	First short circuit overcurrent element
	50.1	Start	
50.2	50.2-I4	Start	Phase Ia
	50.2-I8	Start	Phase Ib
	50.2-I12	Start	Phase Ic
	t50.2	Trip	Second short circuit overcurrent element
	50.2	Start	
50.3	50.3-I4	Start	Phase Ia
	50.3-I8	Start	Phase Ib
	50.3-I12	Start	Phase Ic
	t50.3	Trip	Third short circuit overcurrent element
	50.3	Start	

51N.1	51N.1-I4	Start	Phase Ia	First time delay earth fault element
	51N.1-I8	Start	Phase Ib	
	51N.1-I12	Start	Phase Ic	
	t51N.1	Trip		
51N.2	51N.2-I4	Start	Phase Ia	Second time delay earth fault element
	51N.2-I8	Start	Phase Ib	
	51N.2-I12	Start	Phase Ic	
	t51N.2	Trip		
51N.3	51N.3-I4	Start	Phase Ia	Third time delay earth fault element
	51N.3-I8	Start	Phase Ib	
	51N.3-I12	Start	Phase Ic	
	t51N.3	Trip		
50N.1	50N.1-I4	Start	Phase Ia	First instantaneous earth fault element
	50N.1-I8	Start	Phase Ib	
	50N.1-I12	Start	Phase Ic	
	t50N.1	Trip		
50N.2	50N.2-I4	Start	Phase Ia	Second instantaneous earth fault element
	50N.2-I8	Start	Phase Ib	
	50N.2-I12	Start	Phase Ic	
	t50N.2	Trip		
50N.3	50N.3-I4	Start	Phase Ia	Third instantaneous earth fault element
	50N.3-I8	Start	Phase Ib	
	50N.3-I12	Start	Phase Ic	
	t50N.3	Trip		
IRF	IRF	Start	Internal Relay Failure	
	tIRF	Trip		
	manOpCmd		Manual Open Command	
	CL-Cmd		Close Command	
	C/Bfail		Circuit Breaker failure	
	L/Rdisc		Local/Remote signal Discrepancy	
	BF		Breaker Failure	
	Gen.Start		Start Generic	
	Gen.Trip		Trip Generic	
	UserTriggerOscillo		User Variable for Oscillographic Recording	
	UserVar<0>		User Variable	
	to			
	UserVar<24>			
	Vcc		Reserved	
	Gnd		Reserved	
ResLog		Reset signal logic		
P1		Push-button Open		
P2		Push-button Close		
	0.D1	Digital Input "0.D1"	activated	Digital Input on Main Relay
	0.D1Not	Digital Input "0.D1"	deactivated	
	to			
	0.D4	Digital Input "0.D4"	activated	
	0.D4Not	Digital Input "0.D4"	deactivated	
	1.D1	Digital Input "1.D1"	activated	Digital input on Expansion Board
	1.D1Not	Digital Input "1.D1"	deactivated	
	to			
1.D15	Digital Input "1.D15"	activated		
	1.D15Not	Digital Input "1.D15"	deactivated	
	2.D1	Digital Input "2.D1"	activated	Digital input on Expansion Board
	2.D1Not	Digital Input "2.D1"	deactivated	
	to			
2.D15	Digital Input "2.D15"	activated		
	2.D15Not	Digital Input "2.D15"	deactivated	

15.29.4 – Setting “User Trigger Oscillo”

The “User trigger Oscillo” is a result of a logical operation (Or, AND, ecc...), it can be used like other logical output. This operation is possible only via “MCom2” software.

Name	User descr.	Linked functions	OpLogic	Timer	Timertype	Logical status
------	-------------	------------------	---------	-------	-----------	----------------

15.29.4.1 - Name

Internal name

15.29.4.2 - User descr.

Fixed

15.29.4.3 - Linked functions

Selection functions

15.29.4.4 - OpLogic

Operation Logic = [None, OR, AND, XOR, NOR, NAND, NOT, Ff-SR]

15.29.4.5 - Timer

Time delay (0-10)s, step 0.01s

15.29.4.6 - Timer type

Delay = Add a delay on output activation.
The “Timer” is edge triggered on rise edge.

Monostable = Activated the output for the time “Timer”

15.29.4.7 - Logical status

“User Trigger Oscillo” Logical status

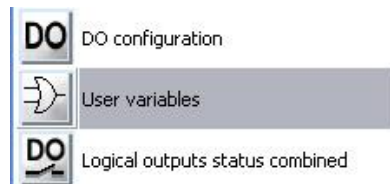
15.29.5 - Example: Setting "User Variable"

Open "MSCom2" program and connect to the relay.

Select "Change Windows" from "Menu" button



Select "User Variable"



Setting for "User Trigger Oscillo" : "**51.1, 51.2, 51.3**", "**OR**", "**1**", "**Monostable P**".

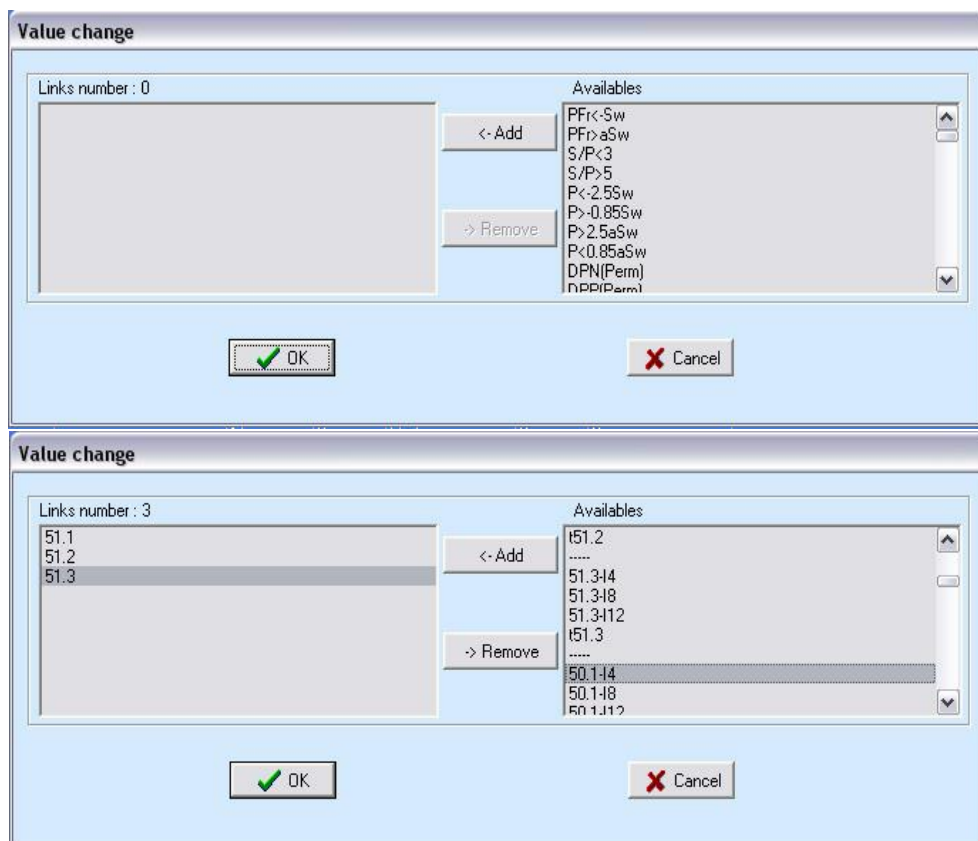
ID	Name	User descr.	Linked functions	OpLogic	Timer	Timer type	Extra	Logical status
1	UserTrigger Oscillo	UserTrigger Oscillo	51.1,51.2,51.3.	OR	0	Monostable P	0	0
2	UserVar <0>	UserVar <0>		None	0	Delay	0	0

15.29.5.1 - "Linked Functions"

Select "**Linked Functions**" related to "User Trigger Oscillo" and press right button on mouse, select "Value change":

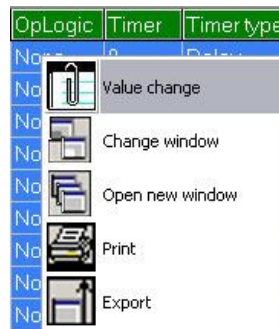


Select "**51.1, 51.2, 51.3**" from "Available" box via push-button "<Add", and press "OK". For remove functions, use push-button ">Remove".

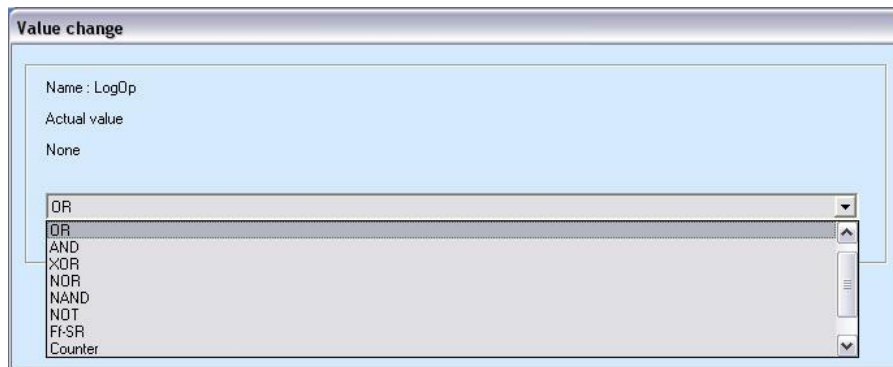


15.29.5.2 - "Operation Logic" (Oplogic)

Select "**Oper Logic**" related to "User Trigger Oscillo" and press right button on mouse, select "Value change":



Insert "**OR**" into box and press "OK":

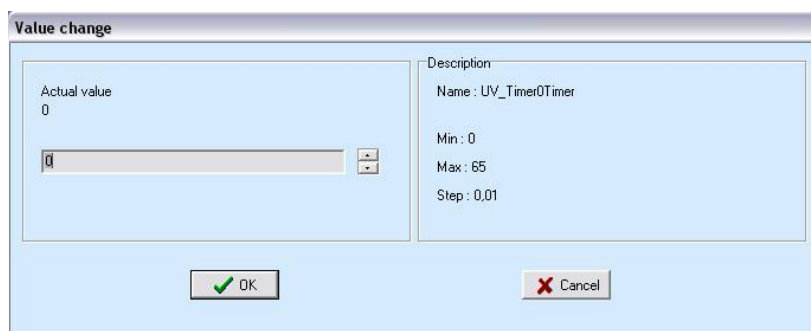


15.29.5.3 - "Timer"

Select "**Timer**" related to "User Trigger Oscillo" and press right button on mouse, select "Value change":

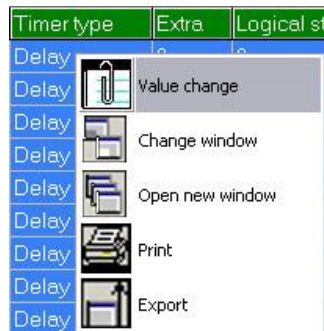


Select "**1**" into box and press "OK":

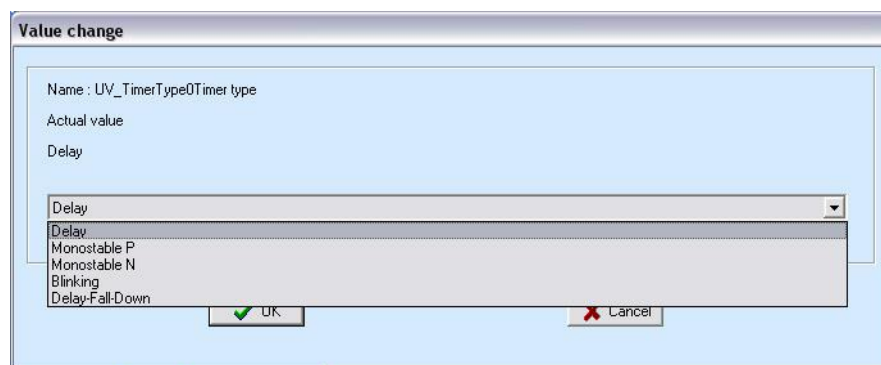


15.29.5.4 - "Timer type"

Select "**Timer**" related to "User Trigger Oscillo" and press right button on mouse, select "Value change":



Select "**Monostable**" into box and press "OK":



Delay	=	Delay
Monostable P	=	Monostable Positive impulse
Monostable N	=	Monostable Negative impulse
Blinking	=	Flashing
Delay-Fall-Down	=	Delay fall down

15.30 - Function: **BrkFail** (Breaker Failure)

Status	→	Enab.	No	[No / Yes]
Timers	→	tBF	0.75	s (0.05÷0.75) step 0.01 s

15.30.1 - Description of variables

- ☐ **Enab.** : Function enabling (No = Disable / Yes = Enable)
- ☐ **tBF** : Trip time delay

15.30.2 - Operation

The Breaker Failure detection is started by the operation of the output relay "R1" (programmed to be controlled by the Protection Functions that trip the C/B).

If after [tBF] seconds from operation of the relay "R1", any input current flow is still detected (>10% In) , the function "BF" trips and operate one user programmable output relay,

16. User Variables

The **"User Variable"** is a result of a logical operation (Or, AND, ecc...), it can be used like other logical output. This operation is possible only via "MSCom2" software.

ID	Name	User descr.	Linked functions	OpLogic	Timer	Timer type	Extra	Logical status
----	------	-------------	------------------	---------	-------	------------	-------	----------------

16.1 - Name

Internal progressive name

16.2 - User Descr.

Custom identification label for user variable

16.3 - Linked functions

Selection functions

16.4 - OpLogic

Operation Logic = [None, OR, AND, XOR, NOR, NAND, NOT, Ff-SR]

16.5 - Timer

Time delay (0-10)s, step 0.01s

16.6 - Timer type

Delay = Add a delay on output activation.
The "Timer" is edge triggered on rise edge.

Monostable = Activated the output for the time "Timer"

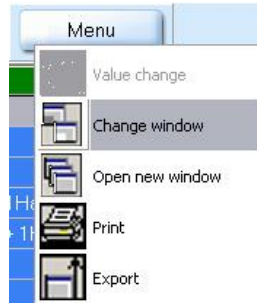
16.7 - Logical status

"User Variable" Logical status

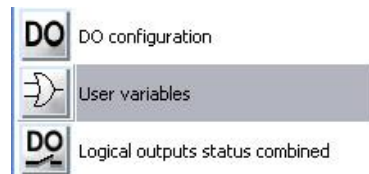
16.8 - Example: Setting "User Variable"

Open "MSCom2" program and connect to the relay.

Select "Change Windows" from "Menu" button



Select "User Variable"



Setting for "UserVar<0>" :

"Start Overcurrent Element", "1I>, 2I>, 3I>", "OR", "1", "Monostable".

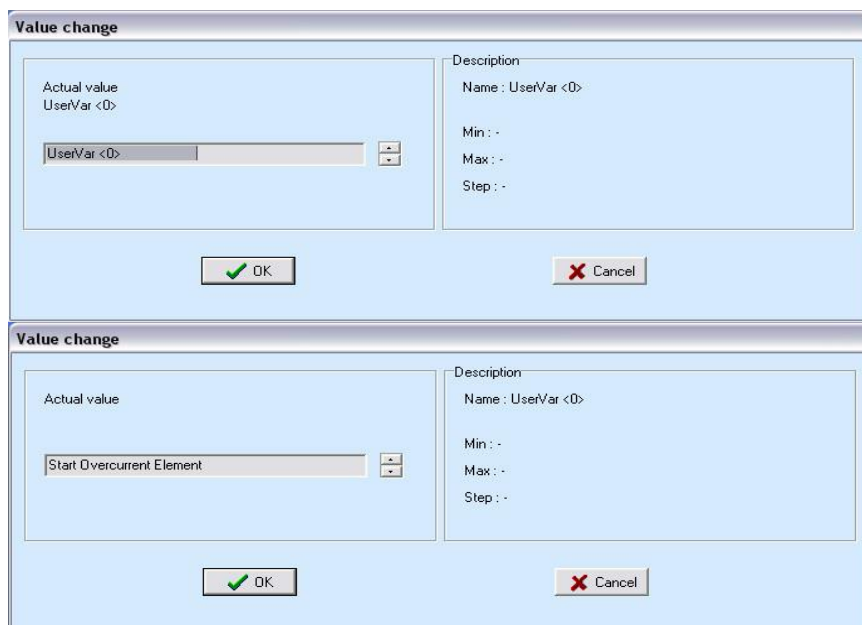
ID	Name	User descr.	Linked functions	OpLogic	Timer	Timer type	Extra	Logical status
1	UserTrigger Oscillo	UserTrigger Oscillo		None	0	Delay	0	0
2	UserVar <0>	Start Overcurrent Element	51.1,51.2,51.3.	OR	1	Monostable P	0	0

16.8.1 - "User description" (User descr.)

Select "**User descr**" related to "UserVar<0>" and press right button on mouse, select "Value change":

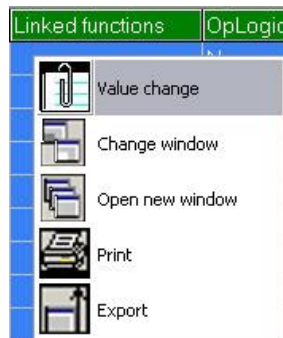


Insert "**Start Overcurrent Element**" into box and press "OK":

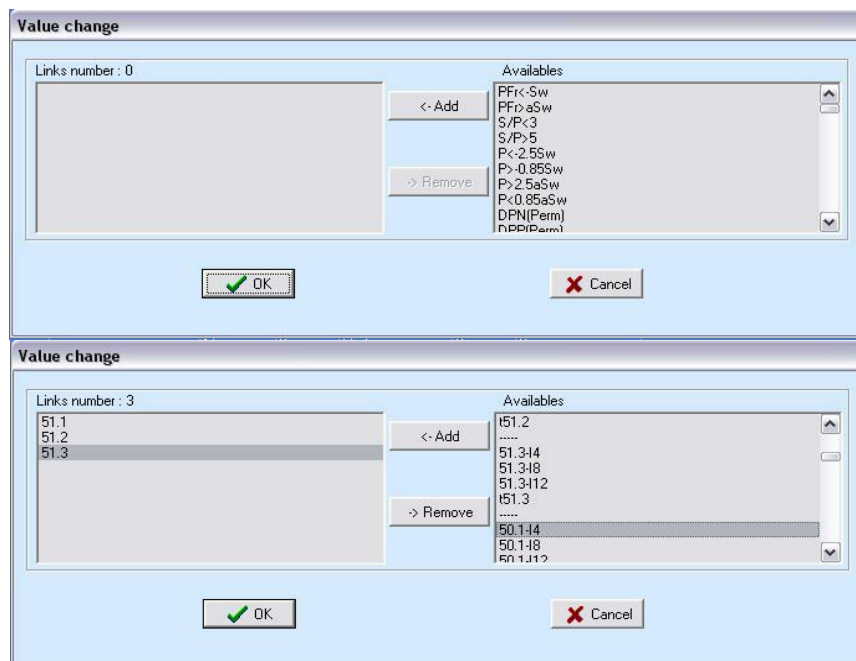


16.8.2 - "Linked Functions"

Select "**Linked Functions**" related to "UserVar<0> ("**Start Overcurrent Element**")" and press right button on mouse, select "Value change":



Select "**1I>, 2I>, 3I>**" from "Available" box via push-button "<Add", and press "OK". For remove functions, use push-button ">Remove".

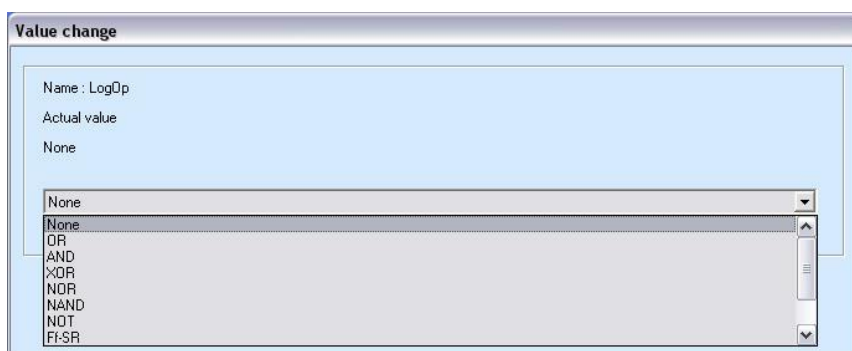


16.8.3 - "Operation Logic" (Oplogic)

Select "**Oper Logic**" related to "UserVar<0>" ("**Start Overcurrent Element**") and press right button on mouse, select "Value change":



Insert "**OR**" into box and press "OK":

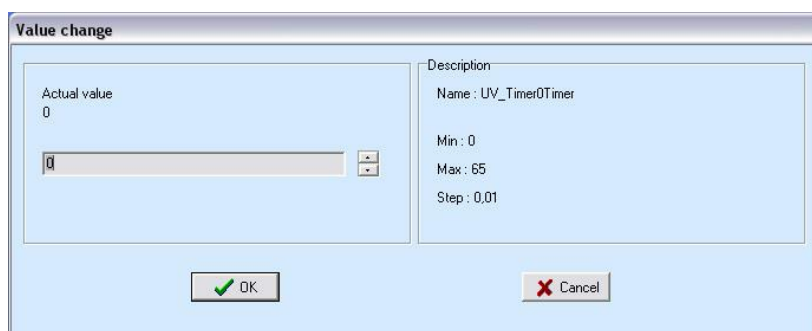


16.8.4 - "Timer"

Select "**Timer**" related to "UserVar<0>" ("**Start Overcurrent Element**") and press right button on mouse, select "Value change":

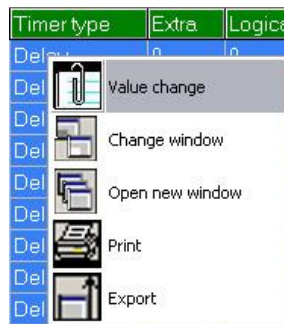


Select "**1**" into box and press "OK":

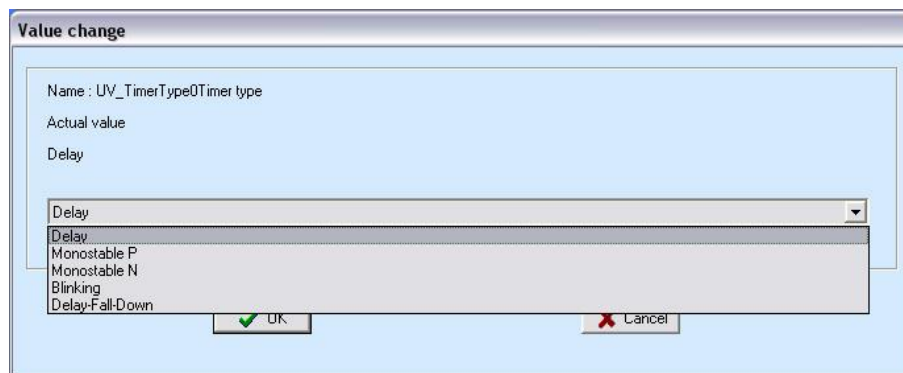


16.8.5 - "Timer type"

Select "**Timer**" related to "UserVar<0> ("**Start Overcurrent Element**")" and press right button on mouse, select "Value change":



Select "**Monostable**" into box and press "OK":





17. Input – Output (via MCom2 software)

The firmware can manage up to 32 digital inputs and 20 output relays; among these, 4 digital inputs and 6 output relays are available on the relay module, the remaining are available on additional expansion modules controlled via the CAN-Bus communication channel.

Can be controlled 1 or 2 additional modules.

14DI	Module	=	14 Digital Inputs
14DO	Module	=	14 Outputs Relay
UX10-4	Module	=	10 Digital Inputs and 4 Outputs Relay

17.1 – Digital Inputs

→ 0.D1	Programmable (D1)	<i>Available in the Main Relay</i>
→ 0.D2	Programmable (D2)	
→ 0.D3	Programmable (D3)	
→ 0.D4	Programmable (D4)	
→ 1.D1	Inputs	<i>Digital input on Expansion Board</i>
→ 1.D--	"D8", "D16" not available	
→ 1.D15		
→ 2.D1	Inputs	<i>Digital input on Expansion Board</i>
→ 2.D--	"D8", "D16" not available	
→ 2.D15		

Any digital input of the expansion modules is active when the relevant terminals (see wiring diagram) are shorted.

Four Digital Input are available on main relay:

☐ D1 (0.D1)	(terminals 38 - 28)	:	Programmable
☐ D2 (0.D2)	(terminals 38 - 18)	:	Programmable
☐ D3 (0.D3)	(terminals 38 - 29)	:	Programmable
☐ D4 (0.D4)	(terminals 38 - 19)	:	Programmable (PTC)

Three of them (0.D1, 0.D2, 0.D3) are deactivated, when the relevant terminals are open and get activated when the relevant terminals are shorted by an external cold contact.

The operation of the Input "0.D4" is dependent on the value "R" of resistance of the external circuit connected to its terminals (38-19):

- Activated if "R < 50Ω" or "R > 3000Ω". - Deactivated if "50Ω ≤ R ≤ 3000Ω".

Therefore, if the terminals "38-19" are open-circuited, the input "0.D4" is activated; for using "0.D4" as a normal Digital Input simply controlled by an external cold contact, it is necessary to permanently connect across the terminal's "38-19" (in parallel to the external contact) a load resistor of value between 50 and 3000Ω (example 1000Ω - 0.5W).

The additional inputs "1.D1....1.D15" are available when the first expansion module is present.

The additional inputs "2.D1....2.D15" are available when the second expansion module is present.

Any digital input of the expansion modules is active when the relevant terminals (see wiring diagram) are shorted.

17.2 – "DI" Configuration (via MCom2 software)

Any of the Digital Inputs can be programmed to control one or more of the following functions.

Group 1-2	Blocking input	Selection of the setting Group 1 or 2.
ExtR	Blocking input	External Reset input
Local State	Blocking input	Local state
Remote State	Blocking input	Remote state
C/B open command	Blocking input	Open C/B Command
C/B close command	Blocking input	Close C/B Command
Circuit Breaker	Blocking input	Status Circuit Breaker
EIPO	Blocking input	Protection (detection module) Inhibition
EITO	Blocking input	AVT timer Inhibition
Bi51.1	Blocking input	<i>First</i> overcurrent element
Bi51.2	Blocking input	<i>Second</i> overcurrent element
Bi51.3	Blocking input	<i>Third</i> overcurrent element
Bi50.1	Blocking input	<i>First</i> short circuit overcurrent element
Bi50.2	Blocking input	<i>Second</i> short circuit overcurrent element
Bi50.3	Blocking input	<i>Third</i> short circuit overcurrent element
Bi51N.1	Blocking input	<i>First</i> time delay earth fault element
Bi51N.2	Blocking input	<i>Second</i> time delay earth fault element
Bi51N.3	Blocking input	<i>Third</i> time delay earth fault element
Bi50N.1	Blocking input	<i>First</i> instantaneous earth fault element
Bi50N.2	Blocking input	<i>Second</i> instantaneous earth fault element
Bi50N.3	Blocking input	<i>Third</i> instantaneous earth fault element

17.2.1 – Example:

ID	Name	Status	OpLogic	Functions
----	------	--------	---------	-----------

17.2.2 – Name

Logical Input name

17.2.3 – Status

Logical Input status

17.2.4 – OpLogic

Not Used

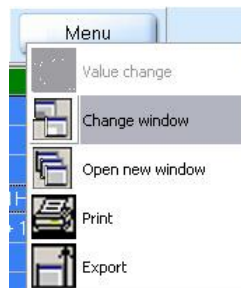
17.2.5 – Functions

Selection function

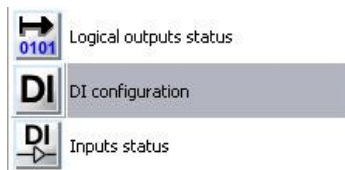
17.2.6 – Example: Setting "Digital Input"

Open "MCom2" program and connect to the relay.

Select "Change Windows" from "Menu" button



Select "DI configuration"

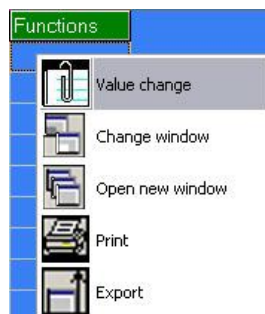


Setting for "**Bi51.1**" : "**51.1**".

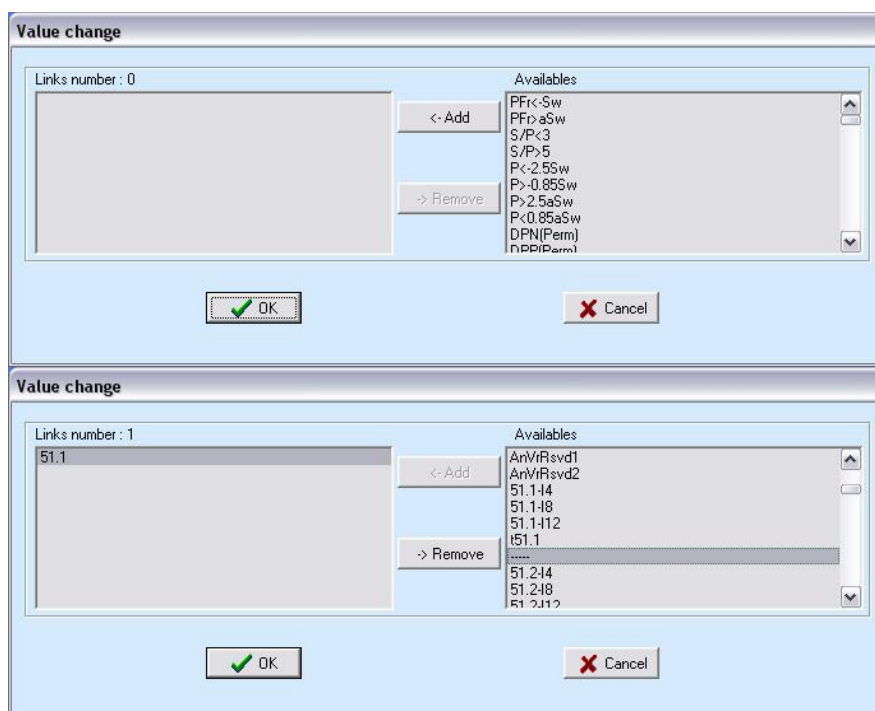
ID	Name	Status	OpLogic	Functions
1	Bi51.1	Not active	None	51.1.

17.2.6.1 – "Functions"

Select "**Functions**" related to "**Bi51.1**" and press right button on mouse, select "Value change":



From box "Available", select "**51.1**" and press "Add".
Press "OK" for confirmation. (if Password is request, see § Password)



17.3 – Outputs Relay

The output relay are fully user programmable and controlled by any protection functions and by any digital inputs.

→ 0.R1	Programmable (R1)	<i>Available in the main relay</i>
→ 0.R2	Programmable (R2)	
→ 0.R3	Programmable (R3)	
→ 0.R4	Programmable (R4)	
→ 0.R5	Programmable (R5)	
→ 0.R6	Programmable (R6)	
→ 1.R1		<i>Output Relays on Expansion Board</i>
→ 1.R--	Programmable	
→ 1.R14		
→ 2.R1		<i>Output Relays on Expansion Board</i>
→ 2.R--	Programmable	
→ 2.R14		

17.4 - "DO" Configuration

Any Output Relay can be programmed to be controlled (energized) by one or more of the following functions or Digital Inputs:

PFr<-Sw		<i>Permanent fault, PFr<-Sw (Active Power < -Sw)</i>
PFr>αSw		<i>Permanent fault, PFr>αSw (Active Power > αSw)</i>
S/P<3		<i>Permanent fault, (SFr/PFr) <3 (Apparent Power/Active Power)</i>
S/P>5		<i>Permanent fault, (SFr/PFr) >5 (Apparent Power/Active Power)</i>
P<-2.5Sw		<i>Fault discontinous / self-extinguishing, average active power under -2.5Sw.</i>
P>-0.85Sw		<i>Fault discontinous / self-extinguishing, average active power under -0.85Sw.</i>
P>2.5αSw		<i>Fault discontinous / self-extinguishing, average active power over -2.5Sw.</i>
P<0.85αSw		<i>Fault discontinous / self-extinguishing, average active power over -0.85Sw.</i>
DPN (Pem)		<i>Permanent fault, POWER NEGATIVE (PFr<-Sw)&&((SFr/PFr) <3)</i>
DPP (Pem)		<i>Permanent fault, POWER POSITIVE (PFr>αSw))&&((SFr/PFr) <3)</i>
DPN (Disc)		<i>Fault discontinous / self-extinguishing, POWER NEGATIVE</i>
DPP (Disc)		<i>Fault discontinous / self-extinguishing, POWER POSITIVE</i>
DPN		<i>POWER NEGATIVE (permanent OR discontinous / self-extinguishing)</i>
DPP		<i>POWER POSITIVE (permanent OR discontinous / self-extinguishing)</i>
DPNM		<i>POWER NEGATIVE hold on dropoff (permanent OR discontinous / self-extinguishing)</i>
DPPM		<i>POWER POSITIVE hold on dropoff (permanent OR discontinous / self-extinguishing)</i>
AMI		<i>Instant reverse fault</i>
AVI		<i>Instant forward fault</i>
AVT		<i>Timed forward fault</i>
DPNMT		<i>Negative power hold & timed</i>
SVrStart		<i>Internal inhibition module Start SVr</i>
SVrTrip		<i>Internal inhibition module Trip SVr</i>
II		<i>Internal inhibition module II</i>
IIM		<i>Internal inhibition module IIM</i>
EIPO		<i>External Protection inhibition out signal (Istantaneous inhibition)</i>
EITO		<i>External Time inhibition out of signal (Istantaneous inhibition)</i>
AnVrStart	Start	<i>Start Fault Vr</i>
AnVrTrip	Trip	<i>Trip Fault Vr</i>
AnVrRsvr1		<i>Reserved</i>
AnVrRsvr2		<i>Reserved</i>
51.1	Start	<i>Phase Ia</i>
	Start	<i>Phase Ib</i>
	Start	<i>Phase Ic</i>
	Trip	<i>First overcurrent element</i>
	Start	
51.2	Start	<i>Phase Ia</i>
	Start	<i>Phase Ib</i>
	Start	<i>Phase Ic</i>
	Trip	<i>Second overcurrent element</i>
	Start	
51.3	Start	<i>Phase Ia</i>
	Start	<i>Phase Ib</i>
	Start	<i>Phase Ic</i>
	Trip	<i>Third overcurrent element</i>
	Start	

50.1	50.1-I4	Start	Phase Ia	First short circuit overcurrent element	
	50.1-I8	Start	Phase Ib		
	50.1-I12	Start	Phase Ic		
	t50.1	Trip			
	50.1	Start			
	50.2	50.2-I4	Start	Phase Ia	Second short circuit overcurrent element
		50.2-I8	Start	Phase Ib	
		50.2-I12	Start	Phase Ic	
t50.2		Trip			
	50.2	Start			
	50.3	50.3-I4	Start	Phase Ia	Third short circuit overcurrent element
		50.3-I8	Start	Phase Ib	
		50.3-I12	Start	Phase Ic	
t50.3		Trip			
	50.3	Start			
	51N.1	51N.1-I4	Start	Phase Ia	First time delay earth fault element
		51N.1-I8	Start	Phase Ib	
		51N.1-I12	Start	Phase Ic	
t51N.1		Trip			
	51N.1	Start			
	51N.2	51N.2-I4	Start	Phase Ia	Second time delay earth fault element
		51N.2-I8	Start	Phase Ib	
		51N.2-I12	Start	Phase Ic	
t51N.2		Trip			
	51N.2	Start			
	51N.3	51N.3-I4	Start	Phase Ia	Third time delay earth fault element
		51N.3-I8	Start	Phase Ib	
		51N.3-I12	Start	Phase Ic	
t51N.3		Trip			
	51N.3	Start			
	50N.1	50N.1-I4	Start	Phase Ia	First instantaneous earth fault element
		50N.1-I8	Start	Phase Ib	
		50N.1-I12	Start	Phase Ic	
t50N.1		Trip			
	50N.1	Start			
	50N.2	50N.2-I4	Start	Phase Ia	Second instantaneous earth fault element
		50N.2-I8	Start	Phase Ib	
		50N.2-I12	Start	Phase Ic	
t50N.2		Trip			
	50N.2	Start			
	50N.3	50N.3-I4	Start	Phase Ia	Third instantaneous earth fault element
		50N.3-I8	Start	Phase Ib	
		50N.3-I12	Start	Phase Ic	
t50N.3		Trip			
	50N.3	Start			
	IRF	IRF	Start	Internal Relay Failure	
		tIRF	Trip		
		manOpCmd	Manual Open Command		
	CL-Cmd	Close Command			
	C/Bfail	Circuit Breaker failure			
	L/Rdisc	Local/Remote signal Discrepancy			
	BF	Breaker Failure			
	Gen.Start	Start Generic			
	Gen.Trip	Trip Generic			
	UserTriggerOscillo	User Variable for Oscillographic Recording			
	UserVar<0>	User Variable			
	to				
	UserVar<24>				
	Vcc	Reserved			
	Gnd	Reserved			
	ResLog	Reset signal logic			
	P1	Push-button Open			
	P2	Push-button Close			
	0.D1	Digital Input "0.D1"	activated	Digital Input on Main Relay	
	0.D1Not	Digital Input "0.D1"	deactivated		
	to				
	0.D4	Digital Input "0.D4"	activated		
	0.D4Not	Digital Input "0.D4"	deactivated		

1.D1	Digital Input "1.D1"	activated	Digital input on Expansion Board
1.D1Not to 1.D15	Digital Input "1.D1"	deactivated	
1.D15Not to 2.D1	Digital Input "1.D15"	activated	Digital input on Expansion Board
2.D1Not to 2.D15	Digital Input "1.D15"	deactivated	
2.D1	Digital Input "2.D1"	activated	Digital input on Expansion Board
2.D1Not to 2.D15	Digital Input "2.D1"	deactivated	
2.D15Not to 2.D15Not	Digital Input "2.D15"	activated	Digital input on Expansion Board
2.D15Not	Digital Input "2.D15"	deactivated	

17.4.1 - Example configuration

ID	Relay	Linked functions	OpLogic	Logical status	Output config	Function	tON	Relay status
1	0.R1 [Master board, R:1]		None	Off	Normally Deenergized	Pulse	0.01	Off
2	0.R2 [Master board, R:2]		None	Off	Normally Deenergized	Pulse	0.01	Off

17.4.1.1 - Relay

Relay internal name

17.4.1.2 - Linked function

It's available only 1 link, select the function for tripping the output relay (for multiple association use "User Variable")

17.4.1.3 - Operation Logic

Not Used

17.4.1.4 - Logical Status

Relay Logical status

17.4.1.5 - Output Configuration

Normally Deenergized	The output relay is deenergized in normal conditions and gets energized on activation of the controlling Functional Output; reset means deenergizing.
Normally Energized	The output relay is energized in normal conditions and gets deenergized on activation of the controlling Functional Output; reset means energizing.

17.4.1.6 - tON (Operation Time)

This timer controls the duration of the activation of the output relay.

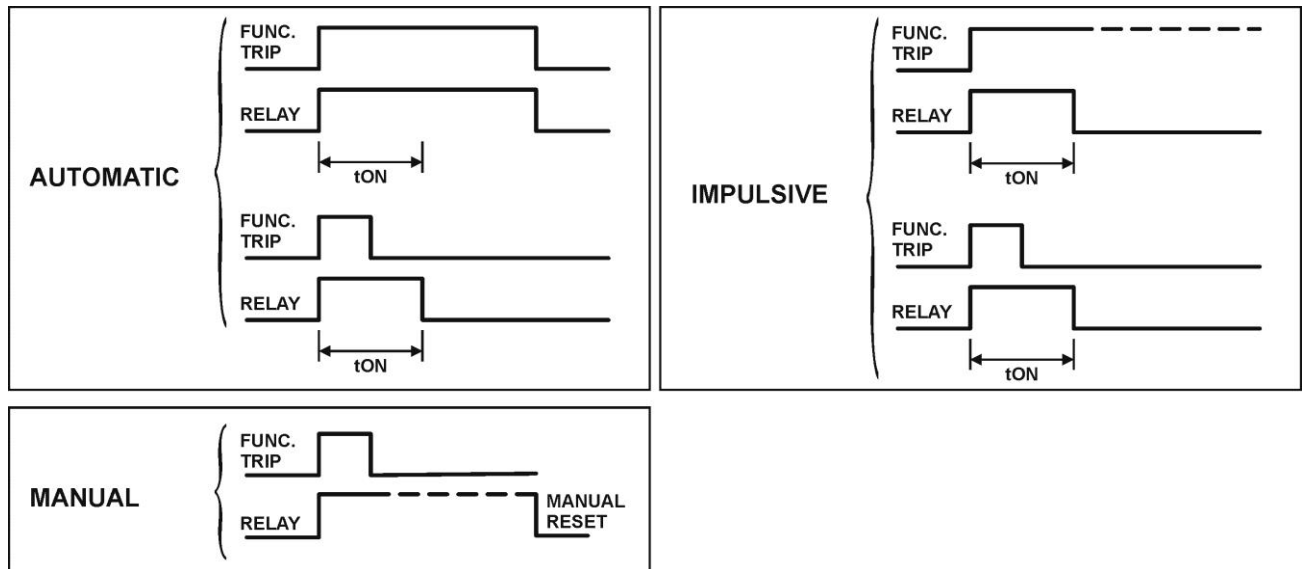
tON : 0 (0.01-10)s, step 0.01s

17.4.1.7 - Relay Status

Relay – Physical status

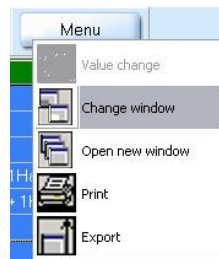
17.5 - Functions - Operation Mode

- Automatic** : In this mode the output relay is "operated" (energized if "N.D.", deenergized if "N.E.") when the controlling Functional Output is activated and it is reset to the "non operated" condition when the Functional Output gets disactivated but, anyhow, not before the time "tON" has elapsed (minimum duration of the operation time)
- Manual** : In this mode the output relay is "operated" when the controlling Functional Output is activated and remains in the operated condition until a manual reset command is issued by the relay keyboard (local commands menu) or via the serial communication. In this mode the timer "tON" has no effect.
- Impulsive** : In this mode the output relay is "operated" when the controlling Functional Output is activated and it remains in the "operated" condition (energized if "N.D.", deenergized if "N.E.") for the set time "tON" independently from the status of the controlling Functional Output.

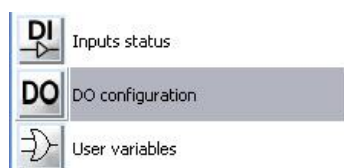


Open "MSCom2" program and connect to the relay.

Select "Change Windows" from "Menu" button



Select "DO Configuration"



17.5.1 - Example: Change settings for "0.R1"

Change settings for "**0.R1**" : "51.1", "Normally Energized", "Automatic reset", "0.5".

ID	Relay	Linked functions	OpLogic	Logical status	Output config	Function	tON	Relay status
1	0.R1 [Master board, R.1]	51.1.	None	Off	Normally Energized	Automatic reset	0.5	Off
2	0.R2 [Master board, R.2]		None	Off	Normally Denergized	Pulse	0.01	Off

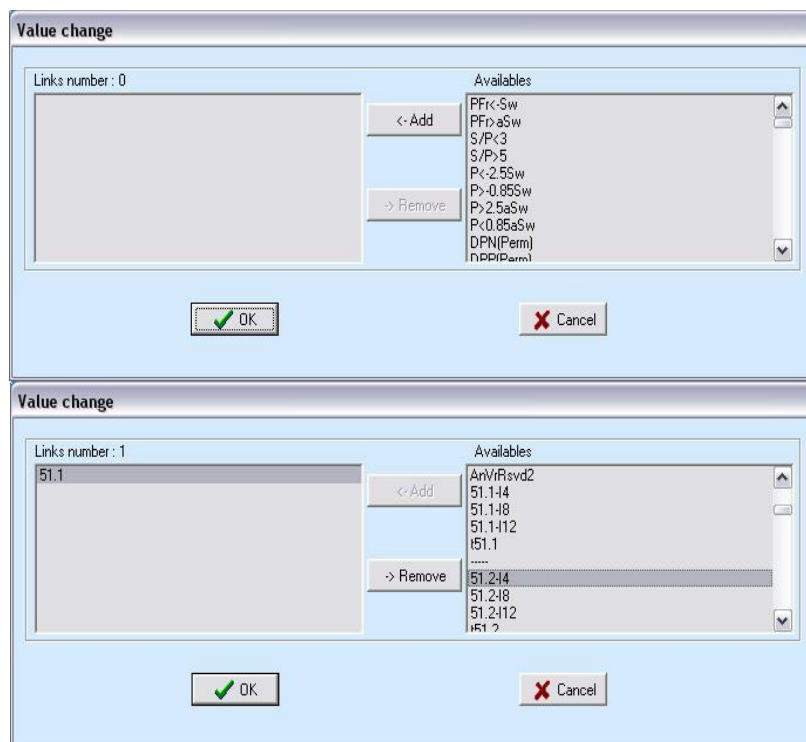
17.5.1.1 - "Linked Functions"

Select "**Linked Functions**" related to "0.R1" and press right button on mouse, select "Value change":



From box "Available", select "**51.1**" and press "Add".

Press "OK" for confirmation. (if Password is request, see § Password)

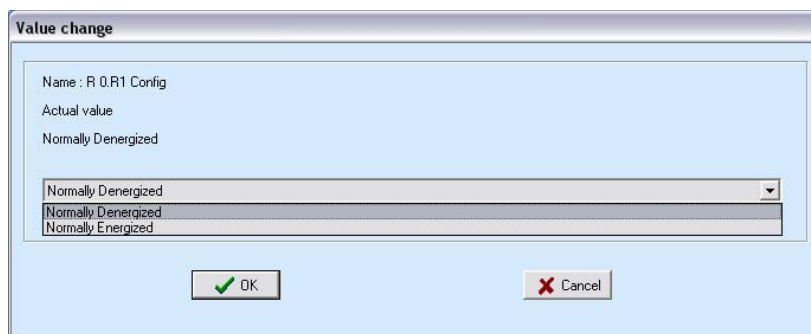


17.5.1.2 - "Output Config"

Select "**Output Config**" related to "0.R1" and press right button on mouse, select "Value change":



Select "**Normally Energized**" from combo box and press "OK"
(if Password is request, see § Password)

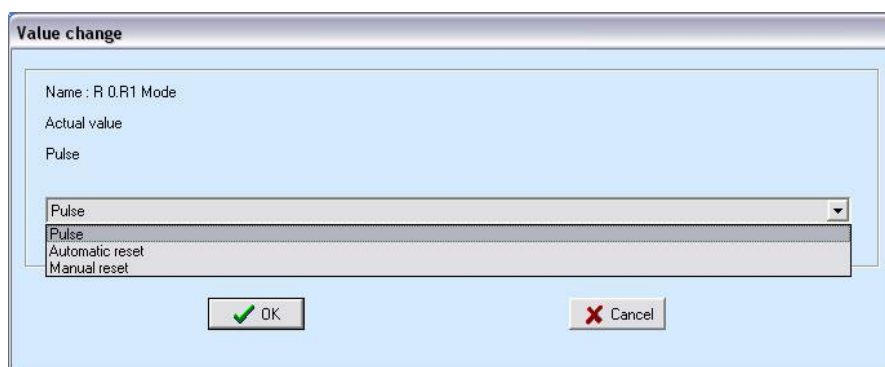


17.5.1.3 - "Function"

Select "**Function**" related to "0.R1" and press right button on mouse, select "Value change":

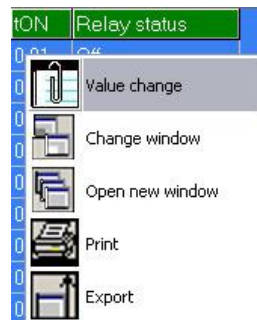


Select "**Manual reset**" from combo box and press "OK"
(if Password is request, see § Password):

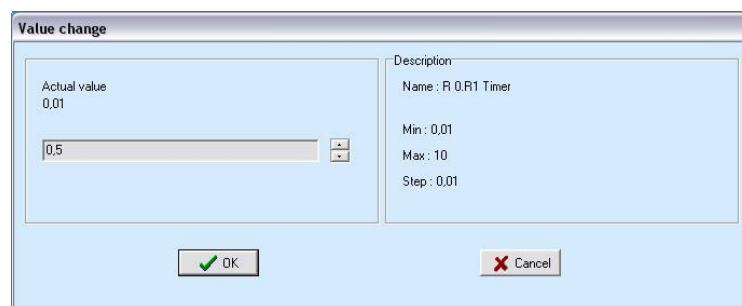


17.5.1.4 - "tON"

Select "**tON**" related to "0.R1" and press right button on mouse, select "Value change":



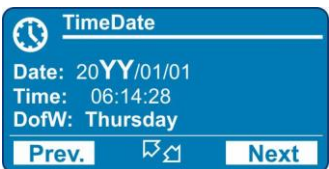
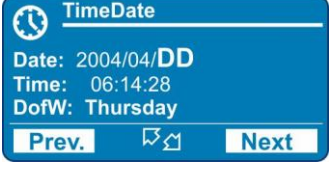
Set "**0.5**" and press "OK" (if Password is request, see § Password):



18. Date & Time

In this menu it is possible to configure the Date and Time

Date:	20YY	/	MM	/	DD	(2000/01/01 ÷ 2099/12/31)
Time:	HH	:	MM	:	00	HH = hour / MM = Minutes / 00
DofW:	Day					Es: Wednesday

- 
 - Press "**Menu**" for access to the main menu with icons.
- 
 - Select icon "**TimeDate**" by pushbuttons "**Increase**" or "**Decrease**".
 - Press "**Select**".
- 
 - Press "**Modify**".
- 
 - The last two figures of the Year will appear in bold character; by pushbuttons "**Increase**" or "**Decrease**" set the new figures.
 - Press "**Next**" to go to the next setting.
- 
 - As above for changing the "Month"
 - Press "**Next**" to go to the next setting.
- 
 - As above for changing the "Day"
 - Press "**Next**" to go to the next setting.

- 7**



- As above for changing the "Hours"
 - Press "**Next**" to go to the next setting.
- 8**



- As above for changing the "Minutes"
 - Press "**Next**" to go to the next setting.
- 9**



- The **Day of the Week** is calculated and displayed automatically.
 - Press "**Exit**" to go back to the main menu.
 - Press "**Modify**" to go back to the step "3"



Press the button "**Next**" to go back to the previous display.

18.1 – Clock synchronization

The internal clock has 1ms resolution and a stability of $\pm 35\text{ppm}$ in the operational temperature range.

It can be synchronized with an external time reference in the following ways:

- ☐ Using the standard "[Time Synchronization](#)" procedure of the "[IEC870-5-103](#)" protocol.
- ☐ Using the "[MCom 2](#)" software or from the DCS with the Modbus RTU protocol.

Note: On power supply failure an internal battery supports the internal clock for over two years.

19. Healthy (Diagnostic Information)

The relay operates a continuous checking of the vital functionalities and in case an internal failure is detected, the I.R.F. function (see § I.R.F.) is activated and the Power/IRF led is set to flashing.

Device	→	No Fail	→	No Fail
		Fail	→	Fail present
		MinorFail	→	Minor Fail
		HisoricalFail	→	Cleared Fail
		FW not comp.	→	Firmware not compatible

If an internal self-clearing (transient) fault is detected, it is recorded into an historical file without any other action.

20. Info (Relay Version)

In this menu it is possible to read the information relevant to relay unit.

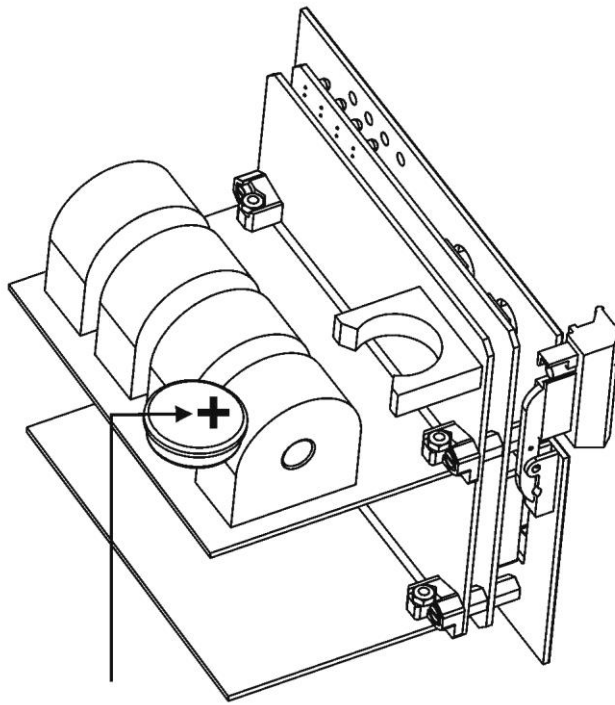
SW Version	AcqUnit-I/O	→	####.##.##.##	Firmware version of acquisition unit	
	ProtectUnit	→	####.##.##.##	Firmware version of CPU unit	
Protect.Model		→	FeederManager	Protection Type	
Serial Number		→	###/###/###/### #	Relay Serial Number	
User Tag		→	UMWR	Relay identification label.	This information can only be modified by the interface program "MSCom 2" and allows the user to give to the relay any suitable denomination.
Build		→	#####	Build identification label.	
Line		→	#####	Line identification label.	

21. Battery

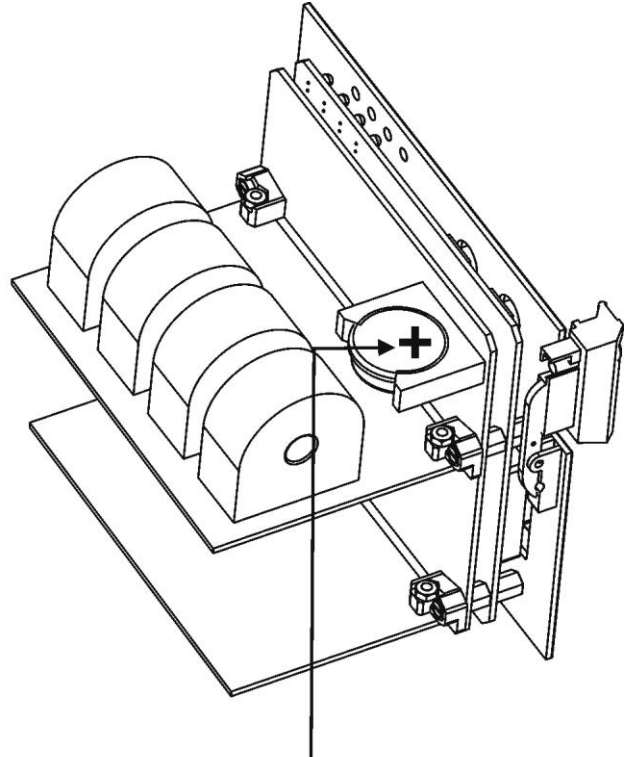
The relay is equipped with a lithium battery type "CR2477N 3V", to support the internal clock and the oscillographic recording memory in case of programmed lack of power.
The expected minimum duration without power exceed 2 years.

Attention!! Use only battery specified.

Instruction for replacement the battery:



BATTERY



BATTERY

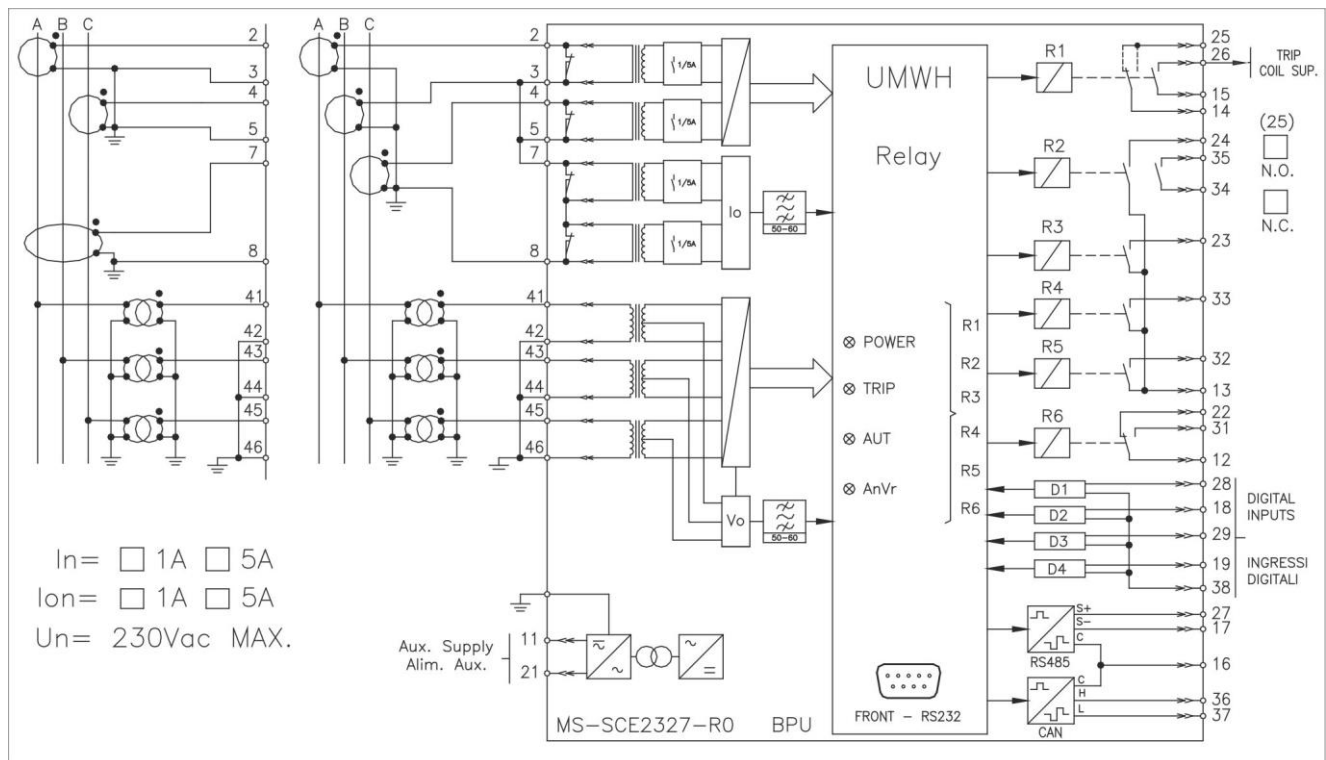
22. Maintenance

No maintenance is required. In case of malfunctioning please contact Microelettrica Scientifica Service or the local Authorized Dealer mentioning the relay's Serial No reported in the label on relays enclosure.

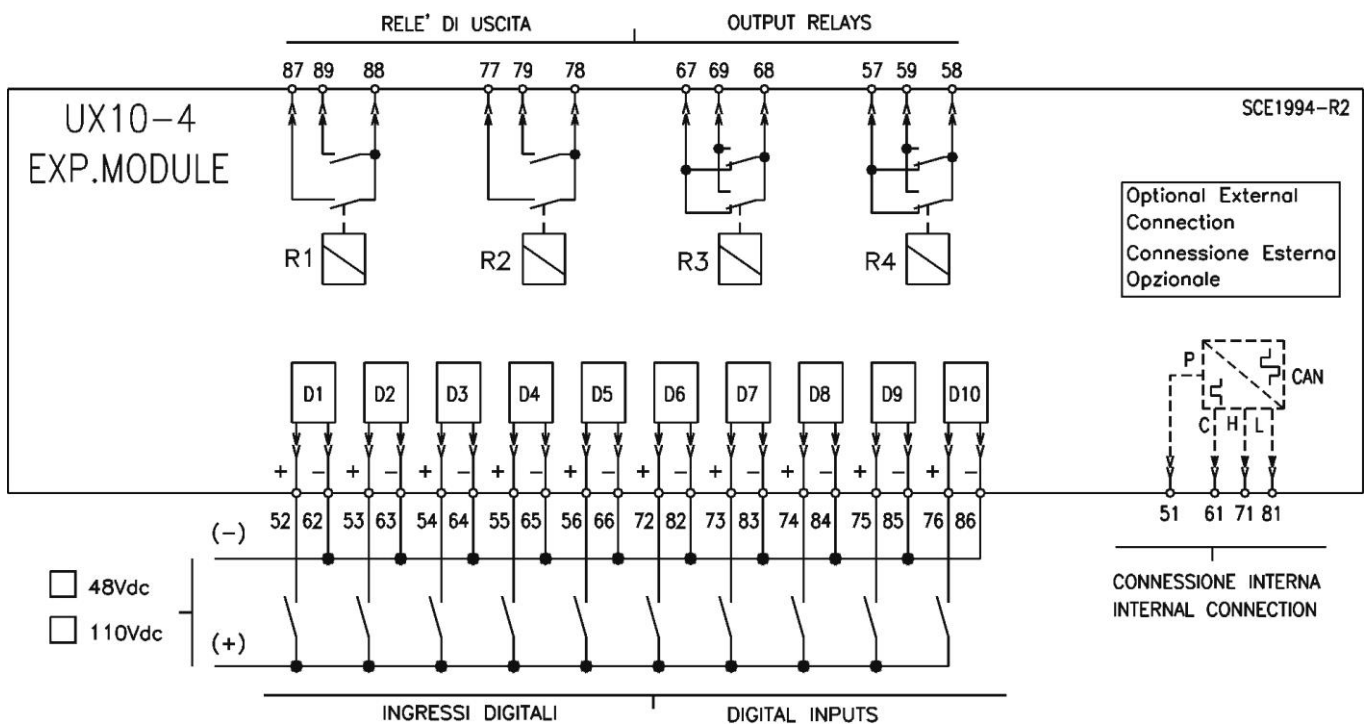
23. Power Frequency Insulation Test

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.

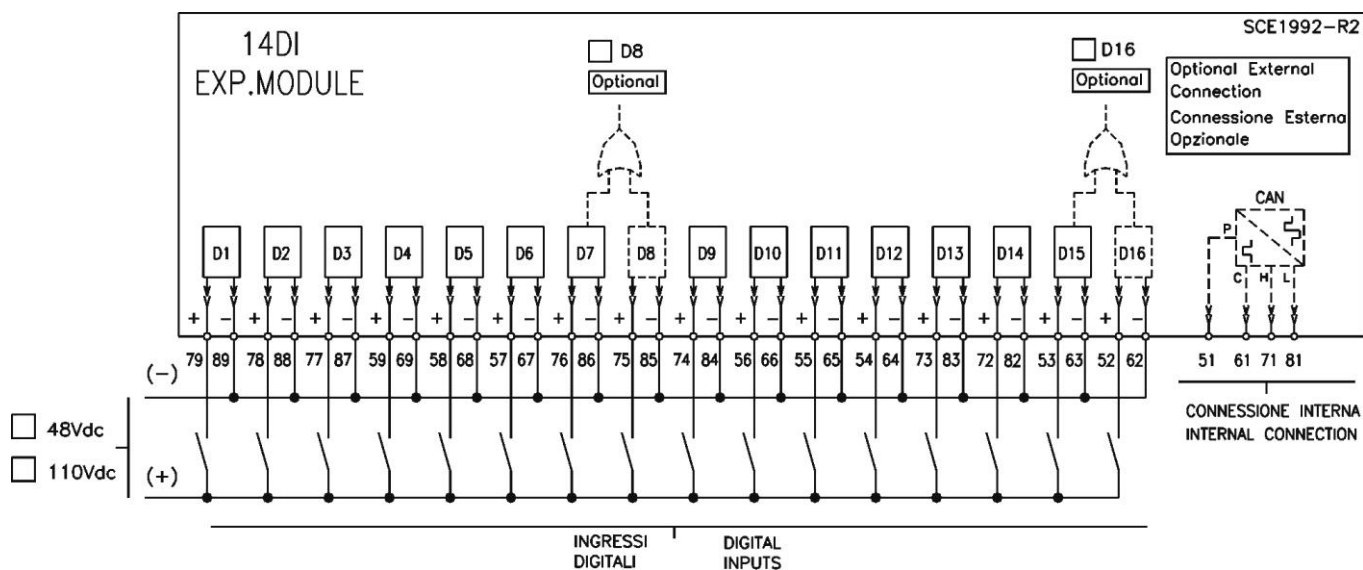
24. Basic Relay - Wiring Diagram



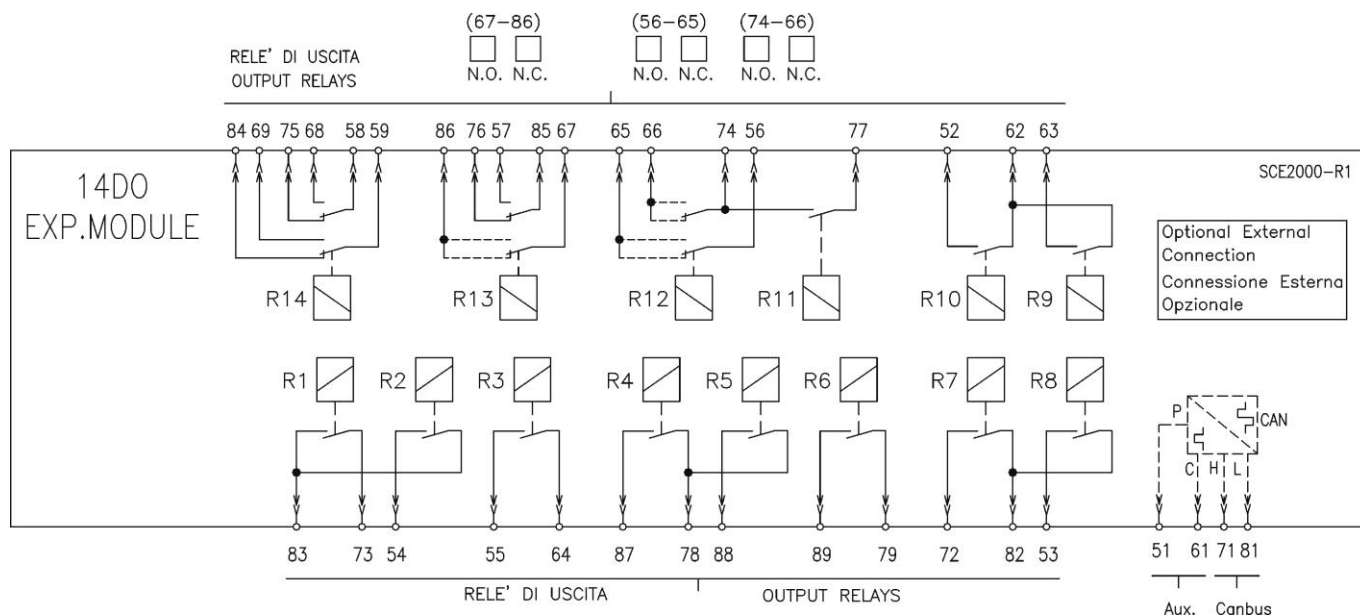
24.1 - UX10-4 - Expansion Module - Wiring Diagram (10 Digital Inputs + 4 Output Relays)



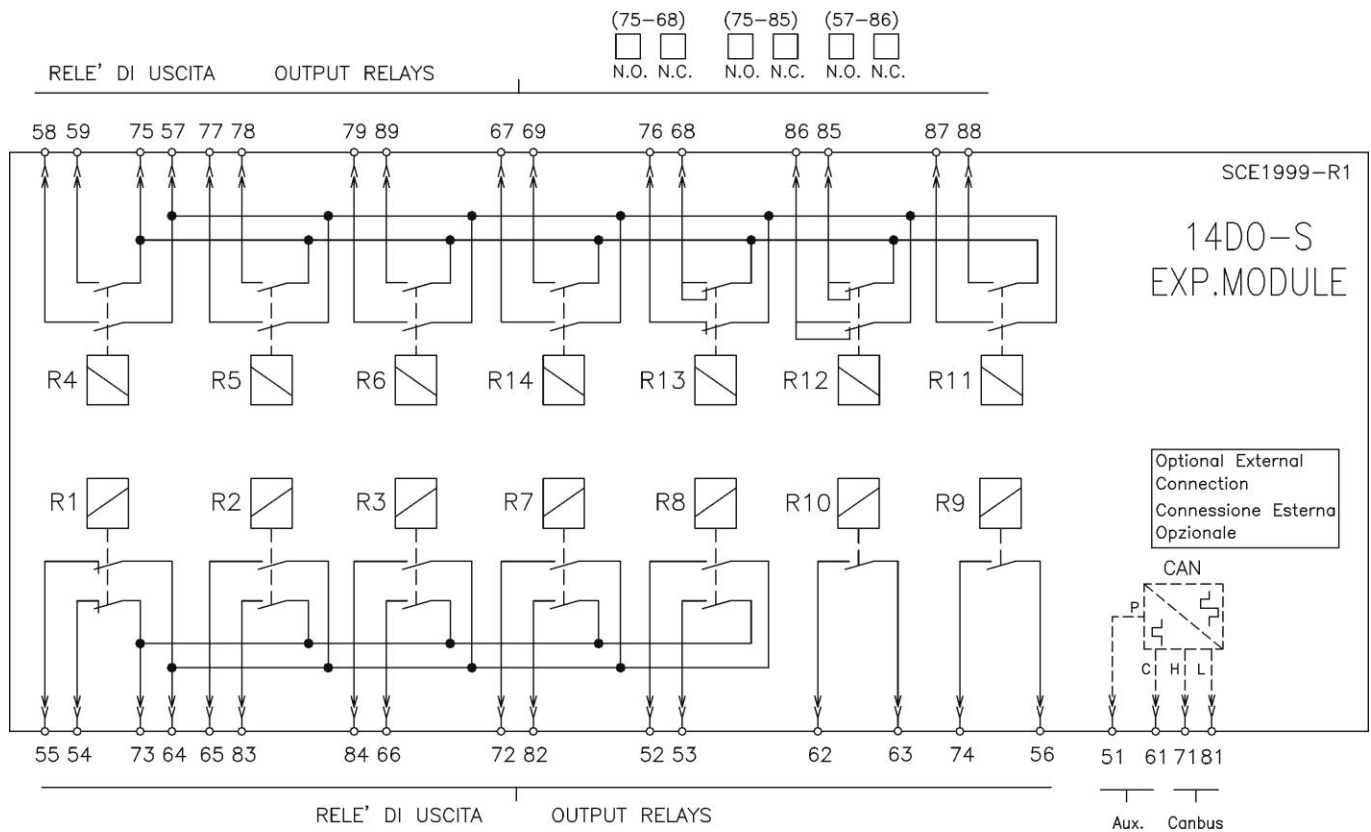
24.2 – **14DI** - Expansion Module - Wiring Diagram (14 Digital Inputs)



24.3 – **14DO** - Expansion Module - Wiring Diagram (14 Output Relays)

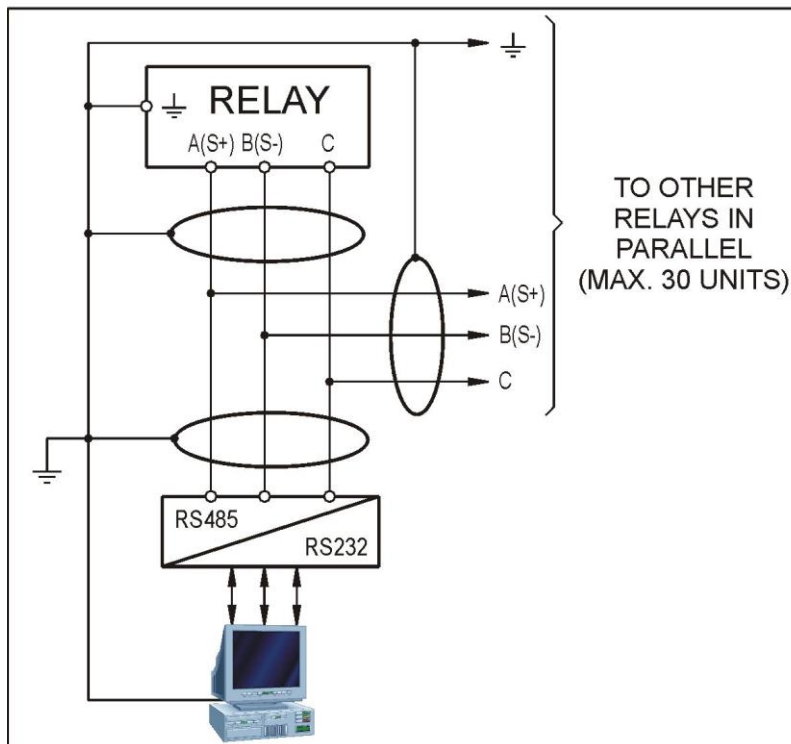


24.4 – **14DO-S** - Expansion Module - Wiring Diagram (14 Output Relays)

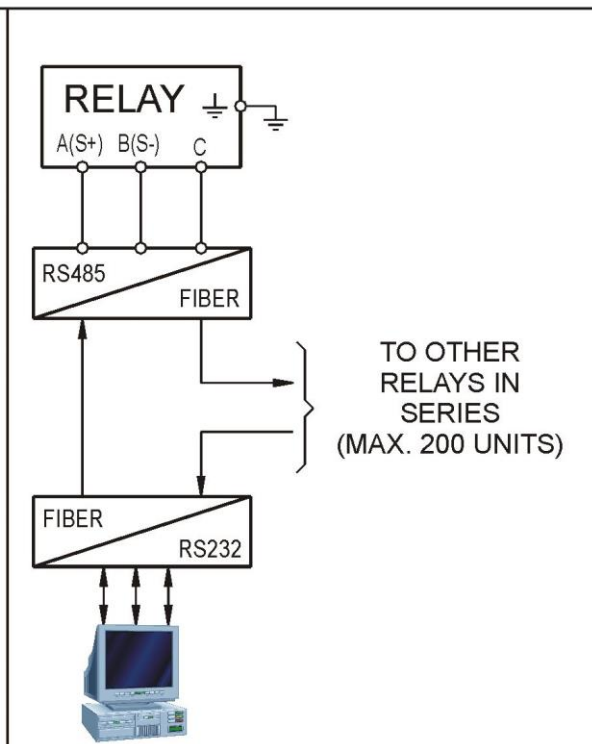


25. Wiring The Serial Communication Bus

CONNECTION TO RS485



FIBER OPTIC CONNECTION



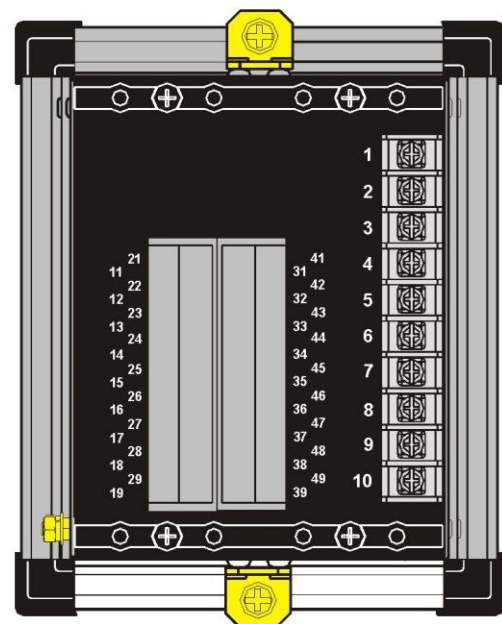
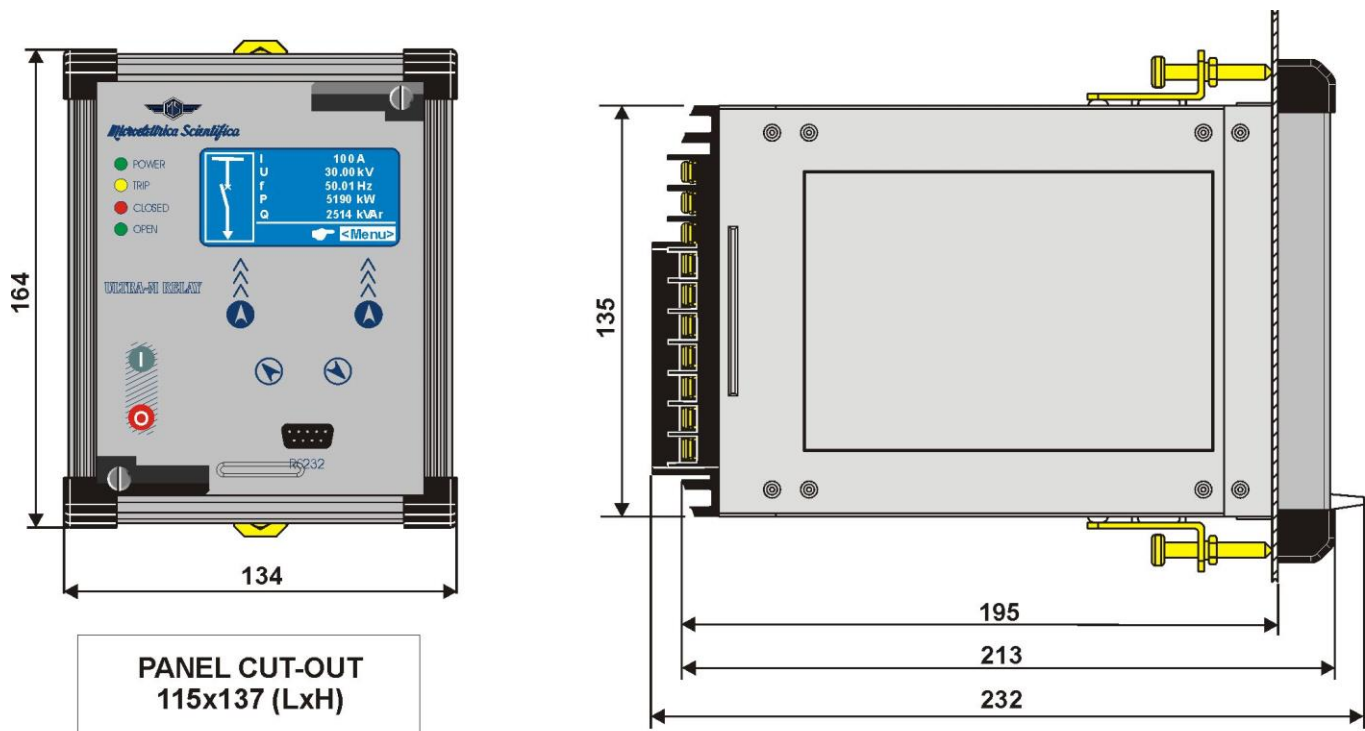
Each relay is identified by its programmable address code (NodeAd) and can be called from the P.C.

A dedicated communication software (MCom2) for Windows 9x/2000/XP (or later) is available.

Please refer to the MCom2 instruction manual for more information.

Maximum length of the serial bus can be up to 200m. For longer distance and for connection of up to 250 Relays, optical interconnection is recommended (please ask Microelettrica for accessories).

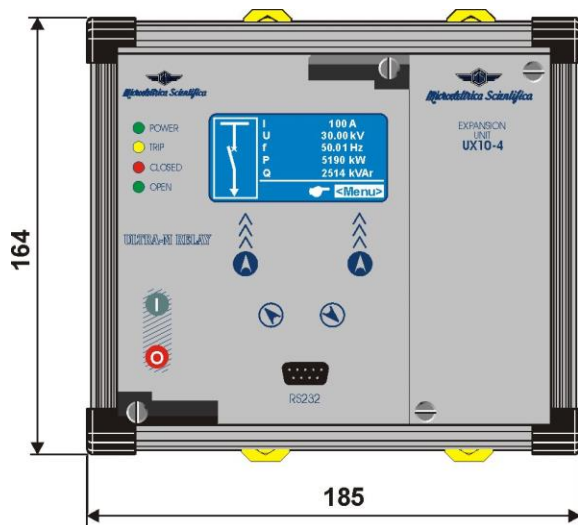
26. Basic Relay - Overall Dimensions



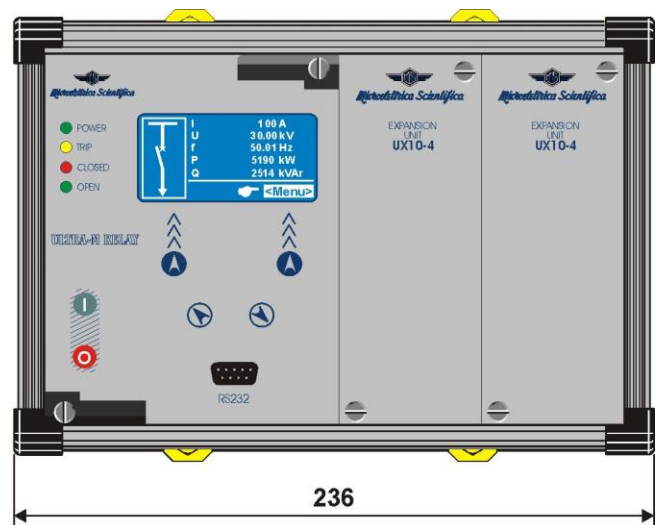
TERMINAL CONNECTION

Flush mounting protection degree: IP44 (54 on request).

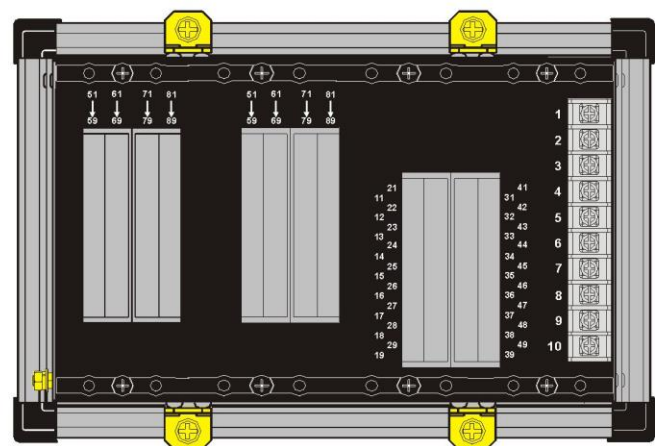
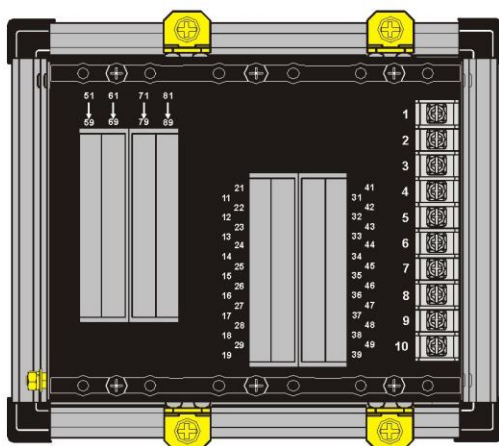
26.1 – (1 Expansion Module) & (2 Expansion Module) - Overall Dimensions



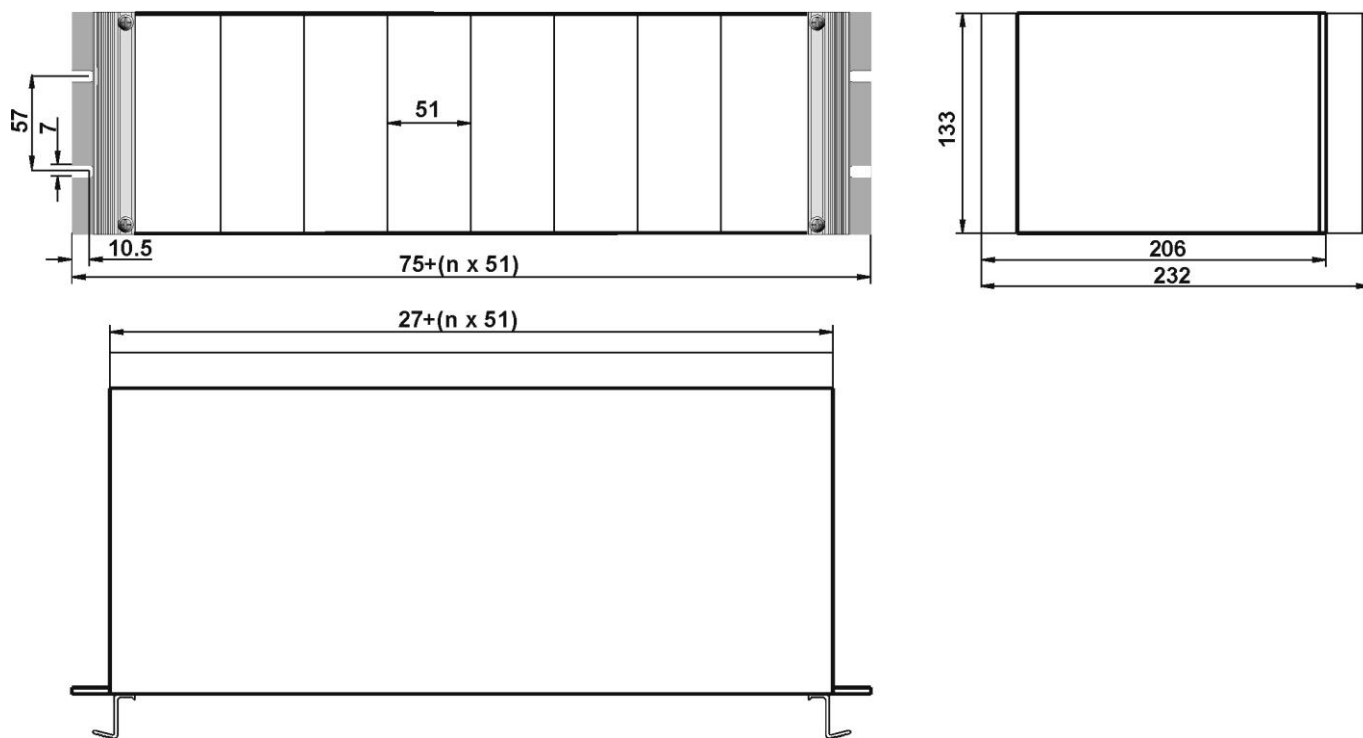
**PANEL
CUT-OUT
165x137 (LxH)**



**PANEL
CUT-OUT
217x137 (LxH)**



26.2 – Rack 3U – Overall Dimensions



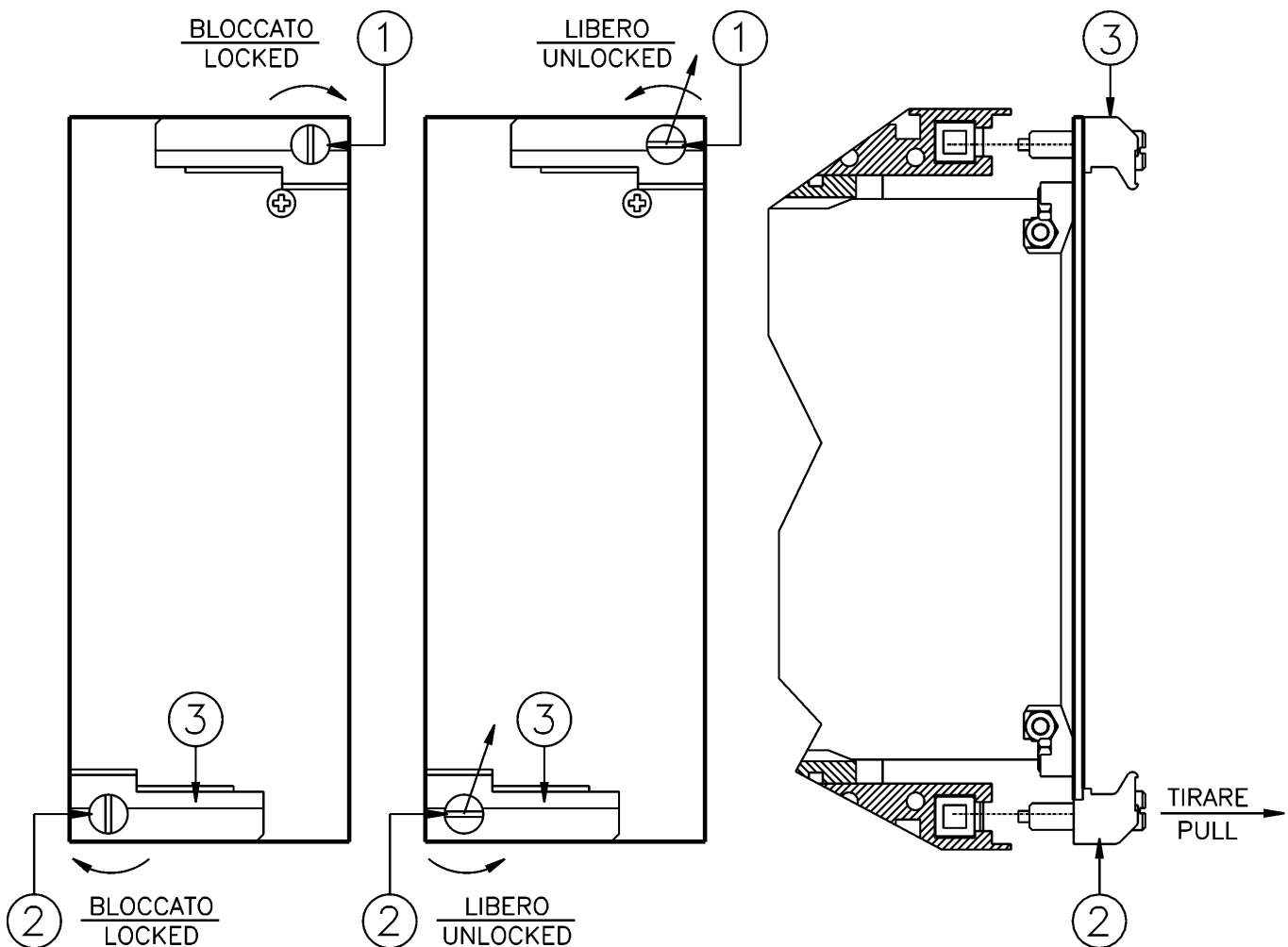
27. Direction for Pcb's Draw-Out and Plug-In

27.1 - Draw-out

Rotate clockwise the screws ① and ② in the horizontal position of the screw-driver mark.
Draw-out the PCB by pulling on the handles ③

27.2 - Plug-in

Rotate clockwise the screws ① and ② in the horizontal position of the screw-driver mark.
Slide-in the card on the rails provided inside the enclosure.
Plug-in the card completely and press the handle to the closed position.
Rotate anticlockwise the screws ① and ② with the mark in the vertical position (locked).



28. Electrical Characteristics

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 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 (EN61000-6-2 - EN61000-6-4 - EN50263)

☐ Electromagnetic emission	EN55011	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 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
☐ 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	
☐ Resistance to vibration and shocks	IEC60255-21-1 - IEC60255-21-2	10-500Hz 1g

CARATTERISTICHE

☐ Accuracy at reference value of influencing factors	1% In - 0.1%On for measure 2% + to (to=20÷30ms @ 2xIs) for times
☐ Rated Current	In = 1 or 5A - On = 1 or 5A
☐ Current overload	80 In for 1 sec; 4 In continuous
☐ Burden on current inputs	Phase : 0.01VA at In = 1A; 0.2VA at In = 5A Neutral : 0.01VA at In = 1A ; 0.2VA at In = 5A Un = (100 ÷ 125)Vac
☐ Rated Voltage	
☐ Voltage Overload	2Un permanent
☐ Burden on voltage inputs	0,1VA at Un
☐ Average power supply consumption	< 10 VA
☐ Output relays	rating 5 A; Vn = 380 V A.C. resistive switching = 1100W (380V max) make = 30 A (peak) 0,5 sec. break = 0.3 A, 110 Vcc, L/R = 40 ms (100.000 op.)

COMMUNICATION PARAMETER

☐ Rear serial port	RS485 - 9600 to 38400 bps - 8,n,1 - Modbus RTU - IEC60870-5-103
☐ Front serial port	RS232 - 9600 to 57600 bps - 8,n,1 - Modbus RTU



28. Software & Firmware Version

Firmware for version

IAU (Intelligent Acquisition Unit)	026.01.x
IPU (Processor Unit)	0800.31.01.x

Application Software

MSCom 2	1.03.43 (or later)
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The performances and the characteristics reported in this manual are not binding and can modified at any moment without notice