

# M

MICROPROCESSOR  
PROTECTION RELAYS  
THE " M " LINE



Digital relays for protection,  
monitoring and control

SHORT FORM CATALOGUE



*Microelettrica Scientifica*

# LINE

# M

**Microelettrica Scientifica manufactures a comprehensive line of protective relays for Electric Power Production, Transmission & Distribution and for the Industrial market.**

**Digital relays for protection, monitoring and control**

The M relays offer that unique combination of performance, functionality, innovation and reliability. A complete line of microprocessor based relays for protection of high voltage and medium voltage, transmission and distribution systems including three phase overcurrent and earth fault, directional overcurrent and earth fault, differential, over/under voltage, frequency, powerfrequency/ load-shedding, motor protection, transformer protection, capacitors protection, generator protection, synchronising and load-sharing, synchro-check and D.C. systems protection.

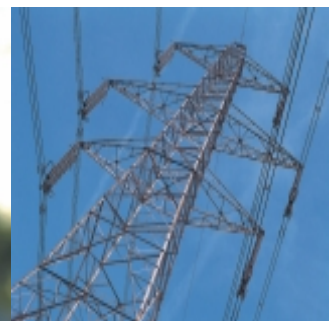


In addition to the flexibility of settings and curves associated with modern protective relays, all M relays also offer:

- Exceptionally simple and intuitive five button user interface.
- Front panel or computer based programming and setting changes for easy local or remote setting, with or without a PC.
- Intense display visible in even brightly illuminated environments.
- Auto-ranging power supplies and selectable 1-5 A inputs take the guesswork out of stocking.
- Modbus protocol ensures communication compatibility with RS485 or fiber optic interface.
- Compact, space saving design.
- Modular, draw-out design in a variety of case styles, including 19" Rack panel.
- Conformance to all IEC255 and IEC1000 IEEE37 Standards, CE Directive, UL-CSA approved.
- Programmable output relays, blocking inputs, and blocking over-rides.
- Comprehensive self diagnostic - not just memory checksums - periodically test the entire relay.
- Real time and recorded measurements.
- Event records and oscillography.
- Certified quality system ISO 9001 - ISO14001



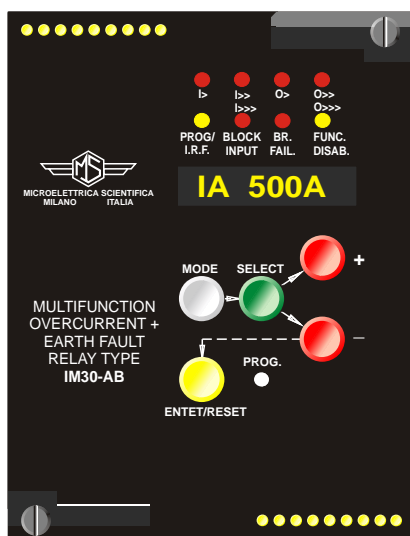
**UL** US LISTED  
IND.CONT.EQ. 19CN



# LINE M

## Current Relays

A complete range of multifunction three-phase + ground relays with selectable and programmable time-current curves. All fitted with digital input/output for selectivity interlock. Versatile and suitable for any application in HV, MV, LV.



### IM30-AB cat. N43

**50/51, 50N/51N, 51BF, 68**

- Three Phase-Fault levels
- Three Earth-Fault levels
- Selectable double setting program
- Time tagged event recording
- User programmable output relays
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

### IM30-AP cat. N40

**50/51, 50N/51N, 51BF, 68**

- Two Phase-Fault levels
- Two Earth-Fault levels
- Selectable Time Current Curves
- Breaker Failure protection
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Modbus Communication Protocol
- UL / CSA listed

### IM30-B00 cat. N49

**50N/51N, 51BF, 68**

- Dual input - Three Earth-Fault levels
- Selectable double setting program
- Time tagged event recording
- User programmable output relays
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

### IM30-BY cat. N38

**46, 50/51, 50N/51N, 51BF, 68**

- Three independent phase element
- Three Phase-Fault levels
- Two Negative Sequence levels
- Three Earth Fault levels
- Selectable double setting program
- Time tagged event recording
- Breaker Failure protection
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Modbus Communication Protocol
- UL / CSA listed

### IM30-C cat. N06

**37,46N,50/51,50N/51N,51BF,68**

- Two Overload levels
- Two Unbalance levels
- Two Earth-Fault levels
- Undercurrent detection
- Dynamic Compensation of Capacitors
- Inherent unbalance
- Breaker Failure protection
- Time delayed capacitor reenergization
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Modbus Communication Protocol
- UL / CSA listed

### IM30-D cat. N05

**50/51,50N/51N,51BF,59Uo,67N,68,I<sup>2</sup>t**

- Three Phase-Fault levels
- Three Directional or not Directional Earth-Fault levels with Zero Sequence voltage polarization
- Zero Sequence Overvoltage level
- Breaker interruption energy  $I^2t$
- Inrush current bias
- Breaker Failure protection
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Modbus Communication Protocol
- UL / CSA listed

### IM30-DR cat. N41

**46,50/51,50N/51N,51BF,67N,68,79**

- Two Phase-Fault levels
- Two Earth-Fault levels
- Zero Sequence Overvoltage level
- One Negative Sequence current level
- Four-shot programmable Autoreclosing
- Reclosure sequence coordination
- Selectable double setting program
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- IRIG-B Time Synchronization
- Modbus Communication Protocol
- UL / CSA listed

### IM30-SA cat. N31

**46,50-51,50N-51N,51BF,64S.E.F.,68**

- Two Phase-fault levels
- Two Earth-fault levels
- One Negative Sequence current level
- One Sensitive Earth Fault level
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

### IM30-SR cat. N28

**50/51,50N/51N,51BF,64S.E.F.,68,79**

- Two Phase-Fault levels
- Two Earth-Fault levels
- Two Sensitive Earth Fault levels
- Selectable double setting program
- Four-shot programmable autoreclosing
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

### DM30-S cat. N27

**50N/51N, 64S.E.F., 67, 68, 51BF**

- Two Directional / Non Directional Phase-fault levels
- Two Earth-fault levels
- Two Sensitive Earth Fault level
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

### DM33 cat. N37

**27,50/51,50N/51N,51BF,59,59Uo,67,67N,68,I<sup>2</sup>t**

- Three Overcurrent levels
- Three Earth-fault levels
- Zero sequence overvoltage level
- Two over / under voltage level
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Breaker Interruption Energy  $I^2t$
- Time tagged multiple event recording
- Modbus Communication Protocol
- UL / CSA listed

## Autoreclosing and Synchrocheck Relays

Suitable for any application in HV, MV, LV systems.

### M-ARM513 cat. N32

**79**

- Single and Three-Phase reclosure
- Up to Four-shot programmable autoreclosing cycle
- Self powered digital inputs
- Serial communication with Modbus Protocol
- Event recording
- Time tagging

### RIA123 cat. R01

**79,68**

- Three shot programmable autoreclosing
- 7 selectable reclosure programs
- Self powered digital inputs
- Optional serial interface
- 3 electromechanical output relays
- 3 optoisolated outputs for external counters
- Local test facility

### SCM21 cat. N20

**25, 27, 59, 81**

- Synchrocheck relay
- Voltage, frequency and fase displ. check
- Over / Under Voltage
- Over / Under Frequency
- Dead Line / Dead Bus programmable operation.
- C/B closing time control
- Event recording
- Modbus Communication Protocol
- UL / CSA listed

## Motor Protection Relays

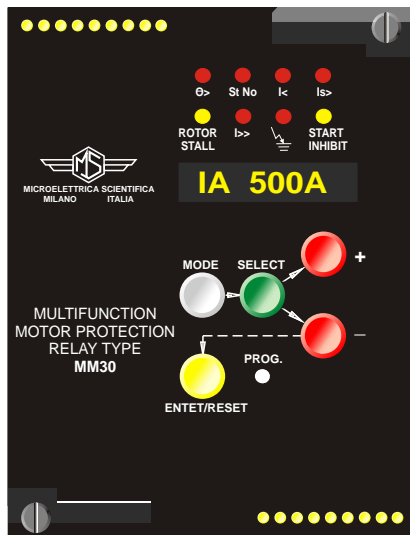
Suitable for protection of medium / large induction motors.

### MM30

cat. N02

37,46,47,48,49,50/51,51LR,64,66,68

- Thermal Image with prealarm level
- Current Unbalance
- Reduced Voltage Starting Control
- Earth Fault
- Locked Rotor
- Overcurrent
- No-Load Running
- Control of n° of startings
- Blocking Output
- Autosetting
- Remote Trip Control
- Speed Control input
- RTD input
- Modbus Communication Protocol
- UL / CSA listed



### MM30-D

cat. N42

37,46,47,48,49,50/51,51LR,66,67N,68

- Thermal Image with prealarm level
- Directional Earth Fault
- Reduced Voltage Starting Control
- Locked Rotor
- Overcurrent
- No-Load Running
- Current Unbalance
- Control of n° of startings
- Blocking Output
- Autosetting
- Remote Trip Control
- Speed Control input
- RTD input
- Modbus Communication Protocol
- UL / CSA listed

### MM30-W

cat. N30

12/14,27/59,37,46,47,48,49,50/51,51LR,55,64,66,68,81

- Thermal Image with prealarm level
- Unbalance
- Earth Fault
- Locked Rotor
- Over / Under Frequency
- Over / Under Voltage
- Starting Control
- No-Load Running
- Control of n° of startings
- Overcurrent
- Low Power Factor
- Speed control
- RTD input
- Power and Power Factor measurements
- Blocking Output
- Modbus Communication Protocol
- UL / CSA listed

## Transformer Protection Relays

Selection of different models to meet the different requirements for HV, MV, LV systems.

### IM30-T

cat. N07

46, 49, 50/51, 50N/51N, 51BF, 68, I't

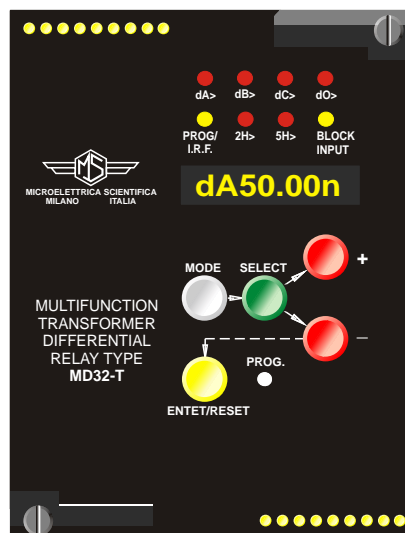
- Three Phase-Fault levels
- Three Earth-Fault levels
- Two Thermal image elements with prealarm
- Two Negative Sequence current levels
- One I't level
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

### IM30-DT

cat. N36

46, 49, 50/51, 51BF, 67N, 68, I't

- Three-Phase Fault levels
- Three Directional Earth-Fault levels
- Two Thermal image elements with prealarm
- Two unbalance levels
- One I't level
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed



### MD32-T

cat. N16

87, 87N

- Three-phase percentage biased differential relay for two-winding transformers
- Automatic correction of CTs' mismatch and Transformer Vector Group
- Two differential current levels
- One restricted Earth Fault level
- 2<sup>nd</sup> and 5<sup>th</sup> harmonic adjust. restraint levels
- Programmable percentage bias curve
- Oscillographic recording
- Modbus Communication Protocol
- UL / CSA listed

### MD33-T

cat. N26

50/51, 87

- Three-phase percentage biased differential relay for three-winding transformers
- Two differential current levels
- One overcurrent level
- 2<sup>nd</sup> and 5<sup>th</sup> harmonic adjust. restraint levels
- Programmable percentage bias curve
- Oscillographic recording
- Modbus Communication Protocol
- UL / CSA listed

### MTR33

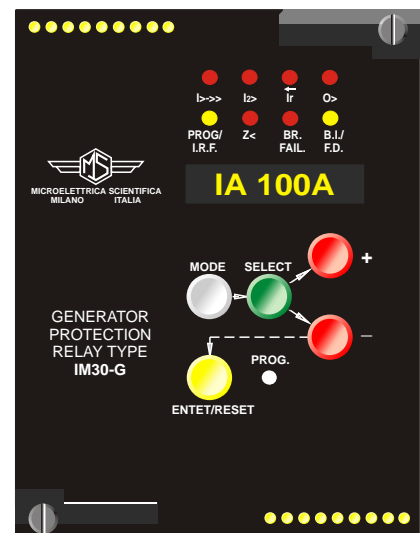
cat. N39

27, 37, 50/51, 59, 90

- Automatic voltage regulation with proportional control pulse
- Over / Under current lock-out and protection levels
- Over / Under voltage lock-out and protection levels
- Line voltage drop compensation (optional)
- Modbus Communication Protocol
- UL / CSA listed

## Generator Protection Relays

For protection of MV & LV medium / Large synchronous generator.



### IM30-G

cat. N10

32, 40, 46, 50/51, 51BF, 64S, 68

- Two Overcurrent levels
- Two Current Unbalance levels
- Stator Earth Fault
- Reverse Power
- Loss of field impedance element
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

## MG30

cat. N29

21,24,27/59,32,37,40,46,49,50/27,  
50V/51V,51BF,60FL,64S,68,81

- Two voltage-controlled overcurrent levels
- Two under-impedance elements
- Thermal image element with prealarm level
- Two unbalance elements
- Two over/under voltage elements
- Two over/under frequency elements
- Two over excitation levels
- Two 95% Stator Earth Fault prot. elements
- One 100% Stator Earth Fault prot. element
- One Reverse power protection element
- One impedance elem.for Loss of Field prot.
- One under-power level
- PTs' fuse failure protection
- Inadvertent C/B closure protection
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

## MD32-G

cat. N15

50/51, 68, 87, 87N or 64S

- Phase Differential protection
- Dual slope programmable percentage bias curve
- Earth Fault or Restricted Earth Fault protection
- Harmonic Restraint
- Phase Overcurrent protection
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed

## UB0/CR

cat. J02/89 (Line "A")

64R

- Rotor Earth Fault protection relay
- 1 Rotor Earth Fault adjustable level

## Autosynchronizing & Load Sharing Control Relays

For HV, MV, LV application

## SPM21

cat. N21

25, 27, 59, 81, 90

- Automatic Synchronization and Synchrocheck
- Fast proportional Voltage and Frequency regulation
- Phase displacement checking with circuit breaker's closing time control
- Antimotoring
- Kicker pulse
- Event Recording
- Modbus Communication Protocol
- UL / CSA listed

## SCM21

cat. N20

25, 27, 59, 81

- Synchrocheck relay
- Voltage, frequency and phase displacement check
- Over / Under Voltage
- Over / Under Frequency
- Dead Line / Dead Bus programmable operation.
- C/B closing time control
- Event recording
- Modbus Communication Protocol
- UL / CSA listed

## RRS

cat. F04/98 (Line "A")

95

- Generator Load Sharing control relay
- Active or Reactive Power Control

## Bus-Bar and Cable Differential Relays

Different technologies for different applications

### M-LIB3

cat. K04

87B

- Modular expandable prewired multizone system with check zone
- Individual modules for: Bus Coupler / Sectionalizer Feeder - income with automatic replica of the position of the bus-bar switches and saturation detectors
- Oscillographic recording
- Zone percentage biased differential protection
- No need for check-zone system CTs
- Modbus protocol

### M-HIB3

cat. K05

87

- Two Differential levels
- Programmable percentage bias
- Through Overcurrent level
- Harmonic restraint
- Breaker Failure protection
- Oscillographic recordings
- Modbus Communication Protocol
- UL / CSA listed

### MFP

cat. N45

50/51, 87/85

- High Sensitivity
- High Speed
- High Stability with automatic Bias
- Adjustable stability coefficient
- Adjustable Compensation of Pilot circuit impedance
- Continuous Monitoring of Pilot wires impedance
- Back-up Overcurrent element
- Oscillographic Recording
- Breaker Failure protection
- 5kV isolation level of the pilot (15kV with additional transformer)
- Up to 1000 pilots resistance (up to 2500 with additional transformer)

## Voltage and Frequency Relays

Three different models to meet any requirement in HV, MV, LV systems

### UM30-A

cat. N03

24, 27d/59d, 47, 59, 59Uo, 78, 81

- Two V/Hz levels
- Two Over / Under voltage elements
- Two Over / Under frequency elements
- Two Zero Sequence voltage levels with Discrimination of faulty phase
- Two positive / negative sequence voltage elements
- Vector shift Detection on Generator Islanding
- Event recording
- Modbus Communication Protocol
- UL / CSA listed

### UFD34

cat. N33

27, 59, 81, df/dt, dv/dt

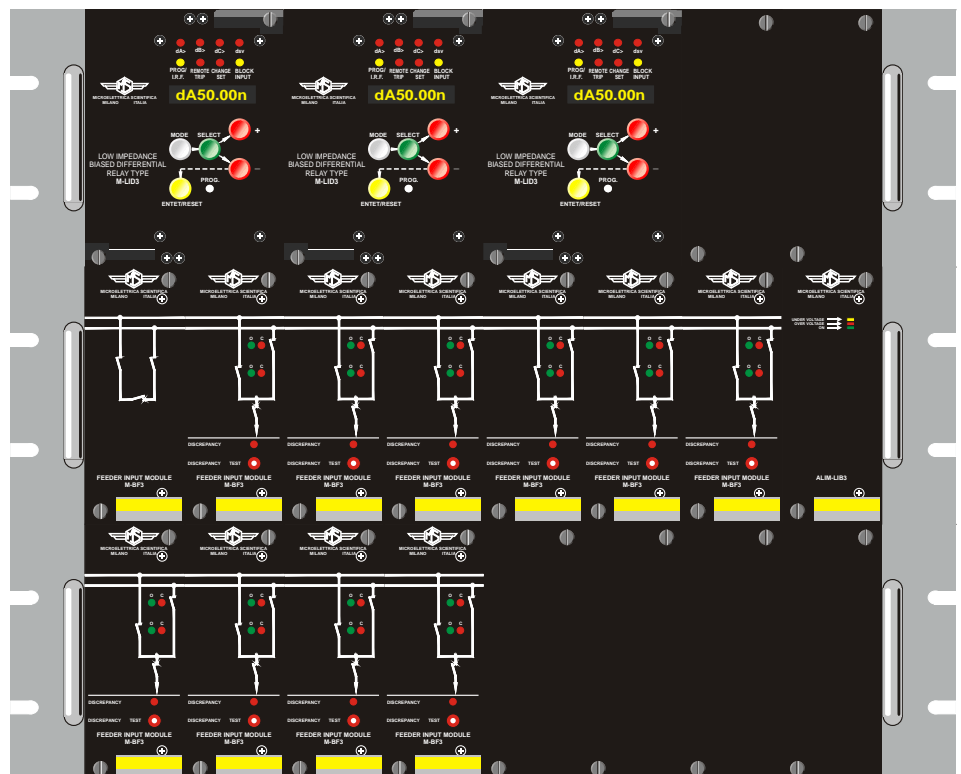
- Three-phase Voltage, frequency relay for load shedding
- Four Over / Under Frequency elements
- Two Over / Under Voltage elements
- Two df/dt elements
- One dv/dt element
- Up to 16 user programmable output relays
- Event recording
- Modbus Communication Protocol
- UL / CSA listed

### UFD14

cat. N25

81, df/dt

- Frequency relay for load shedding
- Four Over / Under Frequency elements
- Two df/dt levels
- One Undervoltage blocking level
- Display of measured Voltage in primary RMS volts
- Up to 16 user programmable output relays
- Event recording
- Modbus Communication Protocol
- UL / CSA listed



## Supervision and Control Relays

### MU30

cat. Z01

#### MULTIFUNCTION THREE-PHASE MEASURING UNIT

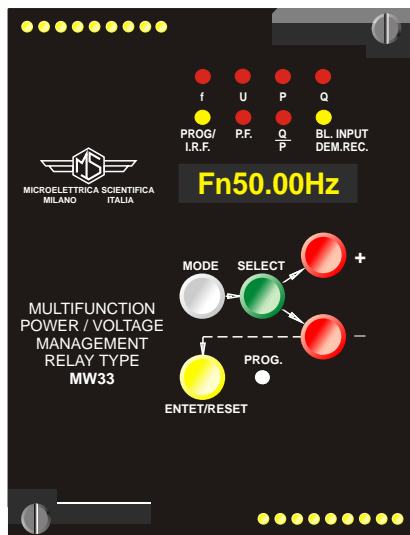
- Programmable multiscale measuring range
- Class 0.5 accuracy
- 1 and 5A, 100-125V adjustable input
- Active Power proportional pulse output
- Active & Reactive Energy with programmable integration time
- Max demand Recording
- Oscillographic recording of input quantities (Version A) or Load Active + Reactive Energy Profile (Version LP)
- 16 Programmable thresholds
- Five Programmable output relays
- Event Counters
- Modbus Communication Protocol
- Time tagging
- UL / CSA listed

### MUCC

cat. Z04

#### DC MULTIFUNCTION MEASUREMENT UNIT

- Oscillographic recording with time tagging on four measurements.
- Demand recording
- Real-time measurement of Voltage, Current, Power
- 8 programmable alarm levels.



### MW33

cat. N17

27, 32, 55, 59, 81

- Two Frequency levels
- Two Voltage levels
- 1 Power factor level
- 1 Q/P level
- Two Active Power levels
- Two Reactive Power levels

### MX7-5

cat. X04

#### PROGRAMMABLE I/O

- 7 Selfpowered digital Inputs programmable as N/O or N/C
- 5 Output programmable as Normally Energize or Normally Deenergize
- Adjustable time delayed operation of output
- Totally programmable AND/OR matrix
- Local / Remote control
- Serial communication with Modbus Protocol
- Time tagged event recording
- Local RS232 port

### MX14-5

cat. X07

#### PROGRAMMABLE I/O

- 14 Selfpowered digital Inputs programmable as N/O or N/C
- 5 Output programmable as Normally Energize or Normally Deenergize
- Adjustable time delayed operation of output
- Totally programmable AND/OR matrix
- Local / Remote control
- Serial communication with Modbus Protocol
- Time tagged event recording
- Local RS232 port

### MC-R

cat. X05

#### MULTIFUNCTION DATA RECORDING & COMMUNICATION MODULE

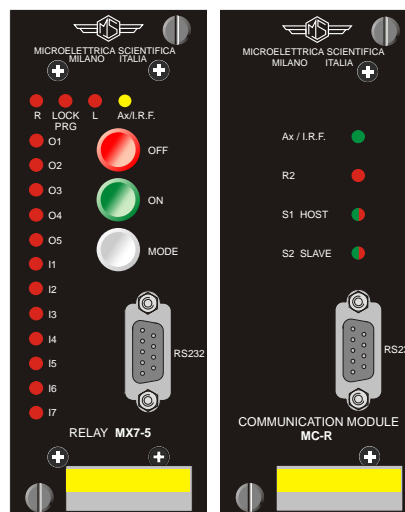
- Communication Concentrator
- Memory expansion
- Serial communication via fiber optic or RS485
- Local RS232 port

### REX-8

cat. X06

#### EXPANSION MODULE FOR M-LINE RELAYS

- Slave module serial controlled for expansion of output relays
- 8 user programmable relays
- 1 diagnostic relay
- DIN Rail mounting (EN50022)
- No operation time delay



### MT4

cat. Z02

#### 4 RTD INPUTS for three wires probes type Pt100

- Temperature monitoring and control unit
- Four Pt100 inputs with dual level programmable alarm.
- Four output relays.
- Two 3-Digit local displays
- Plug-in terminals
- Flush mounting

### MT8

cat. Z03

#### 8 RTD INPUTS for three wires probes type Pt100

- Temperature monitoring and control unit
- Eight Pt100 inputs with dual level programmable alarm
- Three output relays
- Two 3-Digit local displays
- Serial port RS485
- Modbus Communication Protocol
- Plug-in terminals
- Flush mounting

### RCA

cat. J07/93 (Line "A")

- Trip circuit supervision relay.

#### Rated Current:

$I_n = 1$  or 5A;  $I_{on} = 1$  or 5A

#### Current Overload:

200A x 1sec;  
10A continuous

#### Burden on current inputs:

phase: 0.01VA@1A,  
0.2VA@5A,  
earth: 0.015VA@1A,  
0.4VA@5A

#### Rated Voltage:

$U_n = 100-125V_{ac}$

#### Voltage overload:

2  $U_n$  continuous

#### Burden on voltage input:

0.04VA phase@  $U_n$

#### Average power supply consumption:

8.5VA

#### Output Relays:

Rating 5A,  
 $V_n = 380 V_{ac}$   
A.C. resistive switching  
1100W, 380 Vac  
Make=30A peak 0.5 sec  
Break: 0.3A, 110Vdc.  
L/R = 40msec

#### Operation ambient temperature:

-10°C / +55°C

#### Storage temperature:

-25°C / +70°C

#### Reference standards:

IEC60255, IEC61000, IEEE C37  
CE: EN50081-2, EN50082-2  
EN50263, ENV50204  
UL and CSA approval file  
E202083

#### Dielectric test voltage:

IEC60255-5 2kV, 1 min.

#### Impulse test voltage:

IEC60255-5  
5kV(mc), 2kV(md)-1.2/50μs

#### HF disturbance test (1 MHz burst test):

IEC60255-22-1 class 3

#### Electrostatic discharge test:

IEC61000-4-2 level 4

#### Conducted disturbance immunity test

IEC61000-4-6 level 3

#### Radiated electromagnetic field immunity test:

IEC61000-4-3 level 3

#### Electrical fast transient/burst:

IEC61000-4-4 level 4

#### Surge immunity test:

IEC61000-4-5 level 4

#### Oscillatory waves (ring waves):

IEC61000-4-12 level 4

#### Power frequency magnetic test:

IEC61000-4-8 level 5

#### Pulse magnetic field:

IEC61000-4-9 level 5

#### Damped oscillatory magnetic field:

IEC61000-4-10 level 5

#### Voltage interruptions:

IEC61000-4-11 200ms

#### HF induced voltage:

IEC61000-4-1-A.2.6 level 4

#### Resistance to vibrations and shocks:

IEC60255-21-1 and 21-2

## Serial communication and Man Machine Interface

The M series is supported by an advanced communication software with very comprehensive functionality and yet remaining extraordinarily user friendly and versatile.

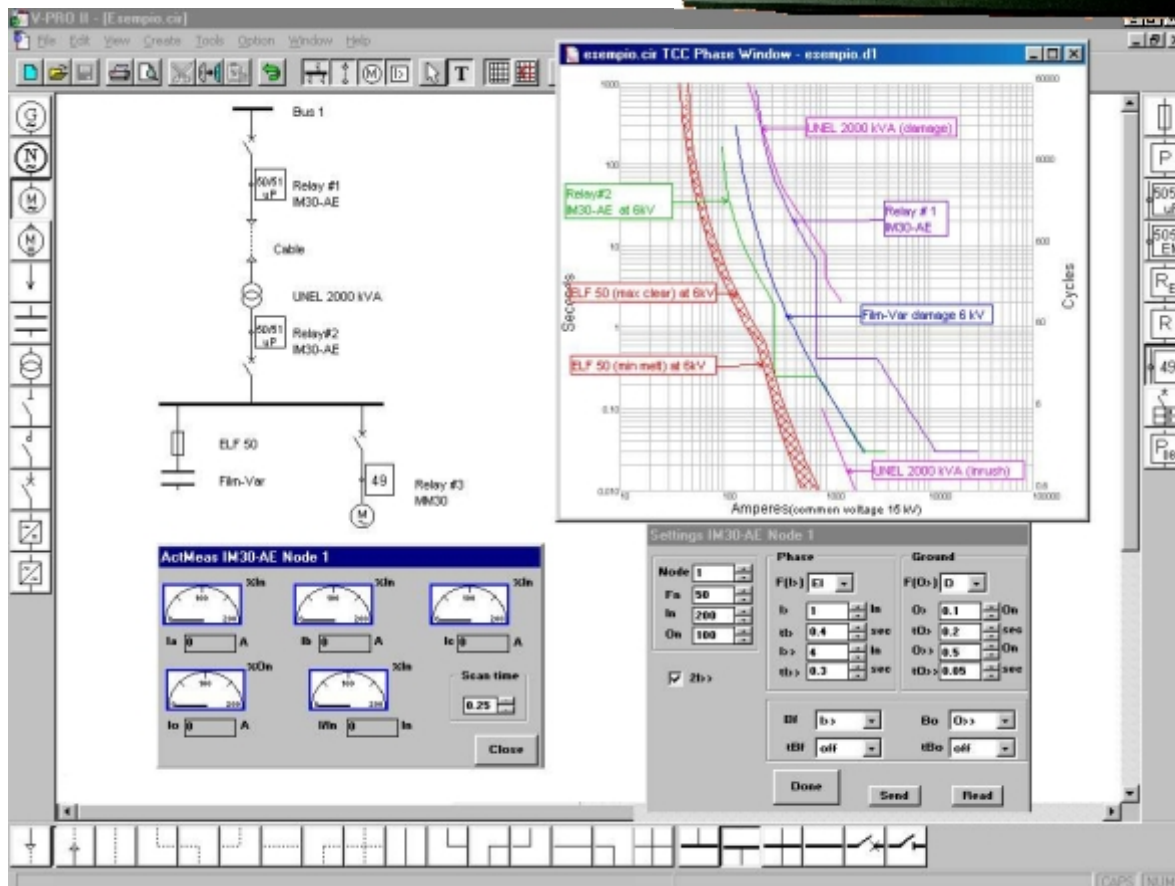
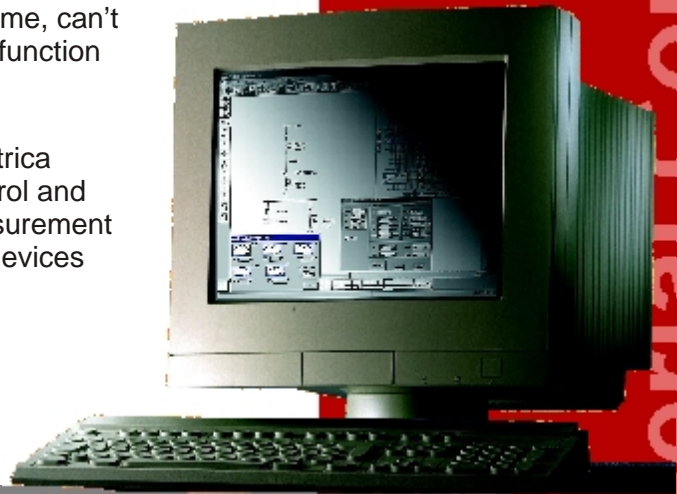
Microelettrica Scientifica has developed and realized **MSCom**: a communication program for Windows systems available in two versions:

**Professional (MSCom Pro)** : is the full version program. It allows to:

- Communicate with 250 Microelettrica Scientifica relays with MODBUS RTU protocol and monitor up to 5 relays at the same time.
- Save data coming from relays on disk
- Program or modify settings
- Manage the configurations of many relays at the same time and store information on hard disk
- Print data tables or diagrams
- Periodically poll the relays and send measurement or event data directly to the hard disk or a printer.
- Access the relays via modem (PC-Modem.....Modem-relays).

**Lite (MSCom Lite)** : this version is freeware and support all the microprocessor relays manufactured by Microelettrica Scientifica. It can communicate only with one relay at a given time, can't communicate via modem, doesn't have the Polling function enabled.

**MS-TD PRO 32** is the software used by Microelettrica Scientifica to implement SCADA (Supervision Control and Data Acquisition) systems based on data and measurement coming from the Protection, Metering and Control devices and designed according to customer requirements.



Serial Communication  
and Man Machine Interface

Founded in 1953, Microelettrica Scientifica has developed a wide range of products, divided into three main lines:

- Electronic Relays for Transmission, Distribution and Machinery protection.

“A Line“ electronic analogic

“M Line“ digital microprocessor

“DIN Line“ digital compact.

- a.c./d.c. low and medium voltage Contactors and Disconnecting Switches:

- “N” Series: Bar Contactors ranging up to 6000A 1000V A.C./D.C.

- “LTH” Series: specially designed for traction up to 1250A 1500V D.C.

- “LTHH” Series: specially designed for traction up to 1750A 4000V D.C.

- “LTHH”:  
Disconnecting Switches elettromagnetic, pneumatic or motor driven ranging up to 1750A 4000V D.C.

- Resistors for any voltage and power rating, neutral or forced air cooled.

For industrial application: load, regulation, earthing, filter.

For railway application: braking, filter.



SEP 2002 - SF03 - Rev.0

