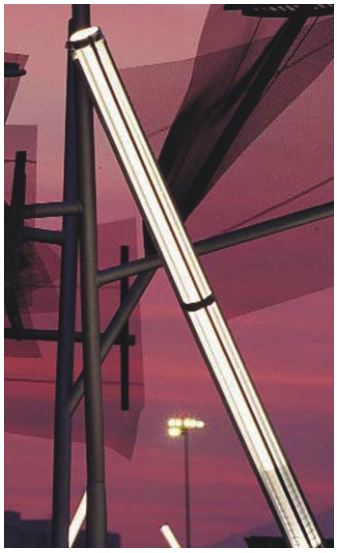
Integrated Range

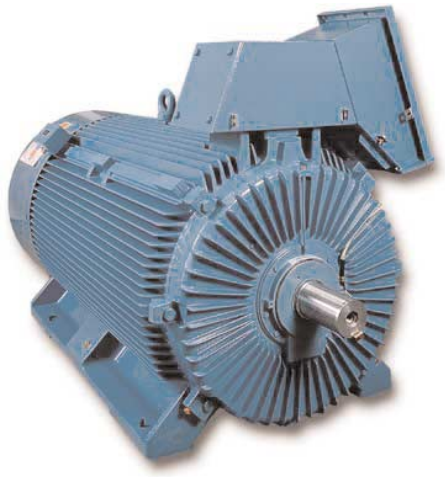


MOTOR PROTECTON

CSPC

TEAM•ARTECHE

INTRODUCTION



The **PL-50 MO** and **PM-250** families represent the different solutions that **Team Arteche** offers for motor protection. Both families are made up by numerical multifunction protection relays.

The **PL-50 MO** is **Team Arteche**'s most economical range of relays used for the motor protection, control and measurement.

Besides motor protection functions it also has measurements and data acquisition functions, which give additional information about events and faults that can happen in the utility.

Optionally it has a rear communications port.

The **PM-250** is **Team Arteche**'s most complete range of relays used for the motor protection, control and measurement.

It has more motor protection functions than **PL-50 MO**, so it is more adequate for important motors protection.

Besides protection functions, it has a wide range of characteristics such as: measurement, communications, oscillography,... This allow Protection engineers to analize the occured events.

Optionally it can have 1 or 2 rear communications ports.

The rear ports that both **PL-50 MO** and **PM-250** units can have allow:

- The relays to be used as a unit integrated in a Protection and Control system.

  Locally or remotely accesing the status, historical data records and settings of the relay.

The **PL-50 MO** units are available in the next mechanical version:

The PM-250 units are available in two mechanical versions:

PM-250-H: Horizontal box

PM-250-V: Vertical box

PL-50 MO

Protection functions

- ✓ 3 phase overcurrent
- ✓ Neutral overcurrent
- ✓ Open phase
- ✓ Thermal image
- ✓ Locked rotor protection
- ✓ Undercurrent protection
- ✓ Protection against long starts
- ✓ Starts per hour
- ✓ Breaker monitoring

Data acquisition functions

- ✓ Measurements (I)
- ✓ Events record
- ✓ Faults record
- ✓ Maximum and minimum measurements record

Hardware

- ✓ 4 current ananlog inputs, 3 for current and 1 for neutral
- ✓ 2 digital inputs
- ✓ 6 digital outputs

Man-machine interface

- ✓ 2 line, 8 character LCD
- ✓ 4 key keyboard
- ✓ 6 programmable LEDs and 1 two-colour LED por self-testing
- ✓ 1 front serial port RS232
- ✓ Optional rear port

PM-250

Protection functions

- ✓ 3 phase overcurrent
- ✓ Neutral ovecurrent
- ✓ Phase unbalance
- ✓ Open phase
- ✓ Thermal image
- ✓ Locked rotor protection
- ✓ Undercurrent protection
- ✓ Protection against long starts
- ✓ Starts per hour
- ✓ Thermal image using RTDs (depending on models)
- ✓ Undervoltage protection
- ✓ Phase voltage unbalance
- ✓ Maximum and minimum frequency
- ✓ Breaker monitoring
- ✓ Trip and close circuit monitoring

Data acquisition functions

- ✓ Measurements (I, V, P, Q)
- ✓ Events record
- ✓ Faults record
- ✓ Maximum and minimum measurements record
- ✓ Oscillograph data recorder

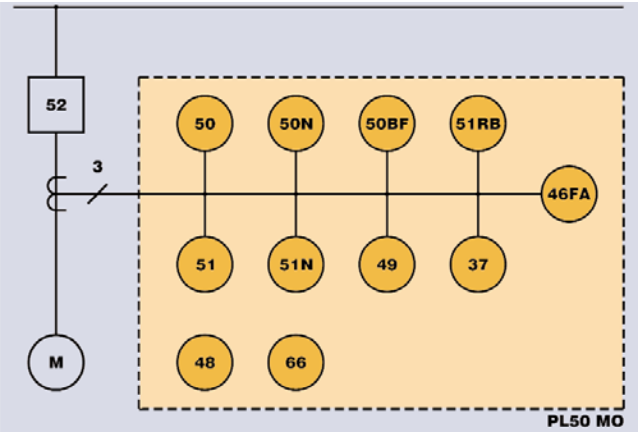
Hardware

- ✓ 4 current analog inputs, 3 for current and 1 for neutral
- ✓ 3 analog voltage inputs for phase voltages
- ✓ 4 inputs for RTDs (depending on model)
- ✓ 6 or 15 digital inputs (depending on model)
- ✓ 10 digital inputs

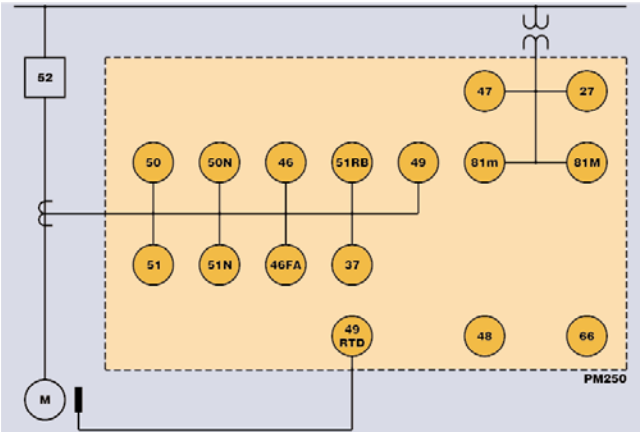
Man-machine interface

- ✓ 2 line, 16 character LCD
- ✓ 16 key keyboard
- ✓ Optical signalling using 8 LEDs
- ✓ 1 front serial port RS232
- ✓ 1 rear communications port (2nd optional port)

PL-50MO FUNCTIONAL DIAGRAMM



PM-250 FUNCTIONAL DIAGRAMM



PROTECTION FUNCTIONS

Phase and neutral overcurrent protection timed and instantaneous (50/51, 50N/51N)

The timed overcurrent, protects the motor against overloads which cause motor heatings and the instantaneous overcurrent, set above the pickup current, protects the motor against short circuits.

Phase unbalance and open phase protection (46/46FA)

The phase unbalance causes a stator current increase and a rotor heating increase. These situations are detected by current unbalance and open phase protections.

Undercurrent protection (37)

The undercurrent unit, protects the motor against load loss.

Locked rotor protection (51RB)

The rotor mechanical lockout, cause currents similar to the pickup current, which moreover, remains during the lokout, this produces severe heatings in the motor.

The locked rotor unit protects the motor against this situation, comparing the set current with the measured average current. If the measured current is higher, the unit trips after the programmed time has elapsed.

Thermal image protection (49)

The thermal image protection protects the motor against thermal overloads. It calculates the temperature depending on the present and recent motor loads, and according to CEI 255-8-17 standard.

RTD treatment (49 RTD)

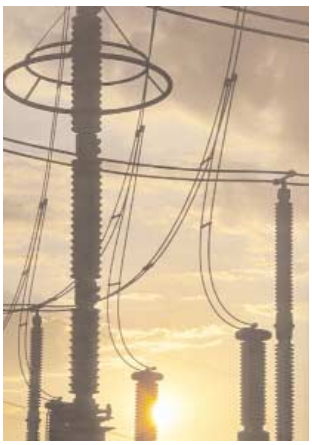
The PM250 relay can have RTD inputs (depending on model). The RTDs are placed near the active parts of the motor and they give direct temperature measurement. This function gives high temperature alarm, low temperature alarm and RTD trip.

Undervoltage protection (27)

Protects the motor against overloads and losses of excitation, this would cause the motor stop.

Frequency protection (81M/m)

The frequency variation causes changes in the motor turning speed. The maximum and minimum frequency protection protects against these regime variations.



Starts per hour (66)

A motor can be damaged if an excessive number of starts happen during a time interval. The protection against successive starts protects the motor against this situation. If the number of starts during a programmed time is higher than a programmed number, more starts won´t be allowed during a programmed time.

Protection against long starts (48)

An excessively long start causes motor heatings. The long start protection acts causing a trip if the starting period is higher than the programmed time.

DATA ACQUISITION FUNCTIONS

Events record

The unit stores the last 200 events in its non-volatile memory with the following data: date and time of occurrence, code description of event and the level of electrical parameters when the event happened.

Faults record

The last 9 faults are stored in non-volatile memory, with the following data: date and time of pickup, start and end of fault, the prefault and fault electrical parameters, duration, type of fault and units engaged.

Programmable logic

The user can configure up to 6 logic signals which can be assigned to output relays and LEDs.

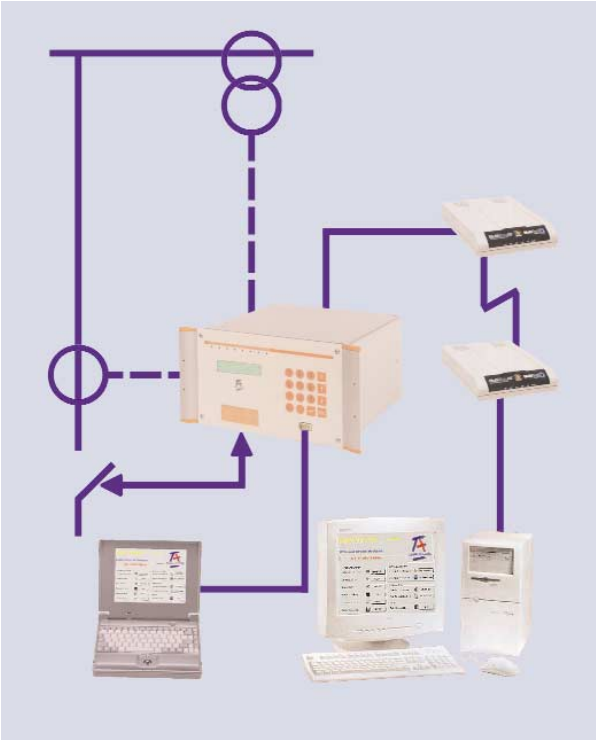
Self-testing

The PM-250 and PL-50 MO protection relays run The following ongoing self-diagnostic checks:

- Power suppy voltage
- Hardware
- Picking up of measurements

Oscillograph data recorder

- PM250 units store in non volatile memory 20 records for 30 cycles.
- Each record comprises the samples from 8 analog signals and 16 selectable digital signals.
- 4 prefault cycles are stored.
- Each record stores the date and time.
- The disturbances are collected and exported in COMTRADE format.



MAN MACHINE INTERFACE

The PL-50 MO and PM-250 units, have the following user communication elements:

Display/keyboard

The units have in their front panel: a keyboard/display unit, signalling LEDs and a front serial communications port.

Allows:

- ✓Displaying of inputs, measurements, date and time, statistical data and the last fault.
- ✓Viewing and modification of active table and settings, and allocation of inputs, outputs and LEDs.

Communications: Local and remote

Both units have:

- ✓One serial RS232 output for direct connection to a PC.
- ✓One or two optional serial rear ports for the connection to a PC, modem or Integrated Protection and Control System. The second port only for PM-250.

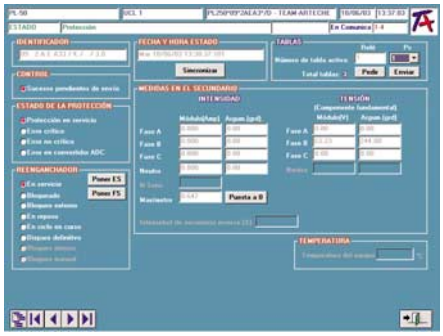
SOFTWARE

TEAM ARTECHE uses the SIPCON™ Protections software, developed for PCs running under WINDOWS. This program allows clear, simple dialogue with the unit for access to the information stored in it for necessary settings.

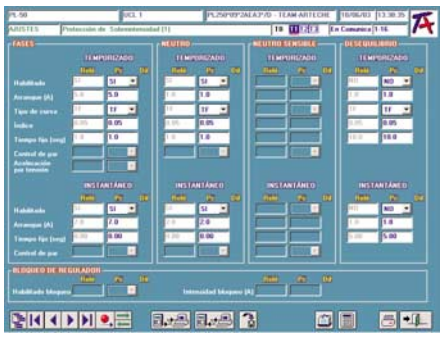
All configurations accesses are password protected to prevent tampering by unauthorised personnel.

The outstanding features of the SIPCON™ Protections software include the following:

- ✓Automatic detection of the unit which it is in dialogue with.
- ✓Unit status display via status screens.



- ✓Presentation and modification of settings



- ✓Filling and presentation of all information stored in the relay: events, faults, historical data, oscilloscope readings, etc.

SIPCON™ Protections software is compatible with the software used in Team Arteche's integrated protection and control systems, and can be incorporated into them as just one more function module.

SETTINGS RANGES

Phase overcurrent

Setting	Range	Step
Timed pickup (A)	(0.1-4) In	0.1A For PL50-MO In=5A, 0.1A In=1A, 0.01A
Instantaneous pickup (A)	(0.1-20) In	0.1A For PL50-MO In=5A, 0.1A In=1A, 0.01A

Neutral overcurrent

Setting	Range	Step
Timed pickup (A)	(0.1-4) In	0.1A For PL50-MO In=5A, 0.1A In=1A, 0.01A
Instantaneous pickup (A)	(0.1-20) In	0.1A For PL50-MO In=5A, 0.1A In=1A, 0.01A

Open phase

Setting	Range	Step
Pickup (I_2/I_1)	PM250: 0.05-0.5 PL-50MO: 0.1-0.5	0.01
Definite time (s)	0.1-99.9	0.1

Locked rotor

Setting	Range	Step
Timed pickup (A)	PM250: (0.2-12) In PL50-MO: (0.2-10) In	0.1
Definite time (s)	0-30	1

Breaker failure (PL-50MO)

Setting	Range	Step
Phase restore (A)	(0.1-20) In	0.1
Neutral restore (A)	(0.1-20) In	0.1
Definite time (s)	0.05-9.99	0.01

Current unbalance

Setting	Range	Step
Timed pickup (A)	(0.2-2.5) In	0.1
Instantaneous pickup (s)	(0.2-20) In	0.1

Undercurrent protection

Setting	Range	Step
Timed pickup (A)	(0.1-1) In	0.1
Definite time (s)	0-30	1

Undervoltage protection

Setting	Range	Step
Undervoltage (V)	10-150V	0.1

Time characteristics

Curves	ANSI	IEC/BSC
Tipe	Ext. inverse	Ext. inverse
	Very inverse	Very inverse
	Inverse	Inverse
	User	User
Time index	0.5-30	0.05-1.09
Step	0.1	0.01
Time	**Range**	**Step**
Definite time (s)	0-99.9	0.1
Inst. addit. time (s)	0-9.99	0.01

Voltage unbalance

Setting	Range	Step
Timed pickup (V_2/V_1)	0.1-0.5	0.1
Definite time (s)	0.1-99.9	0.1
Inst. addit. time (s)	0-9.99	0.01

Thermal image

Setting	Range	Step
Motor rated current	1-10	0.01
Curve index	0-12	1
Alarm threshold (%)	60-100	1

RTD treatment

Setting	Range	Step
Application	Observation Out of service Stator Ambient Other	
Low RTD alarm	OFF	
High RTD alarm	Event only	
RTD trip	Without lockout With lockout	
Low alarm T^a (°C)	1-250	1
High alarm T^a (°C)	1-250	1
Trip T^a (°C)	1-250	1

Maximum and minimum frequency unit

Setting	Range	Step
Minimum frequency (Hz)	45-65	0.01
Maximum frequency (Hz)	45-65	0.01
Definite time (s)	0-10	0.01
Min. supervision voltage (V)	40-120	1

Protection against long starts

Setting	Range	Step
Pickup time (s)	1-99	1

Starts per hour

Setting	Range	Step
Number of pickups	1-15	1
Time window (min)	1-120	1
Trip activation time (min)	1-100	1

TECHNICAL DATA

Power supply

PM 250

- Voltage 24, 48, 110, 125, 220Vdc ±20%
- Maximum burden 16W

PL-50 MO

- Voltage range 18-65 Vdc
  85-280Vdc
- Maximum burden 14W

Current circuits

- Thermal withstand
  - ✓Continuous 4 In
  - ✓For 1 second 100 In
  - ✓For ½ cycle 250 In
- Burden for In=5A 0.25 VA
- Burden for In=1A 0.03 VA

Voltage circuits

- Thermal withstand
  - ✓Continuous 2 Vn
  - ✓For 1 min 3 Vn
- Burden for Vn 0.01VA

RTDs (Only PM250)

- RTD inputs 3 wire PT100
- Maximum distance 10m
- Cable cross section 0.5mm^2

Digital inputs

PM 250

- Voltage range ± 25% power supply
- Burden 3 mA

PL50-MO

- Voltage range 18-160 Vcc 70-270 Vcc
- Burden 3 mA

Output contacts

Trip relays:

- Carry 8 A
- Make (0,5 s) 30 A
- Breaking capac. (L/R=40 ms)
  - ✓125 Vdc 0.3 A
  - ✓48 Vdc 0.5 A
- Breaking capac. (resistive)
  - ✓125Vdc 1 A
  - ✓48Vdc 3 A
- Operating time ≤10ms

Auxiliary relays

- Carry 10 A
- Make (0,5s) 30 A
- Breaking capac. (L/R=40ms)
  - ✓125 Vdc 0.25 A
  - ✓48 Vdc 0.3 A
- Breaking capac. (resistive)
  - ✓125Vdc 0.4 A
  - ✓48Vdc 2 A
- Operating time ≤8ms

Communications

- Front serial interface RS-232C
- Rear serial interface 1 or 2 (only PM250)
- Interface type RS 232C
  Glass F. O.
  Plastic F.O.
  RS 485
- Baud rate 300-38400 bps
- Communication protocol
  IEC 870-5 PROCOME
- Optional depending on model
  IEC 870-5-103; DNP 3.0; MODBUS RTU

Time synchronization

- Date and time synchronization using communications
- Clock with backup battery

Environmental features

- Operating time -10ºC a 55ºC
- Optional operating time -20ºC a 70ºC
- Storage Temperature -40ºC a 75ºC
- Relative humidity
  Up to 95% without condensation

Mechanical characteristics

PM250

- Weight 4.7 Kg
- Front IP IP40

PL-50 MO

- Weight 2 Kg
- Front IP IP52

QUALITY POLICY

Since it was founded, **TEAM ARTECHE** has committed itself to complying with the guideline laid out in its quality policy, oriented towards the continuous improvement of its products and services in each and every one of its activities, in order to obtain complete client satisfaction.

The ISO 9001 international certificate shows that the design, manufacturing and service provided by **TEAM ARTECHE** follows the most secure and stringent control and supervision procedures.

Every unit manufactured by is designed to operate under severe electrical substation and industrial plant conditions, complying with the most exigent electromagnetic, environmental and mechanical tests, thus incorporating the CE mark of electromagnetic compliance.

CERTIFICATE OF APPROVAL

TEAM ARTECHE, S.A.
Mungia, Vizaya
Spain

ISO 9001:2000
UNE EN ISO 9001:2000

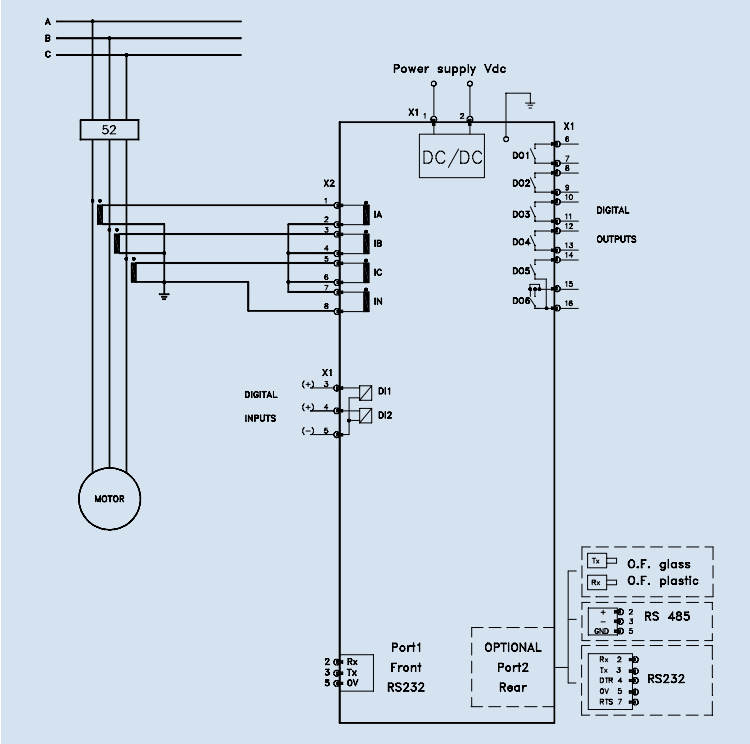
Design, manufacturing and servicing of metrology, recording, control and protection products for electrical grids.

STANDARDS AND TESTS

Electrical		
Immunity to electrostatic discharges	IEC 61000-4-2	Class IV
Immunity to fast transient bursts	IEC 61000-4-4	Class IV
Immuntiy to voltage pulses (surges)	IEC 61000-4-5	Class IV
Immunity to 1MHz damped wave	IEC 61000-4-12	Class III
Measurement of insulation resistance	IEC-255-5	
Measurement of electric rigidity	IEC-255-5	Class III
Measurement of insulation with voltage pulses	IEC 255-5	Class III
Electromagnetic		
Measurement of radiated electromagnetic interference	EN55011	Class A, group 1
Immunity to radiated radiofrequency fields	IEC 61000-4-3	Class III
Immunity to induced radiofrequency signals	IEC 61000-4-6	Class III
Mechanical		
Vibration	IEC 255-21-1	Class I
Shock and bump	IEC 255-21-2	Class I
Environmental		
Damp heat	IEC 68-2-3	(+40ºC, 93% humedad relativa)
Dry heat	IEC 68-2-2	(+55ºC, 3 días)
Cold	IEC 68-2-1	(-10ºC)
Change of temperature	IEC 68-2-14	(-10/+55ºC)

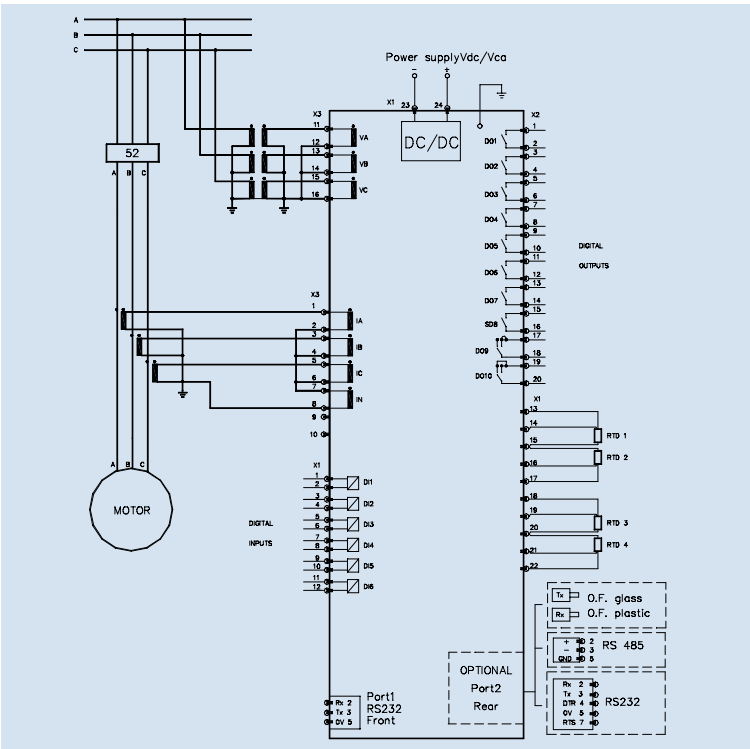
PL-50 MO CONNECTIONS DIAGRAM

Connections diagramm depending on model. Consult instruction manual.

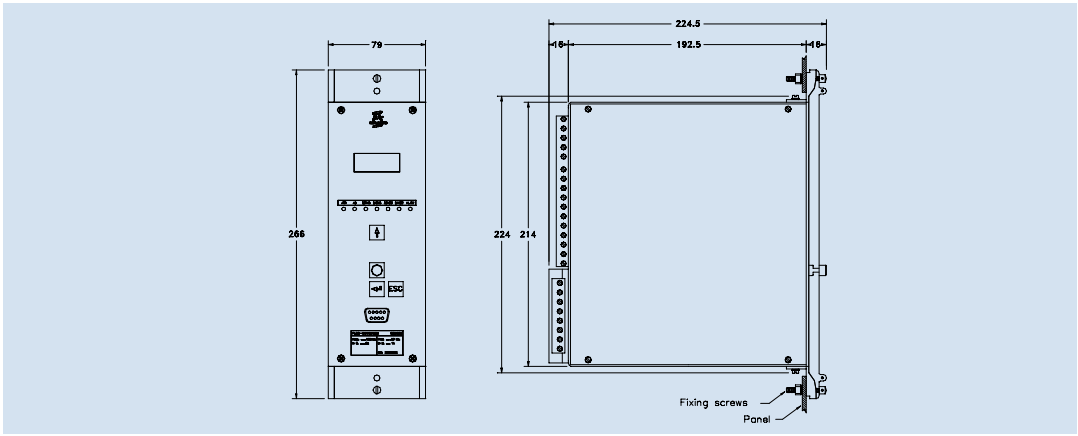


PM-250 CONNECTIONS DIAGRAM

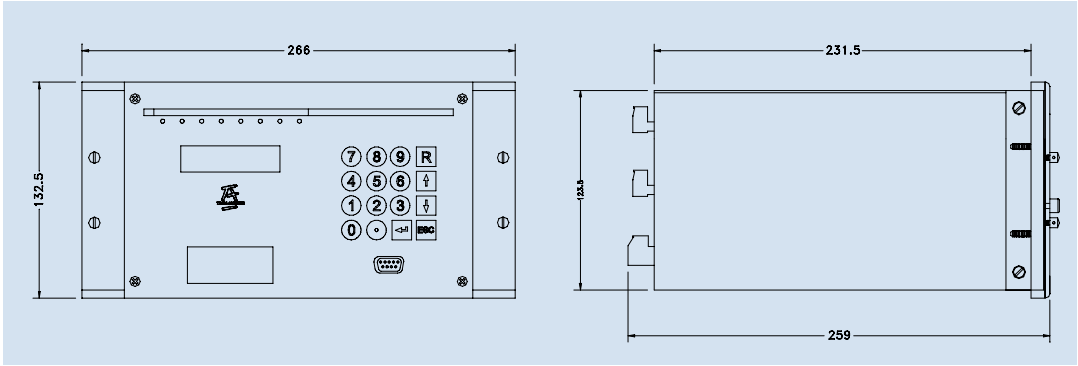
Model with RTD inputs and 6 digital inputs. Connections diagramm depending on model. Consult instruction manual.



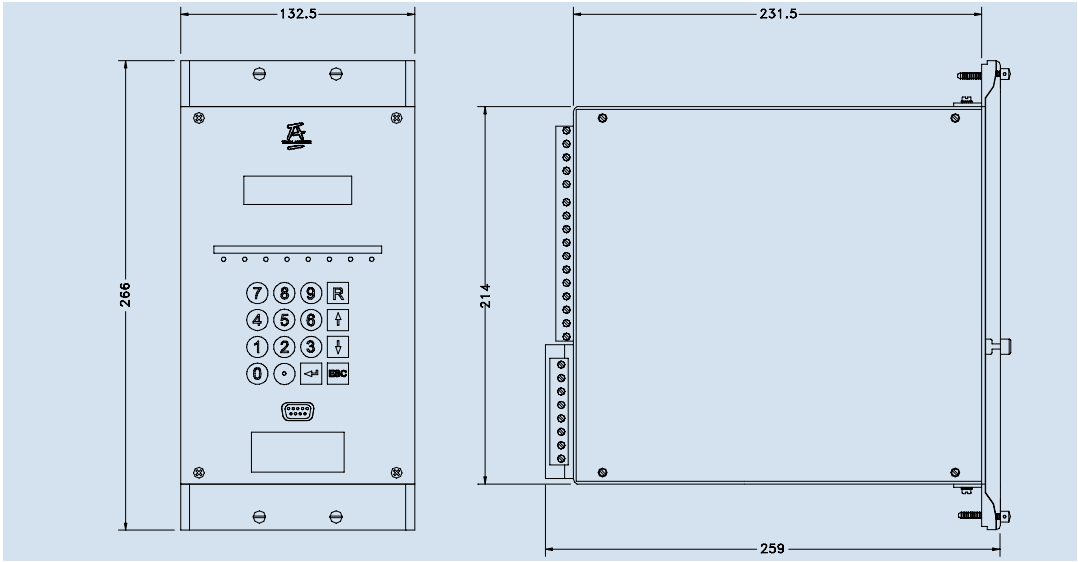
PL-50 MO DIMENSIONS



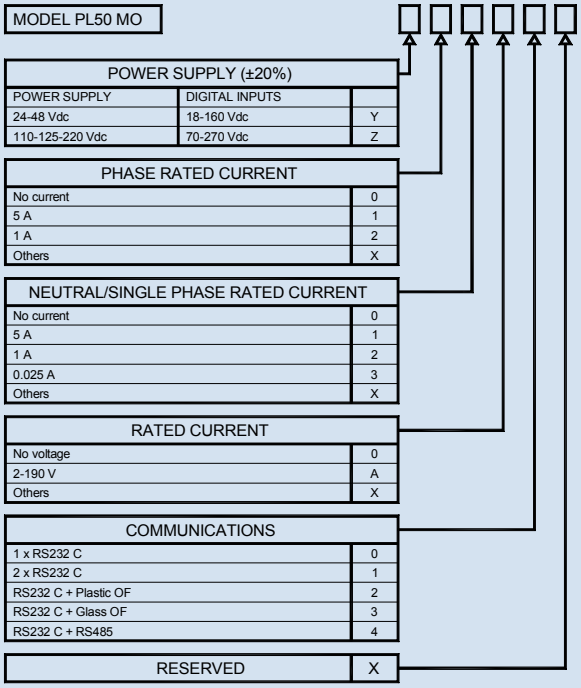
HORIZONTAL PM250 DIMENSIONS



VERTICAL PM250 DIMENSSIONS



PL-50 MO MODEL SELECTION TABLE



The continuous improvement of its products is TEAM ARTECHE's one of the main objectives, consequently, this catalogue's information, can be modified without previous advise. In order to get a completer information, consult the manual or contact our commercial department.

PM-250 MODEL SELECTION TABLE