



Compatible<sup>®</sup>  
**ZIV**ersys



**MCD**

**Metering and Control Terminal**  
Control, Metering and Alarms



## Description

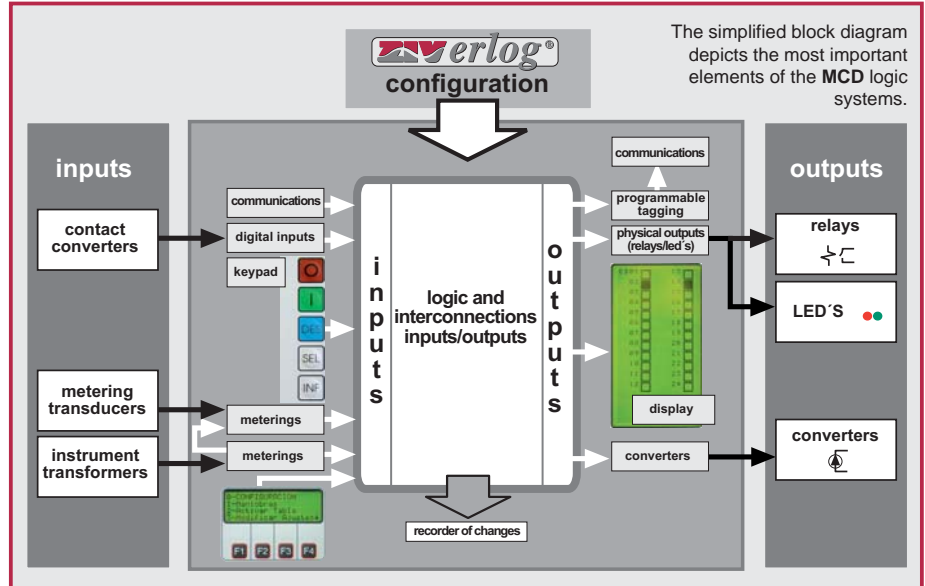
**MCD** terminal units provide complimentary control, metering and alarm functions to other substation protection and control devices. The **MCD** is a microprocessor-based Intelligent Electronic Device (IED) that provides additional PLC type control functions in applications where specialized control and monitoring functions are required (the MCD is not equipped with protections elements).

**MCD** terminal units incorporate (model dependent) one or more of the following functions:

- **Control and monitoring functions (remote/local) of the devices associated to the bay: breakers, sectionalizers, etc. and their corresponding interlockings.**
- **Metering functions.**
- **Alarm functions corresponding to:**
  - Operations performed by the programmed logic, based on inputs received from external devices (measured values from the MCD) or transmitted signals from a Central Unit.
  - Signals directly received as digital inputs without processing.
- **Signal monitoring functions**
- **Automatic Control functions**

**MCD** terminal units are based on a programmable logic platform, around which a set of physical and logic resources for interacting with the external environment are provided. These resources can be categorized as follows:

Physical Inputs	
Type	Capacity
Digital inputs (contact converters)	up to 72
Analog inputs	
From the secondary of CT's	up to 3I + 3V
From transducers	up to 4
Keypad	



Physical Outputs	
Type	Capacity
Output relays	up to 46
Optical indicators	8
Transducer outputs	up to 2
Display	

The indicated number of digital inputs and outputs represent the maximum number available per unit. When inputs and outputs are combined, the resources of each type decrease, with a total maximum of 98.

The **MCD** is equipped with a communications subsystem by which the input signals, defined in the logic, can be activated by virtual signals. Additionally, the inputs may be activated by the status of the outputs signals or metering values.

The logic platform, where the above mentioned physical resources are located, allows the user to design the logic of the systems based on the interconnection of signals and logic functions acting as primitives of the system: **Logical gates AND, OR, XOR, NAND, NOR, etc.; inverters; timers;**

**variable pulse generators; bi-stable RS latches; switches; analog comparators; multipliers and meters.**

Some of the primitives listed above have associated settings (timers, level detectors, etc.) and can be modified through the Human-Machine Interface (HMI).

The logic programming and the assignment of inputs and outputs of the physical devices is performed through the **Verlog** software program. **Verlog** is an intuitive, Windows™ based program that guides the user in selection and use of the available logic programming resources.

Any of the signals generated by the **MCD** can be programmed as part of a chronological event record to be generated through the communications system.

The transmission of information and data to a higher level is carried out through an RS232 or Fiber Optic (plastic or glass) communications port.

## Application

**MCD** terminal units are applied in applications where protection functions are not required or where the protection and control functions are not integrated in the same equipment and additional control functions are required. Additionally, an **MCD** can be part of a Substation Integrated Protection and Control System (SIPACS), or an Integrated Control system with complementary function such as:

- Display of general substation alarms.
- Busbar position metering, control (if required) and alarms.
- Metering positions.
- Auxiliary services.
- Signal monitoring to be sent to other IEDs and/or a Central Unit.
- Automatic control functions, etc.

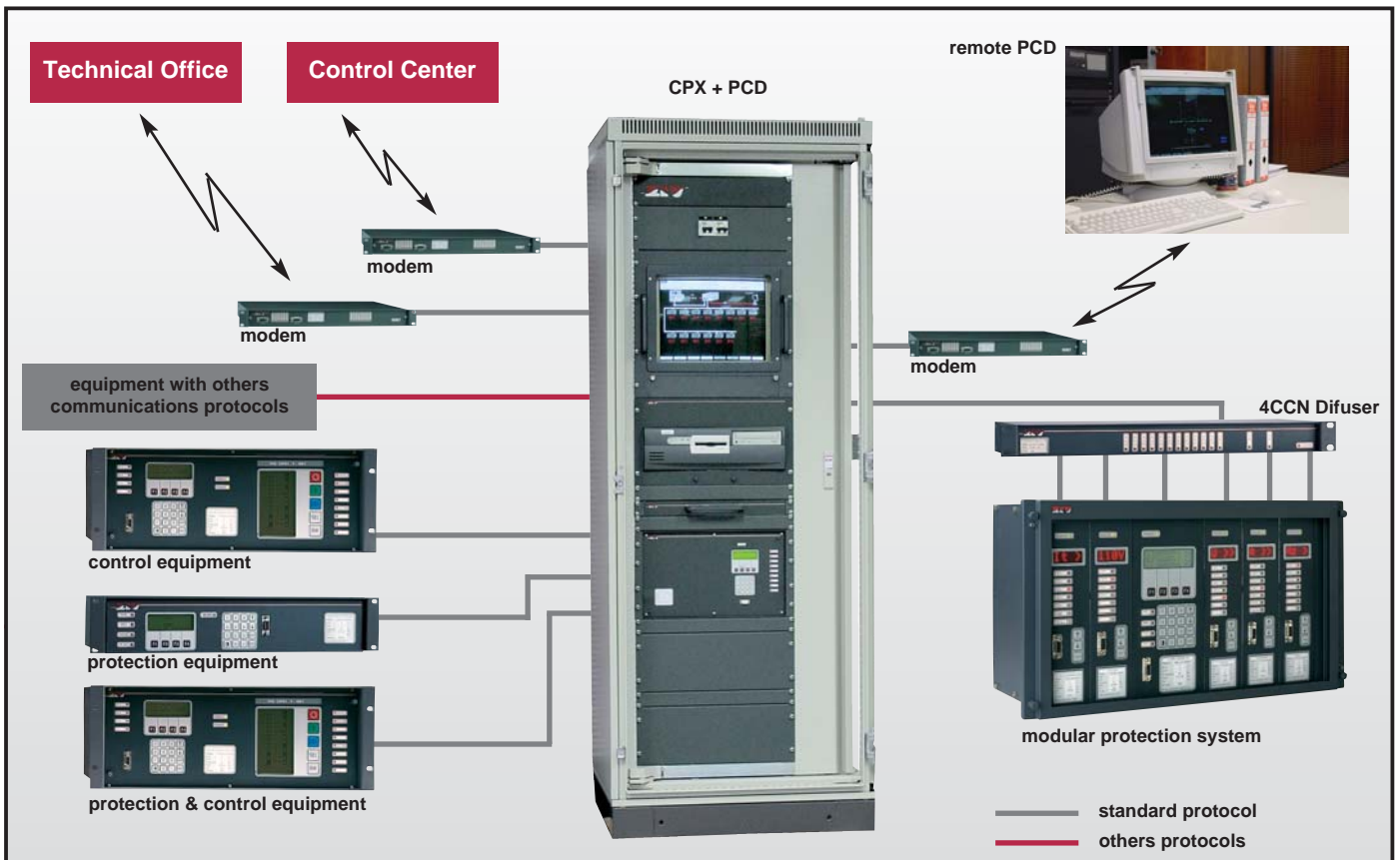
Through a communications network (typically fiber optic), the **MCD** is connected to a substation Central Unit. The Central Unit collects data from all of the IEDs on the network and provides access to all bay position for operations, information, metering, recordings, etc, through a single communications program.

The SIPACS is structured in 2 levels. The lower level (**Level 1**) pertains to the terminal units (IEDs) at each position and the data collected by each IED. Level 1 functions do not require a Central Unit or the communications network to operate. Therefore, Level 1 protection and local control functions remain operational, independent of a communications failure.

The next level (**Level 2**) is comprised of the substation Central Unit that performs the system integration functions. A communications network allows a fast interchange of information between the IEDs and the Central Unit.



24 hours assistance in USA and Canada





## Functions

The **MCD** may incorporate the following functions and/or elements:

- **Control HMI**
- **Command and monitoring (local and/or remote) of all devices associated to the bay: breaker, sectionalizers, etc.**
- **Execution of interlocking logic**
- **Information about metering and active inputs/outputs.**
- **Protection inputs (external).**
- **Metering of analog quantities: (I, V, kW, kVar, kVA, kWh, kVarh, etc.), through:**
  - Analog inputs: V and I (1A & 5A).
  - Inputs from transducers: ( $\pm 2.5$  mA, 0-5 mA or 4-20 mA,  $\pm 1$  mA, 0-1 mA).
  - Inputs from meters: kWh / kVarh (bi-directional).
- **Configurable digital inputs: function related to the collection of field information associated to the bay position or from external protection.**
- **Configurable digital outputs: operations, signaling, etc.**
- **Outputs from transducers: 0 - 5 mA.**
- **Generation and display of alarms.**
- **Configurable visual targets.**
- **Alphanumerical and/or graphical display.**
- **Local and remote communications interface.**
- **Verlog® configuration program.**

## Human-Machine Interface (HMI)

Human-Machine Interface communication is established locally from the front keypad. Configuration and Control HMIs are independent of each other.

### • Configuration HMI

**MCD** terminal units are equipped with a 4 row x 20 character LCD screen. Associated with the LCD screen are 4 functions keys. 16 keys (in a 4x4 matrix) completes the interface. Password protected menus allows the user to gather data and adjust the terminal unit settings.

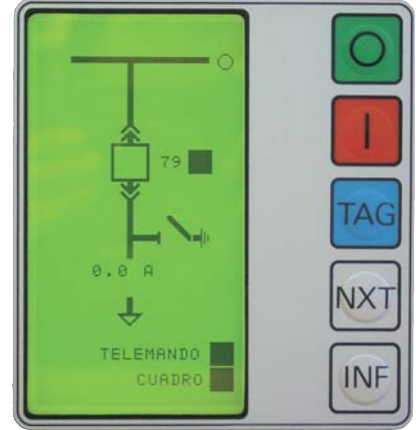
### • Control HMI

The **MCD** Control HMI consists of a backlit 240x128 pixel LCD screen. There are 5 buttons that perform the following functions:

0	Open/Off/Manual/Local
I	Close/On/Auto/Remote
TAG	Tagging
NXT	Cycles through active control mimics
INF	Cycles through information screens

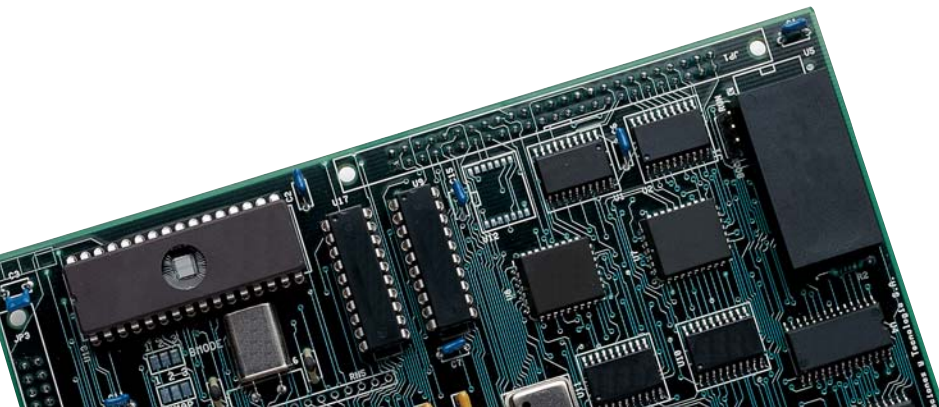
The Control HMI can adapt to represent different configurations of the electrical bay and our vast library of symbols can be used match a utilities diagramming practices.

When the equipment is idle, the display will show the single line diagram of the corresponding position indicating the status of the different elements. Through this screen we have access to:





- **Information Menu (INF).** The **INF** button is associated with a cyclical menu where various information is displayed, such as: Alarms, Metering, I/O Status, Recloser Counter (if any), Virtual I/O Status, Visual Target Indicator Status, Date and Time.

- **Selection Menu (NXT).** The **NXT** button cycles between the programmed actuating control elements in the single line diagram. After a desired control element is selected (signified by a blinking element) the user can assert or unassert the element by pressing either the I or O button respectively. Possible operations include: Open/close breaker and sectionalizers (if any), switch from local to remote mode, place recloser in or take out of service, etc.




## Communications

### Program

The  communications program has been designed to configure the control subsystem of **MCD** terminal units.  is an intuitive, WINDOWS™ based program that is password protected against unauthorized use. The program allows a user to:

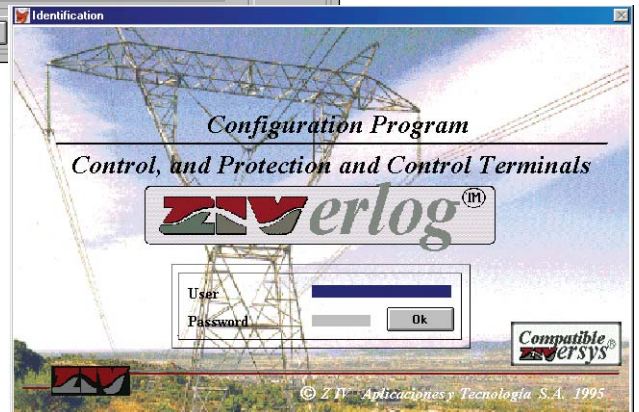
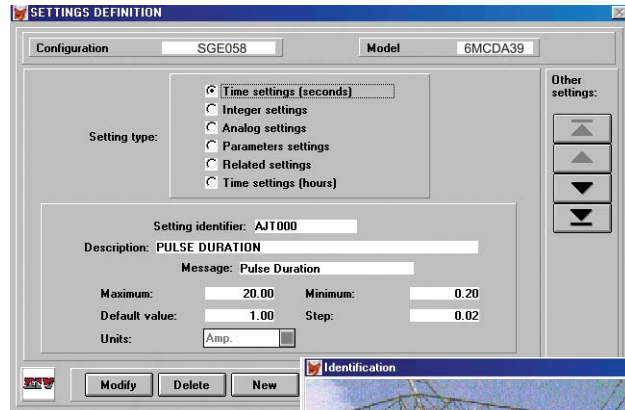
- Implement a designed logic configuration
- Modify a logic configuration
- Load a specific configuration, either in local mode (through a PC) or remotely (via serial port).

Main functions of the  program are as follows:

- Design of the configuration of control subsystem.
- Allows for the creation of a new configuration or for the creation a new configuration based on existing elements from other configurations.
- Modification of an existing configuration.
- Allows the modification of all the logic elements in the design of a configuration

For any of the above options, the following items can be defined:

- Configuration of communications
- Definition of local functions:
  - Interlockings
  - Logic for command outputs
  - Load shedding functions
  - Automatic control functions
  - Timers
- Specification of functions associated to the single line diagram
  - Options for alarm recognition
  - Define number of alarms to be displayed
  - Define texts and alarm inputs
- Configuration of inputs, outputs, protection inputs and optical indicators



**MCD** terminal units are capable of communicating in several different protocols. Many standard protocols have been implemented in our devices, and more are being added, as the industry requires. The model specification chart should be consulted to determine protocol selection.

24 hours  
assistance in  
Spain and  
Europe



## Enclosure

**MCD** terminal units can be mounted (model specific) in the following type of enclosures:

- Cabinets ½ of a 19" rack wide by 6 rack units (RU) tall
- Cabinets of a 19" rack width and 4 rack units (RU) tall

They can be installed either flush mounted or in rack cabinets. Connectors are placed horizontally in the rear of the case and admit wire of cross section up to 4 mm<sup>2</sup> (11 AWG) for analog current/voltage circuits and 2.5 mm<sup>2</sup> (14 AWG) for the status contact input and output circuits.



## Technical Characteristics

### Power Supply Voltage

24-48 V dc ( $\pm 20\%$ )
110-125 V dc ( $\pm 20\%$ )
220-250 V dc ( $\pm 20\%$ )

### Analog Current Inputs

Rated Current	$I_n = 1A / I_n = 5A$
Thermal Withstand Capacity	
Continuous	4 $I_n$
3 sec	50 $I_n$
1 sec	100 $I_n$
Dynamic Limit	240 $I_n$
Burdens	$I_n = 5A < 0.2 VA$ $I_n = 1A < 0.05 VA$

### Analog Voltage Inputs

Rated voltage ( $V_n$ )	110 V, 50Hz 120 V, 60Hz
Thermal Capability (continuous)	1.2 x $V_n$ (phases)
Thermal Capability (for 10 s.)	3.6 x $V_n$ (zero seq.)

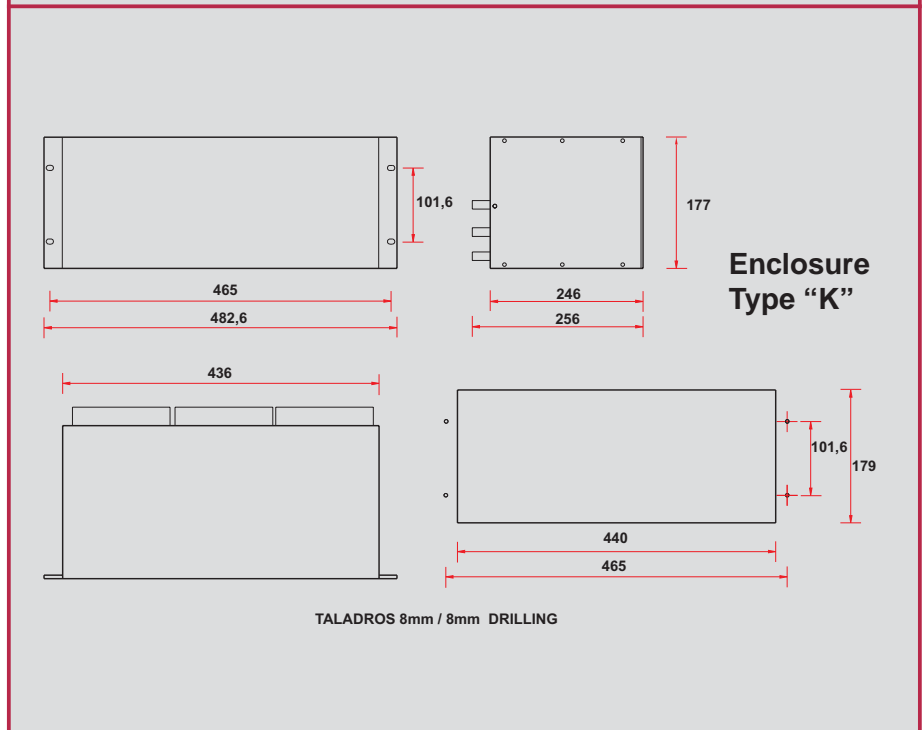
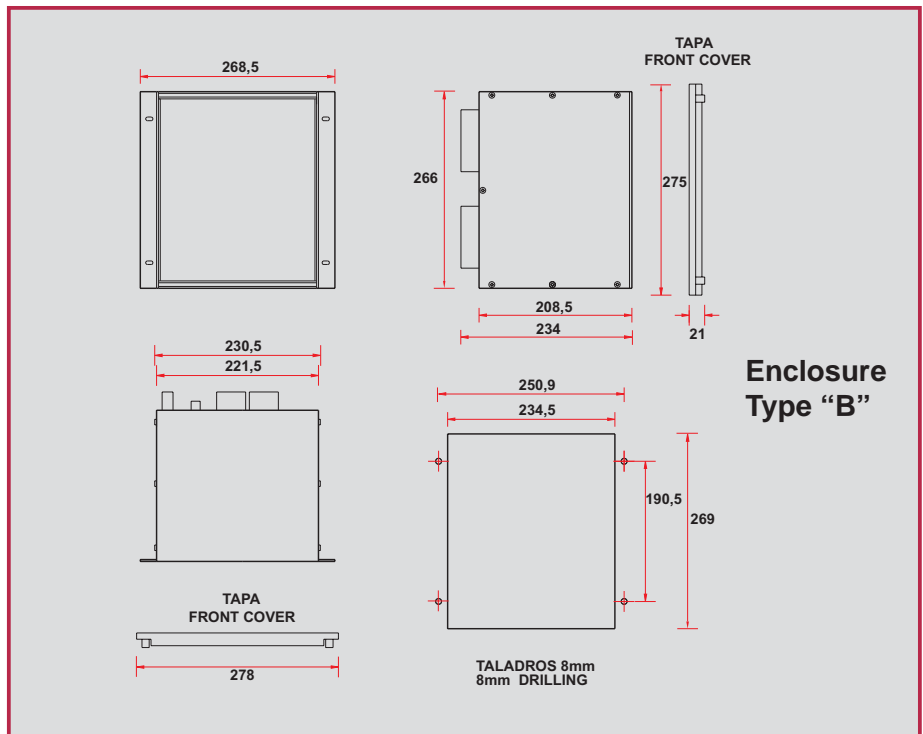
### Digital Inputs

Input Voltage Range	24-125 Vdc ( $\pm 20\%$ ) 48-250 Vdc ( $\pm 20\%$ )
Burden	< 5 mA

### Auxiliary Outputs

Connection Capability	2000 W
Breaking Capability	75 W (48Vdc) 40 W (100 Vdc)
	1000 VA
Switching Voltage	250 Vdc
Continuous Current	3 A
Make and Carry	5 A (30 sec)

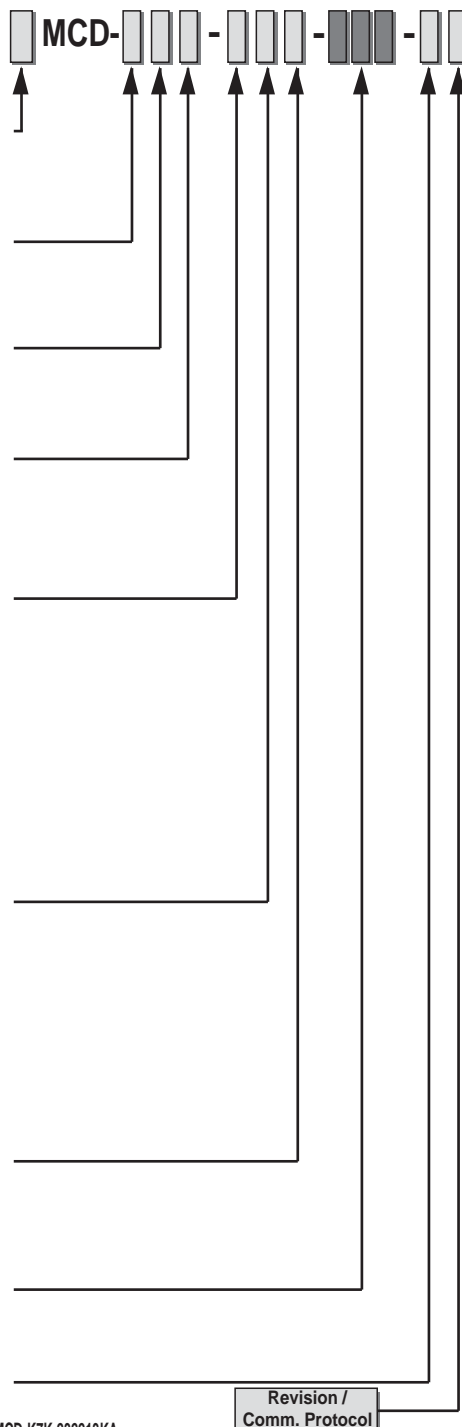
## Dimensions



## Model Selection

Model selection is determined using the following figure, according to the characteristics required:

Construction		
Rack modules		1
Rack		6
Functions		
Metering and I/O capture		K
I/O capture		P
Interface Options		
Alphanumeric display		5
Alphanumeric and Graphical display		7
LED'S Options		
12 LED's		K
Aux. Voltage		
Power Supply	Digital Inputs	
24-48 Vdc (*)	24-125 Vdc	1
110-125 Vdc (*)	24-125 Vdc	2
220-250 Vdc (*)	48-250 Vdc	3
* ±20%		
Frequency / Rated Voltage / Language		
50 Hz / spanish		0
50 Hz / 110 & 110 √3 Vac / spanish		1
60 Hz / english		2
60 Hz / 120 & 120 √3 Vac / english		3
50 Hz / english		A
50 Hz / 110 & 110 √3 Vac / english		B
60 Hz / spanish		C
60 Hz / 120 & 120 √3 Vac / spanish		D
60 Hz / portuguese		E
60 Hz / 120 & 120 √3 Vac / portuguese		F
Communications		
RS232 (front) + RS232 (rear)		1
RS232 (front) + Plastic Fiber 1mm (rear)		2
RS232 (front) + Glass Fiber (SMA) (rear)		3
RS232 (front) + Glass Fiber (ST) (rear)		4
RS232 (front) + Plastic Fiber Double Ring (rear)		6
Metering / Inputs / Outputs		
To be defined at manufacturer's		
Enclosure Type		
6U x 1/2 19" Rack		B
4U x 1 19" Rack		K



Example: model 6MCD-K7K-232213KA

Metering and I/O's with graphical and alphanumeric display; function and control keys; 12 led's; power supply: 125 Vdc; In = 5A; 60 Hz / 120 & 120 √3 Vac / english; communications RS232 and Plastic Fiber Optic; 2AI + 8DI + 10DO + 20's (transducer); 4U x 1 19" rack enclosure.

## Standards and Type Tests

Insulation Test	IEC-255-5
Between Circuits and Ground	2 kV, 50/60 Hz for 1 minute
Between Independent Circuits	2 kV, 50/60 Hz for 1 minute
Impulse Test	IEC-255-5
	5 kV; 1,2/50 μs; 0,5 J

1 MHz Disturbance Test	
IEC-255-22-1 Class III	
Common Mode	2,5 kV
Differential Mode	1,0 kV
Fast Transient Disturbance Test	
IEC-255-22-4 Class IV	
	4 kV ±10%
Radiated Electromagnetic Field Disturbance Test	
IEC-1000-4-3	
Amplitude Modulated	10 V/m
Pulse Modulated	10 V/m
Electrostatic Discharge Test	
IEC-255-22-2 Class III	
	8 kV ±10%

Radio Frequency Emissivity	
EN 55011	

Temperature	IEC-255-6
Operating Range	-10° C to +55° C
Storage Range	-25° C to +70° C
Humidity	95% (non condensing)

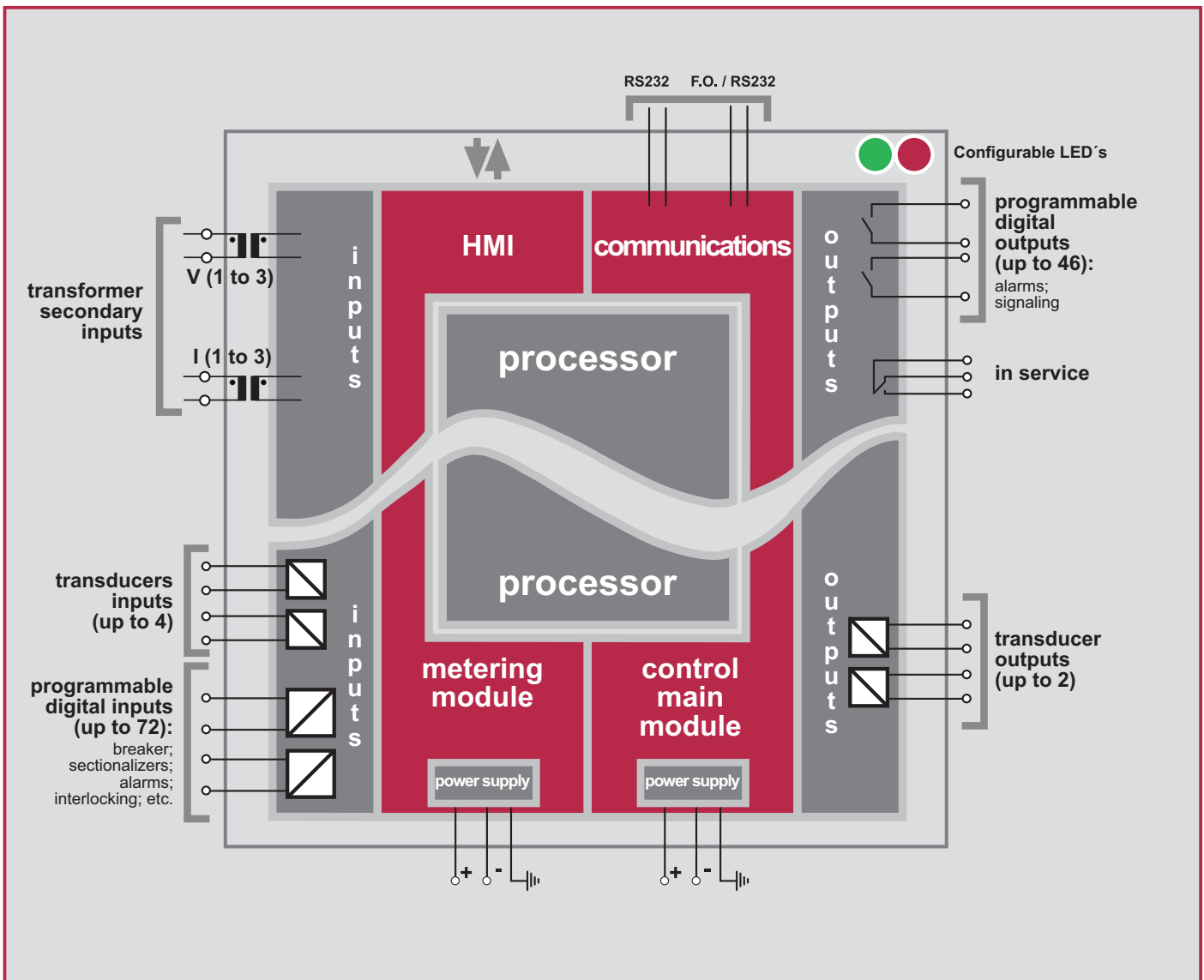
Power Supply Ripple	
IEC-255-11	
	< 20%

Vibration Test (sinusoidal)	IEC 255-21-1 Class I
Shock and Bump Test	IEC 255-21-2 Class I

MCD models comply with the EEC 89/336 standard of electromagnetic compatibility



## Generic Block Diagram



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