



M-Power

Electronics



TECHNICAL MANUAL

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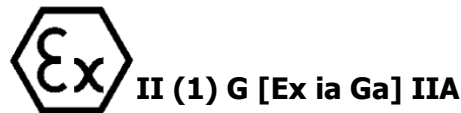
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1 Features

M-Power is an associated equipment capable of powering equipment located in a hazardous area starting from a 12V DC input voltage, while providing an RS485 serial communication channel and a low-level diagnostic signal of the input voltage.

All channels are limited in both voltage and current in order to limit the energy that can flow towards the hazardous area.

The equipment has a protection mode



in the temperature range $-25^{\circ}\text{C} \div +60^{\circ}\text{C}$ and is certified in compliance with the standards EN IEC 60079-0: 2018, EN 60079-11: 2012.

M-Power in its basic version is characterized by the following channels:

In safe zone	To hazardous zone
Power supply input 12 V (9 ÷ 13.6 V)	Output 5 V
RS485 Serial line	Output 3,8 Volt
	RS485 Serial line
	Digital output signalling low input voltage

M-Power can also be equipped with two expansion boards: one for the management of two NAMUR sensors installed in the dangerous area and one for the acquisition of the status of four digital signals in the safe area and its transmission to the dangerous area on the line. RS485.

The channels of the board for conditioning the NAMUR signals are all towards the dangerous area, there is no interaction with the safe area.



Regardless of the expansion boards installed, M-Power can be made in two versions:

- M-Power-INS
- M-Power-PP

M-Power-INS creates galvanic isolation between the channels facing the safe area and the channels facing the dangerous area. The equipment that will be connected to M-Power in the hazardous area can be considered isolated regardless of what is connected to M-Power in the safe area.

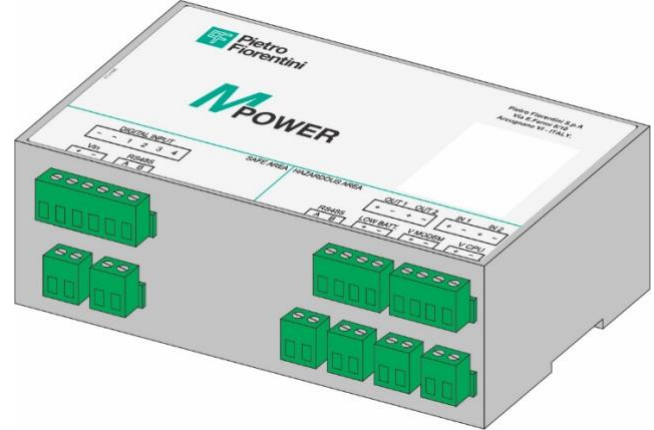
M-Power-PP, on the other hand, does not perform galvanic isolation and therefore can be used only where the equipment connected on the side facing the safe area is powered by a floating source. Typically, a system completely powered by a solar panel and not connected to earth can use M-Power in the PP version as long as its characteristic parameters are respected.

M-Power can be supplied in two different containers.

IP65 container



IP20 DIN Rail container



The DIN rail container can be used for installation in an electrical panel capable of providing adequate overall protection.

2 Certificates

The **M-Power** equipment was designed for monitoring gas distribution systems and certified, according to Directive **2014/34 / EU (ATEX)** as intrinsically safe equipment for use in applications in potentially explosive atmospheres.

Ex II (1) G [Ex ia Ga] IIA Tamb = -25°C ÷ +60 °C
EPT 21 ATEX 4288 X



RISK OF EXPLOSION: the installation of the remote power supply must be carried out in accordance with the requirements contained in this manual

3 Suitability of the equipment for the installation place

In the case of use in areas with danger of explosion, it must be verified that the type of equipment identified is suitable for the classification of the area and the flammable substances present in the system. The essential safety requirements against the risk of explosion in classified areas are established by the European Directives 2014/34 / EU of 26 February 2014 (as regards equipment) and 1999/92 / EC of 16 December 1999 (as regards plants).

The criteria for the classification of areas with risk of explosion are given by the EN60079-10 standard. The technical requirements of electrical systems in classified areas are given by the EN60079-14 standard.

The following table shows the legend of the marking for use in a hazardous area:



II (1) G	Associated equipment of category (1), to be installed in a safe area, for surface installations.
[Ex ia Ga]	Intrinsically safe equipment of category ia with protection level Ga
IIA	Equipment of group IIA suitable for substances (gases) of groups IIA.
	Conformity marking to applicable European directives
	Marking of conformity to directive 2014/34 / EU and related technical standards
EPT 21 ATEX 4288 X	EPT Identification of the laboratory that issued the EC type certificate; 21 year of issue of the certificate 4288 certificate number. X indicates that there are particular conditions of use which are indicated in the manual with safety instructions.
-25°C ÷ +60 °C	Ambient operating temperature of the equipment
1370	Number of the Notified Body (Bureau Veritas) which carries out the surveillance of the production system.

Table 2-1

4 Connections

4.1 Safe area

The input channels of **M-Power**, in the basic version, are the power supply and the RS485 serial line.

4.1.1 Power supply

The power supply of the **M-Power** must be connected to the M1 terminal block respecting the polarities shown in Figure 4.1-1.

M-Power must be powered with a nominal voltage of 12 Volts (9-13.6 Volts). In the **M-Power-INS** version all the channels facing the dangerous area are galvanically isolated from the input while in the **M-Power-PP** version there is no isolation between the input and the output.

4.1.2 RS485 Serial line

The serial line made available in the safe area must be connected to terminal block M2 as shown in Figure 4.1-1.

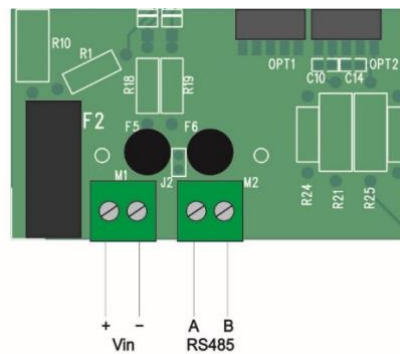


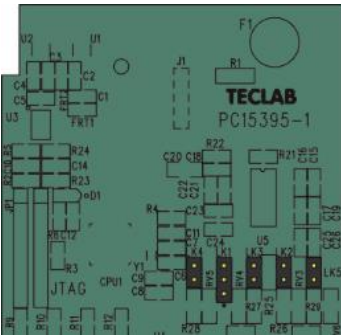
Figure 4.1-1

4.1.3 I/O Expansion

An additional card can be mounted on M-Power which allows with the following characteristics:

- four digital inputs that can be used to connect voltage free signals (dry contact)
- four 4-20mA or + - 5V analog inputs individually configurable. One input can be configured with extended full scale + -20V.
- two opto-isolated open collector outputs

The mounting of the add-on card takes place via three plastic spacers, which make the terminal block M101 find itself above the terminal blocks M1 and M2.

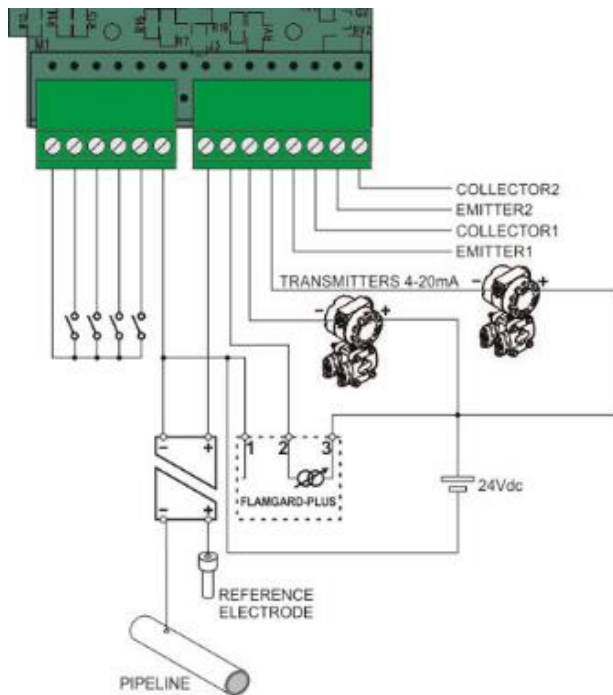


LK1=1-2
LK2=OPEN
LK3=CLOSED
LK4=CLOSED
LK5=CLOSED

LINK	POS.	FUNZIONE
LK1	1 - 2	AIN3 +5V FS o 4-20mA (LK3)
	2 - 3	AIN3 0 +- 20V FS
	Open	AIN3 Open
LK2	Open	AIN0 Voltage
	Closed	AIN0 Current
LK3	Open	AIN3 Voltage
	Closed	AIN3 Current
LK4	Open	AIN2 Voltage
	Closed	AIN2 Current
LK5	Open	AIN1 Voltage
	Closed	AIN1 Current

Tabella 7: Configurazione Link Espansione I/O

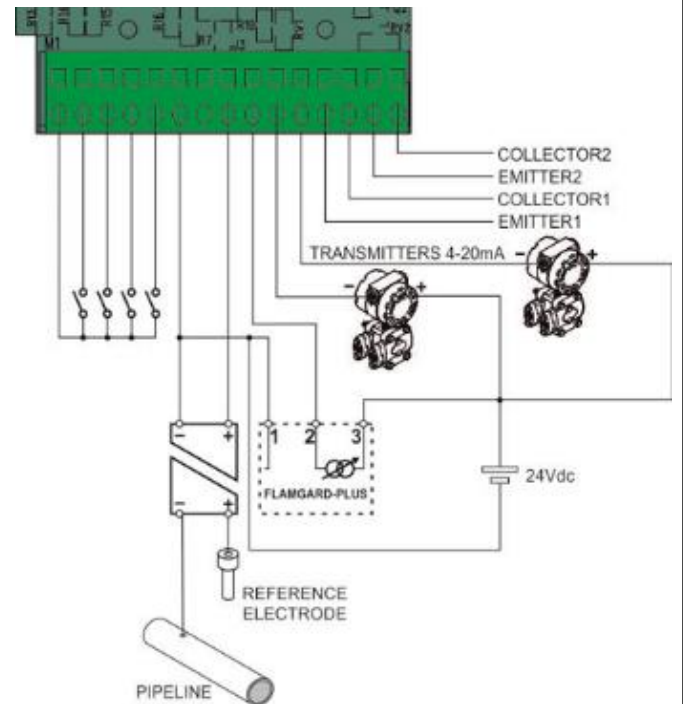
Ingressi Barra DIN



MORS.	DEN	FUNZIONE
M1A	GND	Comune
	DI1	Ingresso digitale 1
	DI2	Ingresso digitale 2
	DI3	Ingresso digitale 3
	DI4	Ingresso digitale 4
M1B	GND	Comune
	AIN1	Ingresso analogico 1
	AIN2	Ingresso analogico 2
	AIN3	Ingresso analogico 3
	AIN4	Ingresso analogico 4
	DO1+	Uscita digitale 1 - positivo
	DO1-	Uscita digitale 1 - negativo
DO2+	Uscita digitale 2 - positivo	
DO2-	Uscita digitale 2 - negativo	

Tabella 8: Ingressi Barra DIN

Ingressi IP 67



MORS.	DEN	FUNZIONE
M1	GND	Comune
	DI1	Ingresso digitale 1
	DI2	Ingresso digitale 2
	DI3	Ingresso digitale 3
	DI4	Ingresso digitale 4
	GND	Comune
	GND	Comune
	AIN1	Ingresso analogico 1
	AIN2	Ingresso analogico 2
	AIN3	Ingresso analogico 3
AIN4	Ingresso analogico 4	
DO1+	Uscita digitale 1 - positivo	
DO1-	Uscita digitale 1 - negativo	
DO2+	Uscita digitale 2 - positivo	
DO2-	Uscita digitale 2 - negativo	

Tabella 9: Ingressi IP 67

4.2 Hazardous area

In its basic version M-Power has four channels facing the hazardous area:

RS485 LOW BATT V MODEM V CPU

Figure 4.2 1 illustrates the portion of the board in which are present the terminal blocks of the channels facing the dangerous area.

4.2.1 RS485 Serial line

The RS485 serial line facing the dangerous area is available on the M3 terminal block. The connections with the equipment located in the dangerous area must be made respecting the polarities shown in Figure 4.2-1.

4.2.2 Low power supply voltage (LOW BATT)

This channel, available on terminal block M4 and also identified as LOW BATT, consists of an open collector output that is activated (transistor conducting) when the input voltage drops below a predetermined threshold.

The opto-isolator emitter is connected to the output ground.
Figure 4.2-1 shows the correct polarization of the channel.

4.2.3 Power supply 1

Power supply 1, also referred to as V MODEM, is available on the M5 terminal block with the polarities shown in Figure 4.2-1.

4.2.4 Power supply 2

Power supply 2, also referred to as V CPU, is available on terminal block M6 with the polarities shown in Figure 4.2-1.

It should be noted that power supply 1 and power supply 2 have the ground pin in common and therefore if a single device is powered by both of these sources, it is possible to use only three conductors by sharing the ground.

4.2.5 Signal conditioning

A signal conditioning board for two NAMUR sensors installed in a hazardous area can be connected to the **M-Power**: the board is mounted with the use of plastic spacers which ensure that the M201 and M202 terminal blocks are located above the M5 and M6 terminal blocks.

Figure 4.2-2 shows the connection diagram of two NAMUR sensors to the M201 terminal block, with the correct polarity highlighted.

The result of the conditioning of the two signals is made available on the M202 terminal board by means of two open collector outputs whose emitters are connected to ground, as shown in Figure 4.2 2.

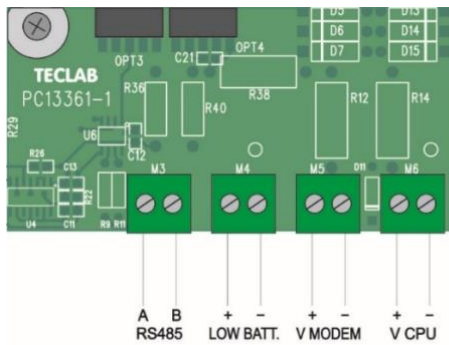


Figure 4.2-1

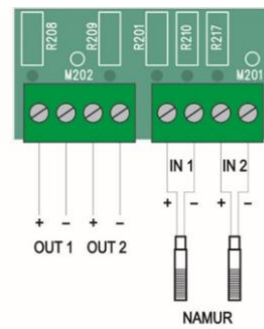


Figure 4.2-2

5 Input channels parameters

5.1.1 M-Power-INS version

5.1.1.1 Power supply

Parameter	U_i	U_m
Value	12 Volt	250 V AC

Table 4.2-1

5.1.1.2 RS485 serial line

Parameter	U_i	U_m
Value	12 Volt	250 V AC

Table 4.2-2

5.1.1.3 Digital inputs expansion

Parameter	U_i	U_m
Value	12 Volt	250 V AC

Table 4.2-3

5.1.2 M-Power-PP version

5.1.2.1 Power supply

Parameter	U_i	U_m
Value	12 Volt	30 V DC

Table 4.2-4

5.1.2.2 RS485 Serial line

Parameter	Ui	Um
Value	12 Volt	30 V DC

Table 4.2-5

5.1.2.3 Digital inputs expansion

Parameter	Ui	Um
Value	12 Volt	30 V DC

Table 4.2-6

6 Output channels parameters

6.1.1 M-Power-INS e M-Power-PP versions

6.1.1.1 Power supply 1

Power supply 1, also referred to as V MODEM, is present on terminal block M5, and is characterized by the following parameters:

Parameter	Uo	Io	Po	Co	Lo
Value	5,88 Volt	3,87 A	5,69 W	1200 μ F	10 μ H

Table 4.2-7

6.1.1.1 Power supply 2

Power supply 2, also referred to as V CPU, is present on terminal block M6, and is characterized by the following parameters:

Parameter	Uo	Io	Po	Co	Lo
Value	4,94 Volt	0,52 A	0,643 W	1200 μ F	10 μ H

Table 4.2-8

6.1.1.2 RS485 Serial line

The serial line facing the dangerous area, available on the M3 terminal board, is characterized by the following parameters:

Parameter	Uo	Io	Po	Co	Lo	Ui
Value	5,88 Volt	12 mA	18 mW	1200 μ F	100 μ H	6 Volt

Table 4.2-9

6.1.1.3 Low power supply voltage signal

The low power supply voltage signal, available on terminal block M4, is characterized by the following parameters:

Parameter	Uo	Io	Po	Co	Lo	Ui
Value	5,88 Volt	6 mA	9 mW	1200 μ F	100 μ H	6 Volt

Table 4.2-10

6.1.1.4 NAMUR sensors power supply channels

The power supply channels for NAMUR sensors, available on the M201 terminal block, are characterized by the following parameters:

Parameter	Uo	Io	Po	Co	Lo
Value	10,5 Volt	24 mA	62 mW	75 μ F	100 μ H

Table 4.2-11

6.1.1.5 NAMUR measurement channels

The measurement channels for NAMUR sensors, available on the M201 terminal block, are characterized by the following parameters:

Parameter	Uo	Io	Po	Co	Lo	Ui
Value	5,88 Volt	14 mA	19,2 mW	1200 μ F	100 μ H	6 Volt

Table 4.2-12

6.1.1.6 Conditioned signals output channels

The output channels that provide the conditioned repetition of the signals coming from the NAMUR sensors, available on the M202 terminal block, are characterized by the following parameters:

Parameter	Uo	Io	Po	Co	Lo	Ui
Value	11,8 Volt	12,43 mA	36,7 mW	39 μ F	100 μ H	6 Volt

Table 4.2-13

7 Fuses

Fuse	Format	Nominal	Maximal voltage	Interruption capacity M-Power -INS	Interruption capacity M-Power -PP
F1	5x20	200 mA	250 Volt	1500 A	35 A
F2	5x20	315 mA	250 Volt	1500 A	35 A
F3	5x20	315 mA	250 Volt	1500 A	35 A
F4	5x20	200 mA	250 Volt	1500 A	35 A

Table 4.2-14

The other fuses on the main board and on any expansions are all of the MICROFUSE type with a nominal current value of 50 mA, voltage of 250 Volts and interruption capacity of 35 A.

8 Identification

The serial number and year of production are shown on the front plate

9 Installation



It is not sufficient for a device to be Intrinsically Safety certified to ensure that it can be connected to an Associated equipment, in fact it is necessary that a qualified technician or a body in charge proceed with the verification and issue of suitable "system certification" proving compatibility among the electrical safety parameters possessed by both devices.

The essential safety requirements against the risk of explosion in classified areas are established by the European Directives 2014/34 / EU of 26 February 2014 (as regards equipment) and 1999/92 / EC of 16 December 1999 (as regards plants).

The criteria for the classification of areas with risk of explosion are given by the EN60079-10 standard. The technical requirements of electrical systems in classified areas are given by the EN60079-14 standard.

10 Verification and Maintenance

All verification and / or maintenance operations must be carried out according to the criteria of the European standard EN60079-17.