
	<p><i>Industrial Electronic Weighing</i></p>

MC 302 WEIGHT INDICATOR AND BATCHER



INSTRUMENT CONNECTIONS AND HARDWARE CONFIGURATION MANUAL

Rev. 01 0304

MC 302 TECHNICAL FEATURES

Power supply	230 Vac 50/60 Hz (115 Vac optional)
Power consumption	15 VA
Insulation	Class II
Installation category	Cat. II
Operating temperature	-10°C - +40°C (max. humidity 85% without condensation)
Storage temperature	-20°C - +50°C
Weight display	7 digits red LED's, 7 segments (14 mm high)
Status LED's	7 red LED, Ø3 mm
Keyboard	Membrane keyboard with 14 keys and buzzer
Overall dimensions	144 x 72 x 120 mm (l x h x d) (DIN43700)
Panel cut-out	139 x 67 mm
Case	Fireproof Noryl (UL 94 V1)
Front panel protection level	IP54
Connections	Pull-out terminal blocks pitch 5.08 (power supply pitch 7.5 mm), serial ports on 9 poles SUB-D connector.
Load cell excitation	5 Vdc / 120 mA (max. 8x350Ω load cells) short circuit proof
Input sensitivity	0.02 μV min.
Linearity	< 0.01% of the full scale
Temperature drift	< 0.0003% of the full scale / °C
A/D converter resolution	24 bit
Displayed weight resolution	Up to 600,000 divisions on the total capacity (10,000 divisions in case of "legal for trade")
mV/V input signal range	From -3.9 to +3.9 mV/V
Weight acquisition frequency	6 Hz - 160 Hz
Digital filter	Programmable from 0.2 Hz to 50 Hz
Weight decimal digits	0 to 4 decimal digits
Zero and full scale calibration	Data-sheet or Dead-load calibration
Logic outputs	6 relays (NA contact) max 115 Vac/30 Vdc, 0.5 A each Optional: Up to 2 external 8-relay modules. Features as above
Logic inputs	8 opto-isolated 12 Vdc / 24 Vdc PNP
Serial ports (2)	COM1: Rs232c half duplex COM2: Rs422/Rs485 half duplex.
Maximum cable length	15m (Rs232c) and 1000m (Rs422 and Rs485)
Serial protocols	ASCII, Modbus RTU, EPSON or Alfapanel Printers
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 115000 selectable
Programme code memory	128 Kbytes FLASH resettable on board by RS232
Data memory	8 Kbytes extendable to 36 Kbytes
Optional alibi memory	1 Mbyte (up to 160,000 weighing procedures recorded)
Clock / calendar	On mother board with buffer battery
Analog output	Voltage: 0 - 10 V / 0 - 5 V Current: 0 - 20 mA / 4 - 20 mA
Resolution	16 bits
Calibration	Digital via keyboard
Impedance	Voltage: minimum 10KΩ Current: maximum 300Ω
Linearity	0.03% of the full scale
Temperature drift	0.001% of the full scale / °C
Conformity to Standards	EN50081-1, EN50082-2, EN61010-1, EN45501

DECLARATIONS OF CONFORMITY



Pavone Sistemi S.r.l.
Via Dei Chiosi , 18
20040 CAVENAGO BRIANZA (MI)

DECLARES that the product named: **MC 302**
used as described in the installation and use manual, conforms to the following standards:

ELECTROMAGNETIC COMPATIBILITY:

EN50081-1
EN50082-2

On the basis of that provided for in directive 89/336/CEE and amendments.

ELECTRICAL SAFETY:

EN61010-1

On the basis of that provided for in directives 73/23/CEE and 93/68/CEE and amendments.

The CE mark has been stamped on the rear of the product

Mezzago, 20 - 05 - 2003

(The Manager)

03

(last two figures of the year of
application of the mark)

WARNINGS

This manual aims to use texts and figures in order to provide the operator with instructions and information about the basic criteria for the installation and correct use of the instrument.

- Specialized personnel should only install the instrument, after having read and understood this manual. By "specialized personnel", we mean personnel who, due to specific training and professional experience, have been expressly authorized by the system safety manager to carry out the installation.
- Do not power the instrument with voltage outside the limits specified in the characteristics.
- The user is responsible for ensuring that the installation conforms to relative current regulations.
- In the case of anomalies, contact the nearest Service Centre. Any unauthorized attempt at dismantling or modifying the instrument will void the warranty and relieve the Manufacturer of all responsibility.
- The appliance has been designed and manufactured for use in weighing and dosage processes. Any improper use will relieve the Manufacturer of all responsibility.

SYMBOLS

A list of the symbols used in the manual to attract the reader's attention follows below:



Warning! Risk of electric shock.



Warning! Specialized personnel must perform this operation.



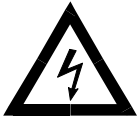
Read the following instructions carefully.

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SECTION 1: INSTRUMENT INSTALLATION

WARNINGS



- As indicated above, specialized personnel must carry out the following procedures.
- Do not make connections when the instrument is switched on.

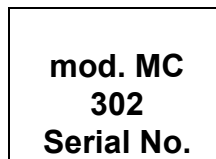
INSTRUMENT ASSEMBLY

The instrument is installed as a panel in a cavity with a panel cut-out of 139 x 67 mm and fixed into place with the 2 turnbuckles provided.



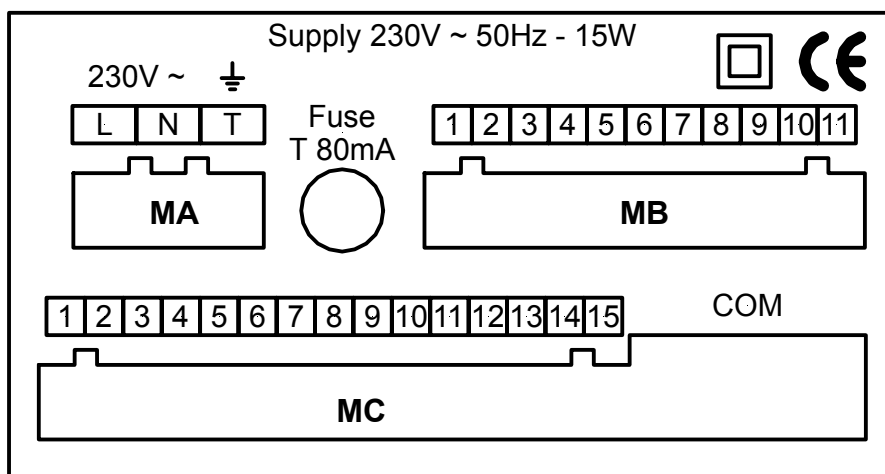
- An isolating switch must be installed near the instrument in order to be able to cut the power supply at any time.
- Consider that the depth of the instrument, with the pull-out terminal blocks assembled, is 135 mm. and the necessary space must be reserved for the connections.
- Do not install the instrument near power appliances (motors, inverters, contacts, etc.) or appliances that do not meet CE standards for electromagnetic compatibility.
- The connection wire for the load cells must be no more than 140 m/mm² long.
- The Rs232 serial line must be no more than 15 metres long (EIA RS-232-C standards).
- The warnings indicated in the connection of the individual peripherals must be respected.

INSTRUMENT IDENTIFICATION DATA PLATE



It is important to provide this information when requesting information or instructions regarding the instrument, along with the programme number and the version, which are shown on the manual cover and are displayed when the instrument is switched on.

REAR PANEL



In keeping with standards, some instructions are printed on the back of the instrument in order to facilitate the installation process.

INSTRUMENT POWER SUPPLY



- The instrument is powered through the MA terminal block.
- The power supply wire must be grounded and must be channelled separately from other supply wires with different voltages, from the load cell wires and the logic input/output wires.

Supply voltage: 230V ~ 50/60 Hz 15W
 Fuse: T 80mA with delayed fusion

3 pole MA TERMINAL BLOCK CONNECTION, pitch 7.5 mm

L. LINE
 N NEUTRAL
 E GROUND



The instrument has class II insulation (double insulation) and is grounded for practical reasons; therefore check the presence of valid ground protection.

LOAD CELL CONNECTION



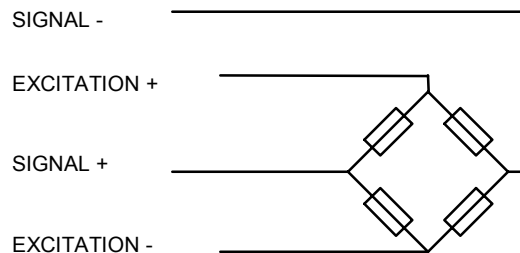
- The load cell cable must not be channelled with other cables (i.e. outputs connected to remote switches or power supply wires), but must follow its own route.
- Any cable extensions must be carefully shielded, respecting the colour codes and using the same type of wire as that supplied by the manufacturer. The extension connections must be soldered or connected through support terminal blocks or the joint block supplied separately.
- The load cell wire must not have more conductors than those effectively used (4 or 6). In the case of a 6-conductor wire, of which only 4 are used (excitation + and -, signal + and -), connect the sense + and - wires to the respective polarities of the excitation wires.

A maximum of eight 350-ohm load cells can be connected to the instrument in parallel. The load cell excitation voltage is 5 Vdc and is protected against a temporary short circuit. The instrument's input signal range requires the use of load cells with sensitivity from 1 mV/V to 3.9 mV/V.

The load cell wire must be connected to terminals 1 ... 6 of the pull-out 15 pole MC terminal block.

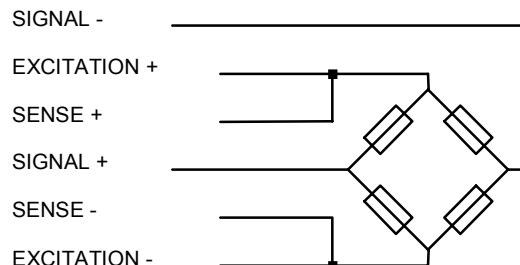
4 WIRE CONNECTION

1. EXCITATION -
2. EXCITATION +
3. Short circuit with terminal 2.
4. Short circuit with terminal 1.
5. SIGNAL -
6. SIGNAL +



6 WIRE CONNECTION

1. EXCITATION -
2. EXCITATION +
3. SENSE +
4. SENSE -
5. SIGNAL -
6. SIGNAL +



Connect the load cell wire shield to ground (terminal **T** in the **MA** terminal block).

LOGIC INPUT CONNECTION (MC TERMINAL BLOCK)

The logic inputs are electrically isolated from the instrument through opto-isolators.



- The logic input connection wires must not be channelled with power or supply wires.
- Use the shortest possible connection wire.

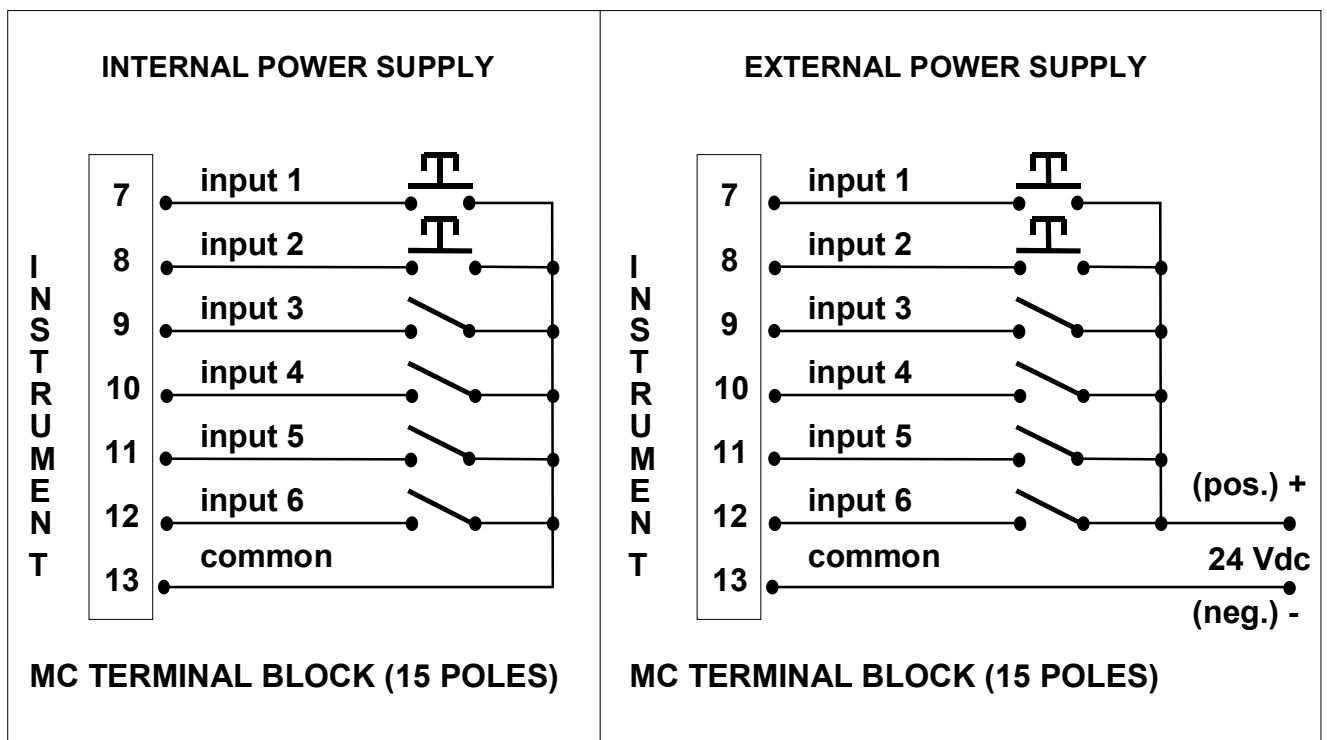
The inputs are active when a voltage of 24 Vdc is applied (PNP logic).

The instrument is supplied in two possible configurations:

INTERNAL POWER SUPPLY: this is the standard configuration. In order to activate a logic input, it is necessary to close the relative terminal to the common, consisting of the positive supply pole (terminal 13 in the MC terminal block).

EXTERNAL POWER SUPPLY: The instrument is only configured in this way if expressly requested by the client. In order to activate a logic input, it is necessary to apply + 24V to the relative terminal and 0 V to the common (terminal 13 in the MC terminal block).

The following diagrams show the two types of connection using, for example, a button for inputs 1 and 2 and a switch for inputs 3, 4, 5 and 6.



If the inputs have an external power supply, we recommend supplying them with a stabilized voltage, because a rectified voltage (pulsing) could cause constant input activation – de-activation.

LOGIC OUTPUT CONNECTION (MB TERMINAL BLOCK)

The logic outputs are electrically isolated from the instrument through opto-isolators.

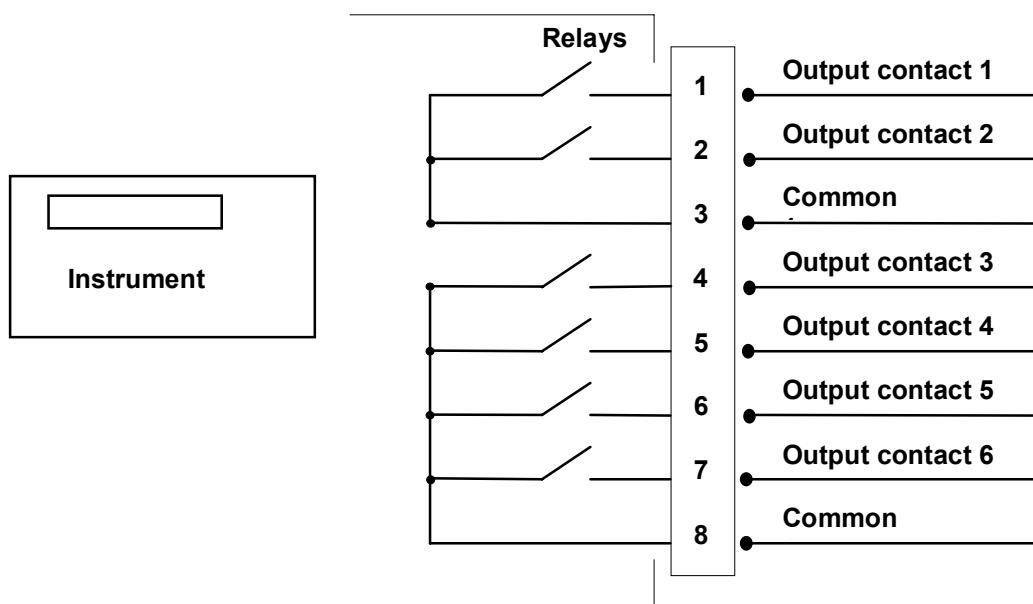
The logic outputs are provided on a 6 relays with commons grouped on 2 terminals. The rate of each contact is 0.5A / 24Vdc 115Vac. Each output is enabled when the contact is closed.



- Other machinery in the area may normally subject to strong magnetic fields and electrical disturbance cause the environment where the instrument is installed; it is therefore best to make normal provisions in order to prevent these affecting the typical signals of an electronic precision instrument. (filters on the remote switches, diodes on the 24 Vdc relay, etc.)

The output connection diagram follows below:

MB TERMINAL BLOCK (11 poles)

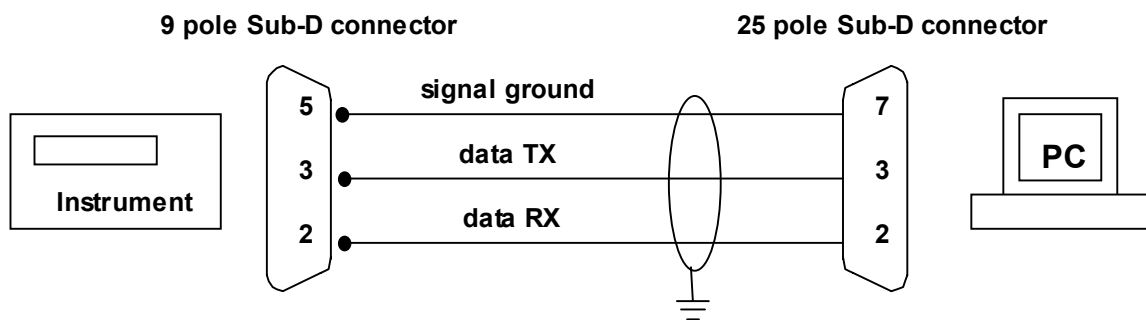


RS 232 SERIAL CONNECTION TO PERSONAL COMPUTER

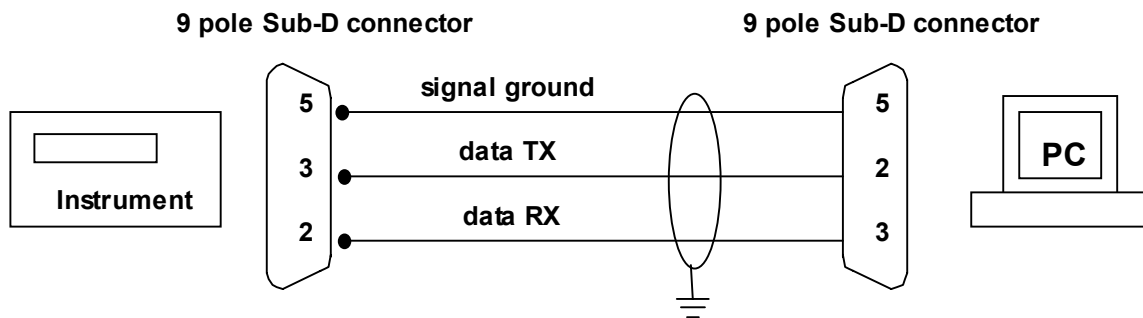


- In order to create the serial connection use a shielded cable, making sure that only one of the two shield ends is grounded. If the cable has more conductors than those used, connect the free conductors to the shield.
- The serial connection wire must be a maximum of 15 metres long (EIA RS-232-C standards), in addition to which it is necessary to adopt the Rs422 interface that the instrument can be equipped with.
- The cable must not be channelled with other cables (i.e. outputs connected to remote switches or power supply wires), but must follow its own route.
- The PC used for the connection must conform to the EN 60950 standard.

The diagram below illustrates connection of the instrument to a 25 pole PC connector:



The diagram below illustrates connection of the instrument to a 9 pole PC connector:



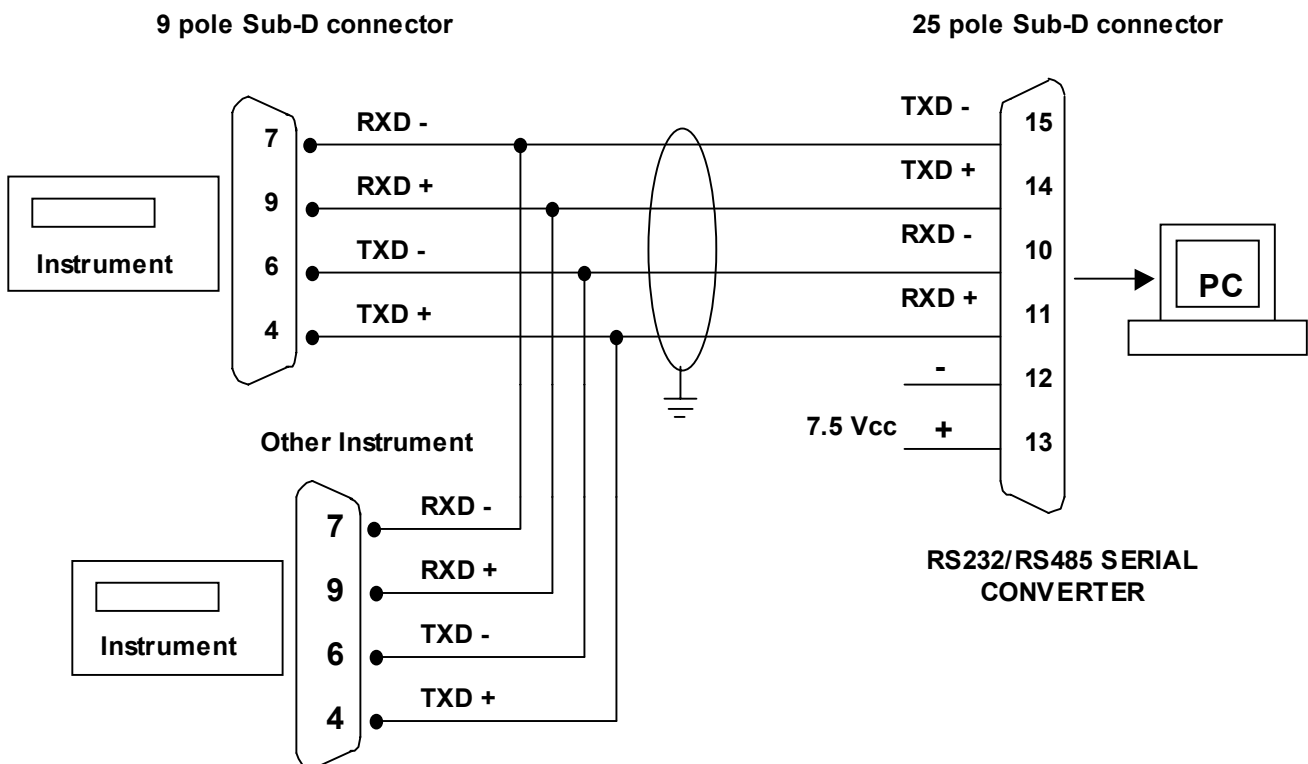
RS 485 SERIAL CONNECTION (optional)

This type of connection makes it possible to connect several instruments to one MASTER unit (generally a PC or a PLC), using a single serial line and therefore just one MASTER serial port. A maximum number of 32 units may be connected. Obviously, the master unit must also be equipped with the RS485 serial interface.



- The serial connection cable must be suitable for RS485 serial communications, with two twisted pairs and relative protective shielding.
- The cable must not be channelled with other cables (i.e. outputs connected to remote switches or power supply wires), but must follow its own route.
- The PC used for the connection must conform to the EN 60950 standard.

CONNECTION TO RS232/RS485 SERIAL CONVERTER



It should be born in mind that the last device connected must be terminated with a suitable resistance value. Make sure that this instrument is connected in the last place in the chain.

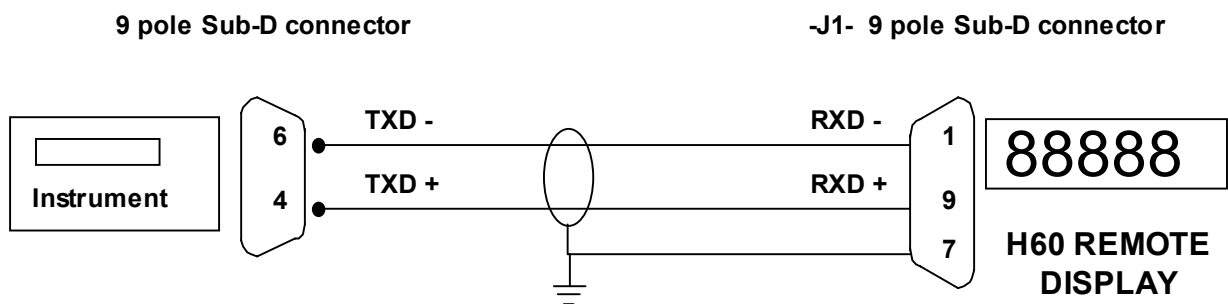
RS 422 SERIAL CONNECTION TO REMOTE DISPLAYS (optional)

It is possible to make long distance serial connections using the RS422 serial interface.

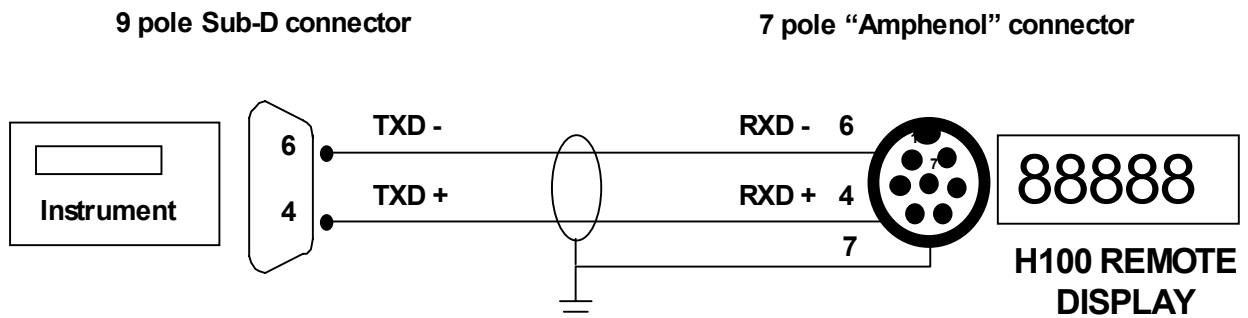


- The serial connection cable must be suitable for RS422 serial communications, with two twisted pairs and relative protective shielding.
- In the case of remote display connection, a single twisted pair relative to the transmission (TX +, TX -) is sufficient.
- The cable must not be channelled with other cables (i.e. outputs connected to remote switches or power supply wires), but must follow its own route.

RS 422 SERIAL CONNECTION WITH REMOTE DISPLAY MOD. H60



RS 422 SERIAL CONNECTION WITH REMOTE DISPLAY MOD. H100

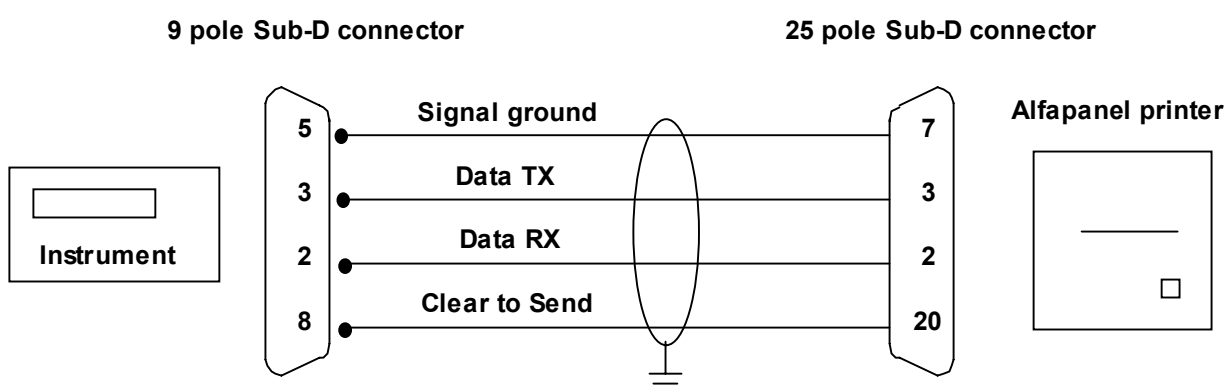


RS 232 SERIAL CONNECTION TO ALFAPANEL PRINTER (optional)

The ALFAPANEL printer used must be equipped with Rs232 serial interface. Consult the relative manual for the correct setting of the dipswitches assembled on the printer's serial interface card.



- The printer must be assembled so that the serial connection wire connecting it to the instrument is not longer than 15 metres (EIA RS-232-C standards).
- A male, 25 poles D-connector to be inserted into the female connector on the rear printer panel, must be wired to the connection wire.
- In order to create the serial connection use a shielded cable, making sure that only one of the two shield ends is grounded. If the cable has more conductors than those used, connect the free conductors to the shield.
- The cable must not be channelled with other cables (i.e. outputs connected to remote switches or power supply wires), but must follow its own route.
- The panel cut-out for the Alfapanel printer is 112 x 112 mm.
- Use the dedicated power supply to power the printer.



In the case of a printer equipped with a 9-pole connector instead of 25 the connections will be "pin to pin" (5 ↔ 5, 3 ↔ 3, 2 ↔ 2, 8 ↔ 8).

ANALOG OUTPUT CONNECTION (optional)

When having this hardware configuration, the instrument provides an opto-isolated analog current or voltage output.

Characteristics:

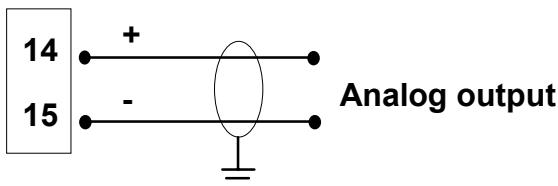
- **Voltage** Analog output: range from 0 to 10 Volts, minimum load 10K Ω
- **Current** Analog output: range from 0 to 20 mA or from 4 to 20 mA. The maximum load is 300 Ω .

The settings for the type of analog output provided (voltage or current) are decided in the factory and must be specified upon purchase.



- In order to create the connection use a shielded cable, making sure that only one of the two shield ends is grounded.
- The analog transmission is particularly sensitive to electromagnetic disturbance. We therefore recommend that the cable is as short as possible and is channelled separately.

CONNECTION ON THE MC TERMINAL BLOCK (15 poles)



ANALOG OUTPUT TYPE MODIFICATION

The analog output is normally set in voltage or current in the factory as requested by the client. It is however possible to change this setting by moving a jumper bridge present on the instrument base card (S118).



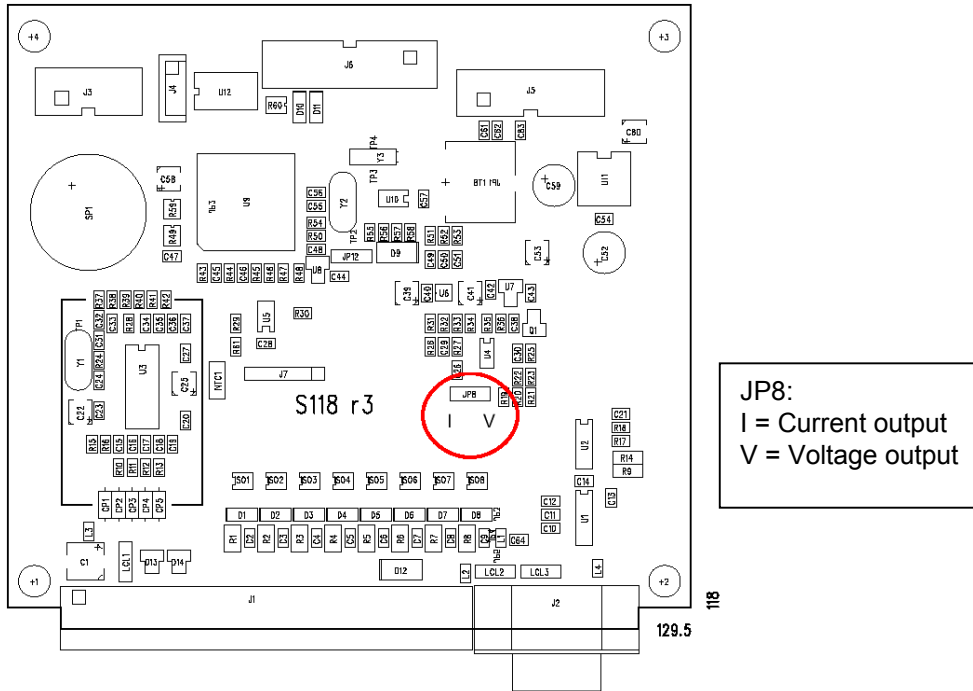
- **Warning! Qualified personnel must carry out this operation with express authorization from the manufacturer.**
- **Disconnect the appliance from the power supply before carrying out the operation described below.**
- **Non-observance of these regulations will void the instrument's guarantee and relieve the Manufacturer of all responsibility.**

Setting modification procedure:

- 1) Disconnect the instrument power supply.
- 2) Remove the back frame and cover by acting on the side tongues.
- 3) Use a flat screwdriver to act as a lever between the keyboard and the cover until the keyboard comes out.
- 4) Slide off the flat that connects the keyboard to the display board.
- 5) Remove the electronic cards from the rear part of the container.
- 6) Use a 5.5 mm spanner to unscrew the two nuts that hold the power supply card in place (S119)
- 7) Remove the power supply card.
- 8) The base card (S118) is now visible.
- 9) The topography of the base card (S118) is illustrated below.
- 10) The bridge marked with the letters **V** and **I** indicates the type of analog output selected:
 - Voltage output:** jumper bridge between **V** and **central**

❑ **Current output: jumper bridge between I and central**

- 11) Position the jumper bridge as required.
- 12) Reconnect the wires that were disconnected.
- 13) Reassemble the device.
- 14) Place it in the cover.
- 15) Attach the keyboard to the card and the container.
- 16) Insert the back frame and cover
- 17) Reconnect the supply line and anything else to the instrument.
- 18) Power the instrument and configure the analog option.



When the analog output is changed from voltage to current or vice versa, disconnect the digital meter and reconnect it with the right configuration since an output in Volts with a ammeter in series could damage the circuit (causing the output to short circuit).

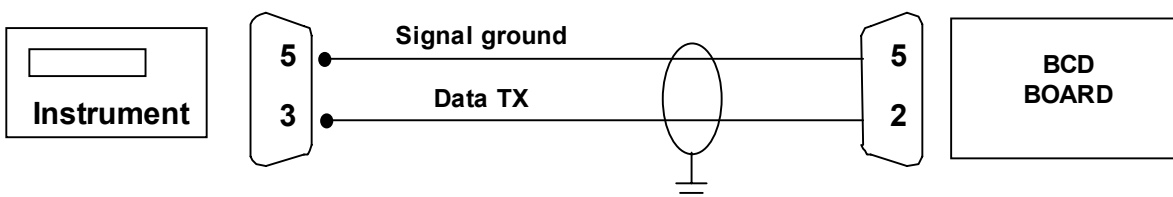
RS 232 SERIAL CONNECTION TO BCD OUTPUT CARD



- In order to create the serial connection use a shielded cable, making sure that only one of the two shield ends is grounded. If the cable has more conductors than those used, connect the free conductors to the shield.
- The serial connection cable should be no longer than 3 metres. The cable must not be channelled with other cables, but must follow its own route if possible.

9 pole Sub-D connector

9 pole Sub-D connector

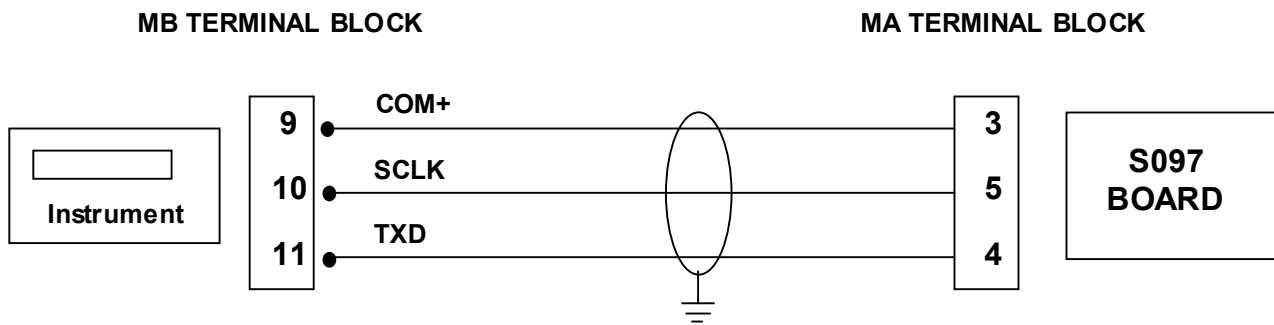


SERIAL CONNECTION TO THE EXTERNAL 8 RELAYS MODULE S097 (optional)

This type of connection is only available for instruments equipped with software that provides for the management of supplementary outputs, such as the batching from 5 to 12 components for example.



- In order to create the serial connection use a shielded wire, making sure that only one of the two shield ends is grounded. If the cable has more conductors than those used, connect the free conductors to the shield.
- The serial connection wire should be no longer than 100 metres. The wire must not be channelled with other wires, but must follow its own route if possible.



SERIAL CONNECTION TO 80-COLUMN DOT MATRIX PRINTER (optional)

The printer must be equipped with Rs232 serial interface. The printer must be configured in order to receive the data from the serial interface (instead of the parallel one) and the following specifications must be set:

- **Baud rate:** 9600 bps (or other selection in keeping with the speed selected on the instrument).
- **Data bits:** 8 bits
- **Start bit:** 1 bit. **Parity bit:** 0 bit. **Stop bit:** 1 bit.
- **Handshaking:** DTR protocol.



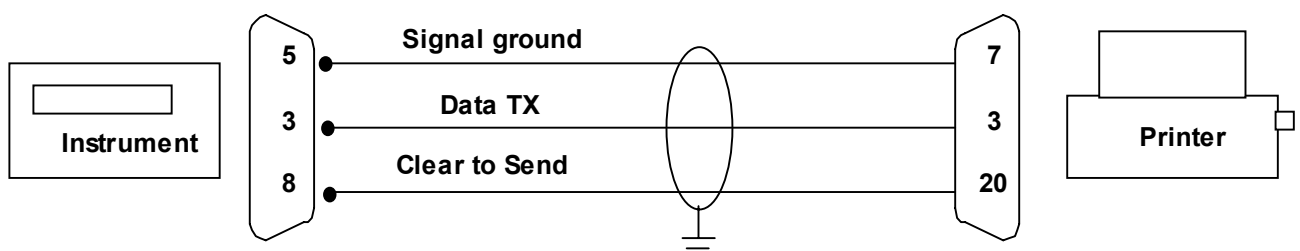
Refer to the printer manual in order to make the selections.



- In order to create the serial connection use a shielded cable, making sure that only one of the two shield ends is grounded. If the cable has more conductors than those used, connect the free conductors to the shield.
- The printer's serial interface connector is normally a female, 25 pole D-connector, therefore a male 25 pole D-connector should be wired to the connection cable.
- The serial connection cable should be no more than 15 metres long (EIA RS-232-C standards). In addition to this measure, it is necessary to adopt the Rs422 serial interface that the instrument can be optionally equipped with.

9 pole Sub-D connector

25 pole Sub-D connector



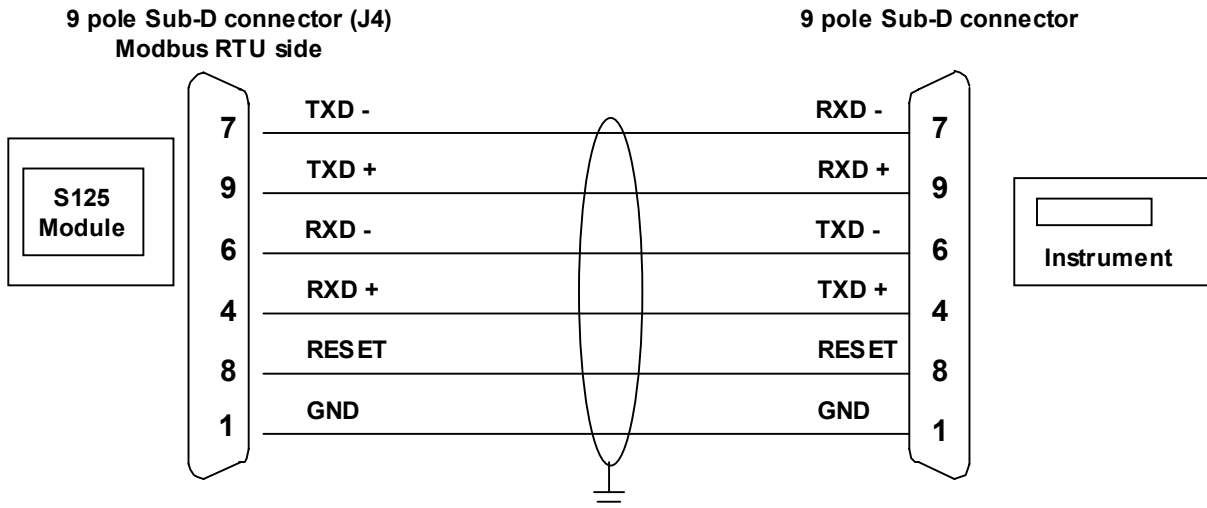
PROFIBUS-DP CONNECTION (OPTIONAL)

Profibus-DP connection is available as an **option** on the MC 302 instrument and is developed through the help of an external module installed in a container for assembly on the DIN guide.

The external Profibus module is identified by the code **S125**

The instrument is connected to the external Profibus module using the RS422 serial line.

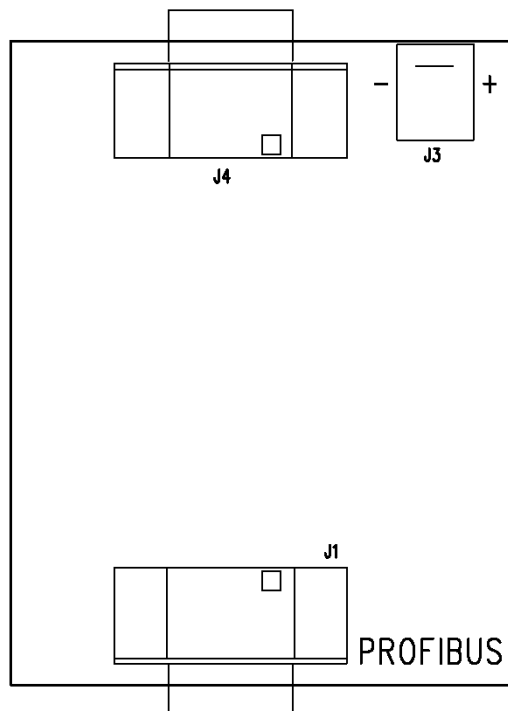
A connection diagram for the two devices and a drawing of the Profibus-DP module are illustrated below:



COM1 (RS232), limited to RX, TX and GND signals (without CTS), remains available on the same MC302 instrument 9-pole connector. All the protocols, except MODBUS, can be activated.


MODBUS RTU CONNECTOR TO MC302 INSTRUMENT

24Vdc



PROFIBUS-DP CONNECTOR TO FIELDBUS SIDE

PROFIBUS-DP CONNECTOR DESCRIPTION

Pin	Description	Function	
Housing	Shield	-	
1	Not connected	-	
2	Not connected	-	
3	B-Line, Positive RS485 RxD/TxD	Non-inverting RxD/TxD	
4	RTS, Request To Send	Request to send	
5	GND BUS	GND from RS485	
6	+5V BUS	+5 V from RS485	
7	Not connected	-	
8	A-Line, Negative RS485 RxD/TxD	Inverting RxD/TxD	
9	Not connected	-	

Profibus Connector on S125 module

MODULE S125 TECHNICAL FEATURES

Power supply	24 Vdc +/- 15%
Power consumption	3 VA
Insulation	Class II
Installation category	Cat. II
Operating temperature	-10°C - +40°C (max. humidity 85% without condensation)
Storage temperature	-20°C - +50°C
Serial port 1 (9P male)	Rs422
Baud rate	34,800 bit/sec.
Maximum cable length	100m
Serial protocol	Modbus RTU
Serial port 2 (9P female)	PROFIBUS DP
Baud rate	Up to 12 Mbit/sec.
Maximum cable length	Depends on the PROFIBUS network
Overall dimensions	71 x 90 x 58 mm (l x h x d)
Assembly	Support for DIN section or OMEGA bar
Case	Fireproof NORYL UL 94 V-0
Front panel protection level	IP40
Weight	120 g
Connections	1 x 2 pole pull-out terminal block, pitch 5.08 for the 24 Vdc power supply. 2 x 9 pole Sub-D connectors for serial ports
Conformity to Standards	EN50081-1 and EN50082-2 for EMC EN61010-1 for Electrical Safety

NOTES ON PROFIBUS CABLE

The cable to be used for connecting the instrument in a Profibus network is shielded with twisted pairs. The typical impedance of the cable used should be between 100 and 130 Ohm ($f > 100$ kHz). The capacity of the cable (measured between conductor and conductor) should be below 60 pF/metre. The minimum section of the conductor should be no less than 0.22 mm^2

In a Profibus-DP network it is possible to use both type A and type B cables, depending on the performances required: The following table sums up the characteristics of the cable to be used:

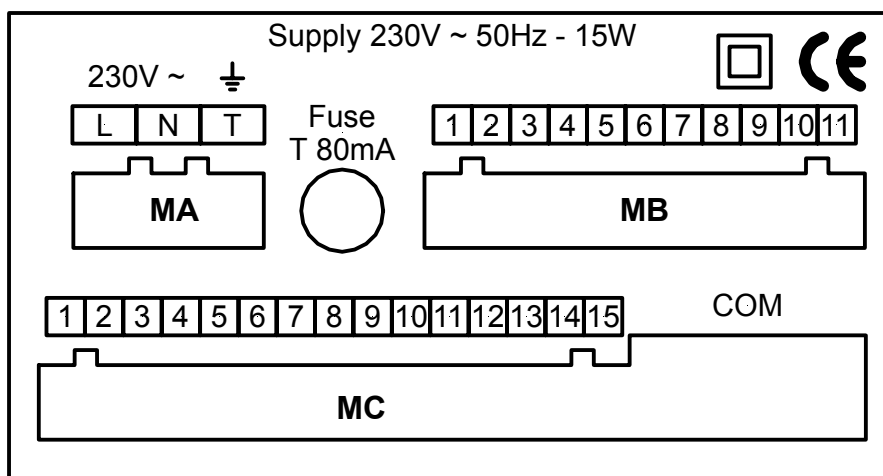
CHARACTERISTICS	TYPE A CABLE	TYPE B CABLE
Impedance	from 135 to 165 ohm ($f = 3 - 20$ MHz)	from 100 to 300 ohm ($f > 100$ kHz)
Capacity	< 30 pF/m	< 60 pF/m
Resistance	< 110 ohm/km	-
Conductor section	> 0.34 mm^2	> 0.22 mm^2

The following table shows the maximum length of the line with type A cable and with type B cable depending of the different communication speeds required:

Baud rate (kbit/s)	9.6	19.2	45.45	93.75	187.5	500	1500	3000	6000	12000
Length cable type A in metres	1200	1200	1200	1200	1000	400	200	100	100	100
Length cable type B in metres	1200	1200	1200	1200	600	200	-	-	-	-

SUMMARY OF CONNECTIONS

A summary of the connections to be made in terminal blocks MA, MB and MC is illustrated below.



CONNECTIONS

NR.	MA Terminal block 3Pole pitch 7.5	MB Terminal block 11Pole pitch 5.08	MC Terminal block 15Pole pitch 5.08	COM D-SUB 9P Connector
1	230V~ line	Output 1	Load cell Excitation -	
2	230V~ neutral	Output 2	Load cell Excitation +	(RX) RS232 (COM1)
3	Ground	Common Outputs	Load cell Sense +	(TX) RS232 (COM1)
4		Output 3	Load cell Sense -	(TX +) RS422 (COM2)
5		Output 4	Load cell Signal -	GND (COM1)
6		Output 5	Load cell Signal +	(TX -) RS422 (COM2)
7		Output 6	Input 1	(RX-) RS422 (COM2)
8		Common Outputs	Input 2	(CTS) RS232 (COM1)
9		COM+ (*)	Input 3	(RX+) RS422 (COM2)
10		SCLK (*)	Input 4	
11		TXD (*)	Input 5	
12			Input 6	
13			Common Inputs	
14			Analog output + (Input 7)	
15			Analog output - (Input 8)	

(*) Used for the connection to the **8 relays external module** (see page 1.15)

HARDWARE PROBLEM TROUBLESHOOTING



- **Warning! Qualified personnel must carry out the operations described below.**
- **The fuse should only be replaced when the instrument is cut off from the voltage.**

PROBLEM	POSSIBLE CAUSE	SOLUTION
The instrument does not switch on	<ul style="list-style-type: none"> • The fuse has blown • The supply voltage is incorrect 	<ul style="list-style-type: none"> • Replace the fuse with an identical T 80 mA fuse • Provide the correct power supply voltage
The displayed weight does not change	<ul style="list-style-type: none"> • The load cell does not work correctly or is not correctly connected 	<ul style="list-style-type: none"> • Use a digital meter to check that there are 5V between Exc + and – and between Sense + and – . Then check the millivolt signal change between signal + and – when loading or unloading the load cell.
The instrument displays 0-L on the most part of the scale	<ul style="list-style-type: none"> • The load cell gain value is wrong • The full scale value is wrong 	<ul style="list-style-type: none"> • In the parameter programming function, set the correct value in the weight measurement field • In the parameter programming function, set the correct maximum weighing value
The inputs and/or the outputs do not work correctly	<ul style="list-style-type: none"> • Incorrect wiring or software setting 	<ul style="list-style-type: none"> • Use the I/O Test function to check whether the inputs and outputs are working properly and check the specific programme settings.
The instrument does not accept the set calibration	<ul style="list-style-type: none"> • The number of points available is insufficient for the required calibration 	<ul style="list-style-type: none"> • Repeat the calibration so that the number of points representing the full scale is less than 600000



If the anomaly is not included amongst the above or the proposed solutions do not solve the problem, contact an assistance centre.