

## FREQUENCY DIVIDER / MULTIPLIER

- ❑ Opto-isolated input with OPTO (SENSUS), NAMUR, REED, NPN, PNP photoelectric sensors, paddlewheel flow sensors F3.00.F (FLOWX3)
- ❑ 12 Vdc, 100 mA built-in sensor power-supply
- ❑ Divider selectable in a 1...9999 range (up to 3 decimal digits)
- ❑ Display visible divider preset value
- ❑ Output signal :
  - 30mA@24V static NPN / PNP (opto-isolated),
  - REED relays with 250mA@100V SPST contact
- ❑ 2...250 ms settable output pulse time
- ❑ Information about power on, input signal, output signal
- ❑ Casing suitable for being coupled onto a DIN 2M rail



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## 1.0 PACKING LIST

The package includes:

- user's manual (this document)
- safety precautions and notes
- apparatus

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## 2.0 SAFETY PRECAUTIONS

Carefully read the warnings supplied with the product (see 1.0, Packing list) along with the instructions written in this document before using the device.

The product is an electronic instrument, thus it must not be considered a machine; consequently, it is not subject to the requirements fixed by the EC Directive relating to Machinery.

If the product is used as part of a machine, it cannot be started if the machine does not meet the Directive requirements.

The product marking does not relieve the customer from fulfilling the obligations provided by the law concerning the end-item.

Check the device code in advance and select the suitable power supply voltage (see par. 3.6 in this manual).

Provide for an appropriate protection on the power circuits; we recommend using a 300mA fuse with a medium time delay.

The apparatus is fulmination resistant ("surge" internal protection)



**Before supplying power, make sure that the model corresponds to the one you are installing (see paragraph 4.5).**

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## 3.0 GENERAL DESCRIPTION

Frequency divider / multiplier. The device is provided with:

- an opto-isolated input for OPTO (Sensus), NAMUR, REED, NPN (10...30 Vdc), PNP (10...30 Vdc), photoelectric sensors
- built-in sensor power-supply (12Vdc / 100 mA max)
- input max frequency :
  - static 400 Hz
  - reed 15 Hz
- output signals:
  - static NPN/PNP (opto-isolated) 30 mA / 24V
  - REED relays (with SPST contact) 250 mA / 100V
- 2 to 250 ms settable output pulse time
- keypad selectable divider in a 1...9999 range with selectable resolution (no, one, two, three decimal digits)
- indication through display DP of:
  - power (PWR)
  - active input (IN)
  - active output (OUT)

### 3.1 OPERATING CYCLE

Each input pulse is counted; the Decimal Point "IN" displays that.

When reaching a whole number, an output pulse is generated; the Decimal Point "OUT" displays that. The decimal part is stored and added up to the next pulse.

*Example 1:* Divider = 2  
Every two input pulses the device generates an output pulse.

*Example 2:* Divider = 53.4  
After getting the 54<sup>th</sup> pulse, the device generates an output pulse and keeps the value 0.011236 [(54/53.4) -1] stored to add it up to the next counting.

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## 4.0 PREPARATION FOR USE

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### 4.1 FIRST SETTING UP

The device is designed for being mounted as a back panel.  
It is necessary to prepare a DIN rail to hang the device on.

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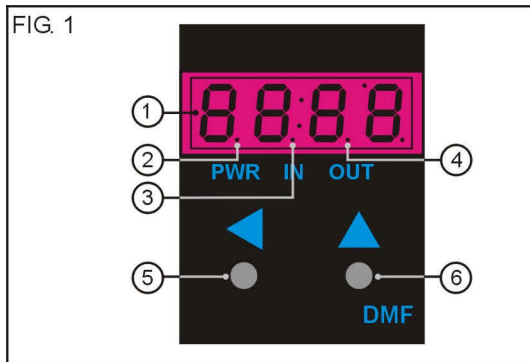
### 4.2 ASSEMBLY AND INSTALLATION

The equipment can be snap-fitted for mounting: hook the top (which is not provided with the black spring hook) up onto the DIN rail and press slightly to hook up the lower part until the spring hook fits together. (To make the operation easy pull the black tab gently by means of a screwdriver of appropriate size).  
Refer to the diagrams below for connection.

Make all electrical connections with power supply off.

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### 4.3 FRONT VIEW



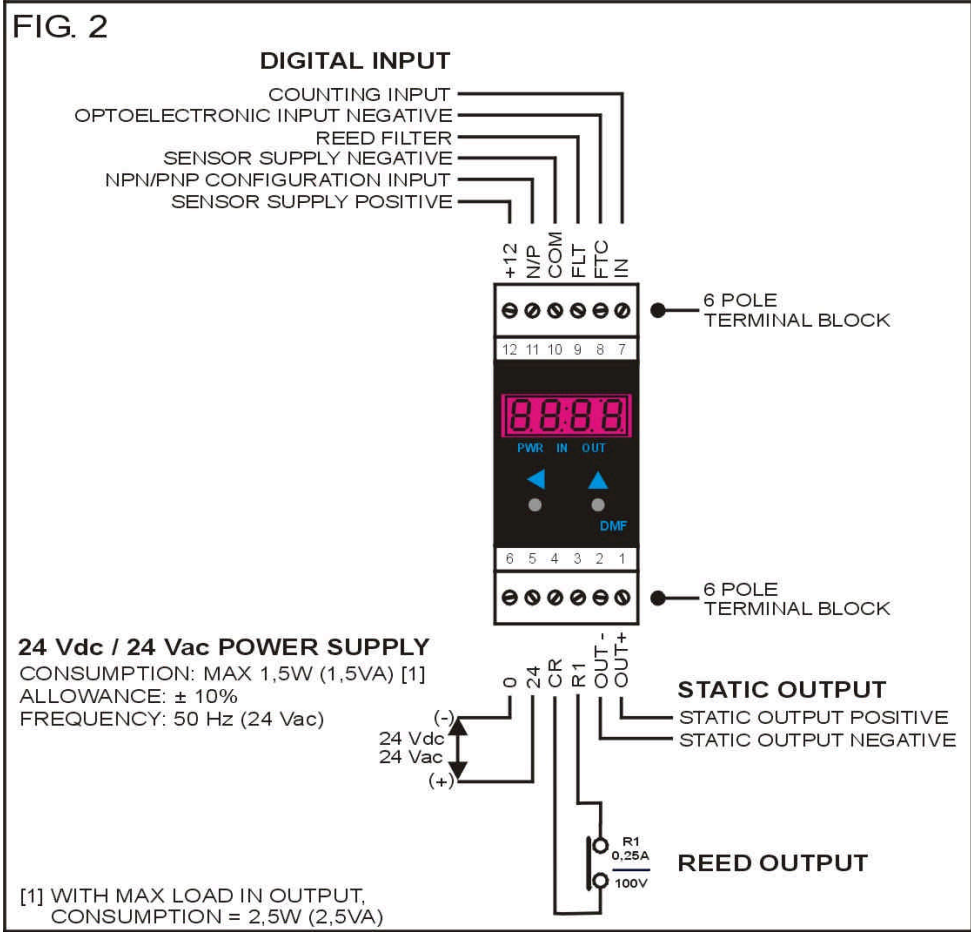
- |   |   |   |     |
|---|---|---|-----|
| 1 | = | divider display set with four 9mm-digits  | [1] |
| 2 | = | decimal point PWR to display the power supply voltage in use  | [2] |
| 3 | = | decimal point IN to display the active input  | [2] |
| 4 | = | decimal point OUT to display the active output  | [2] |
| 5 | = | SHIFT key to:      access the parameter value modification<br>shift the digit selected during the value modification<br>exit the parameter value modification |     |
| 6 | = | UP key to :         access the programming menu<br>increase the digit selected during the value modification  |     |

[1] it lights up only during programming

[2] active only when operating

## 4.4 CONNECTIONS

FIG. 2



## 4.5 POWER SUPPLY



Check the instrument model (see code) and select the correct power supply voltage to prevent damages.

Model

Power supply

DMF

24 Vac / 24 Vdc  $\pm 10\%$



Always provide adequate protection against voltage surges to avoid irreversible damages to the device.

## 4.6 ELECTRICAL CONNECTIONS

Two 6-pole terminal blocks are provided to electrically connect the interface (see figure 2): one at the bottom (terminals identified by numbers 1 ... 6), one at the top (terminals identified by numbers 7 ... 12).

### 4.6.1 POWER SUPPLY

24 Vdc : to terminals 5 (24, positive) and 6 (0, negative)

24 Vac : to terminals 5 (24) and 6 (0)

### 4.6.2 REED OUTPUT

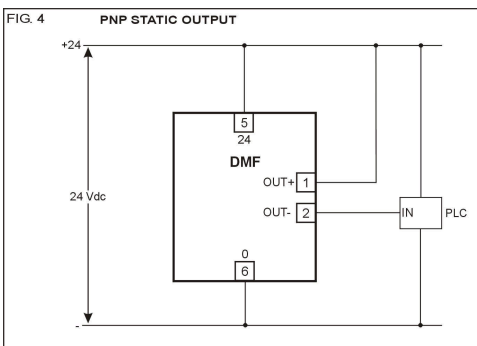
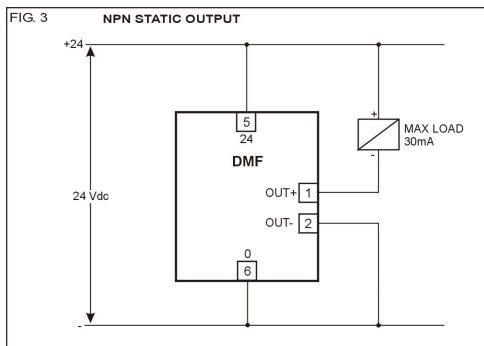
Terminal 4 (CR)

Terminal 3 (R1)

### 4.6.3 STATIC OUTPUT (NPN/PNP)

Positive : terminal 1 (OUT+)

Negative : terminal 2 (OUT-)



### 4.6.4 COUNT OUTPUTS

#### 4.6.4.1 NPN INPUT

Connect terminal 11 (N/P) to terminal 12 (+12) (see figure 5)

Fast input for static sensors (max 400 Hz):

positive = 12 (+12)  
negative = 10 (COM)  
output = 7 (IN)

#### 4.6.4.2 PNP INPUT

Connect terminal 11 (N/P) to terminal 10 (COM) (see figure 6)

Fast input for static sensors (max 400 Hz):

positive = 12 (+12)  
negative = 10 (COM)  
output = 7 (IN)

#### 4.6.4.3 INPUT FROM OPTOELECTRONIC SENSOR

Connect terminal 11 (N/P) to terminal 10 (COM) (see figure 7)

Input for optoelectronic sensor (max 400 Hz):

positive = 12 (+12)  
negative = 8 (FTC)  
output = 7 (IN)

#### 4.6.4.4 OPTO INPUT (SENSUS)

Connect terminal 11 (N/P) to terminal 12 (+12) (see figure 8)

Input for NAMUR type static sensors (max 400 Hz):

positive = 7 (IN)  
negative = 10 (COM)

**4.6.4.5 NAMUR INPUT**

Connect terminal 11 (N/P) to terminal 12 (+12) (see figure 9)

Input for NAMUR type static sensors (max 400 Hz):  
 positive = 7 (IN)  
 negative = 10 (COM)

**4.6.4.6 INPUT FROM MODULARIS SENSOR**

Connect terminal 11 (N/P) to terminal 12 (+12) (see figure 10)

Input for MODULARIS sensor (max 400 Hz):  
 white = 7 (IN)  
 brown = 10 (COM)

**4.6.4.7 REED INPUT**

Connect terminal 11 (N/P) to terminal 12 (+12) (see figure 11)

Connect terminal 9 (FLT) to terminal 10 (COM) (see figure 11)

Mechanical contact (not powered) between terminal 7 (IN) and 10 (COM)

**4.6.4.8 PADDLEWHEEL FLOW SENSOR (F3.00.F - FLOWX3) INPUT**

Connect terminal 11 (N/P) to terminal 12 (+12); see figure 12 (cable connection) or figure 13 (DIN connector)

Input for paddlewheel flow sensor (max 400 Hz):  
 white = 12 (+12)  
 brown = 10 (COM)  
 green = 7 (IN)

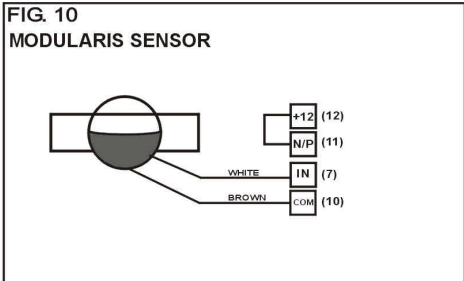
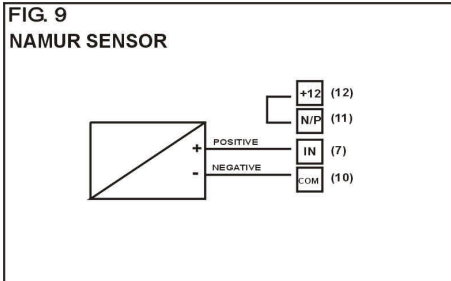
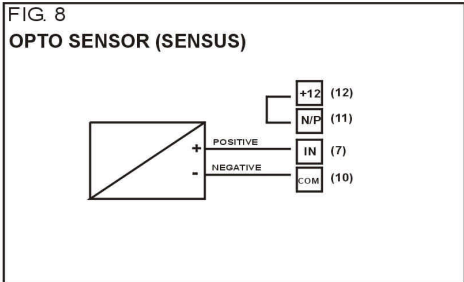
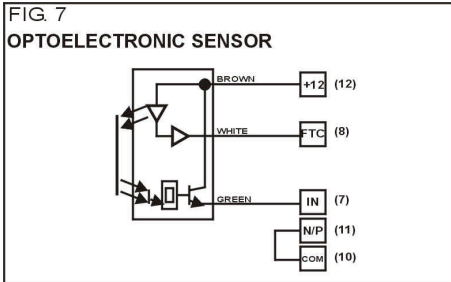
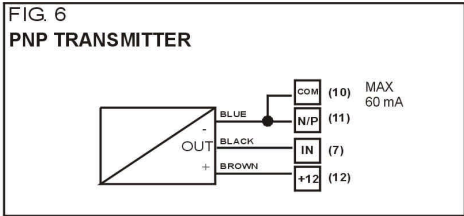
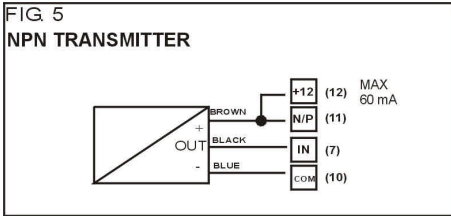


FIG. 11

**REED TRANSMITTER**

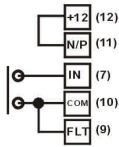


FIG. 12

**PADDLEWHEEL FLOW SENSOR  
(F3.00.F - FLOWX3 - IP68 - CABLE)**

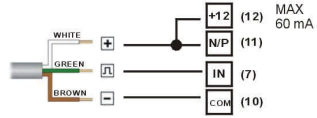
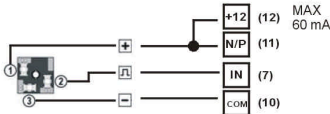


FIG. 13

**PADDLEWHEEL FLOW SENSOR  
(F3.00.F - FLOWX3 - IP65 - CONNECTOR)**



## 4.7 FUNCTIONAL CHECK

Supply power.

The Decimal Point “PWR” should light up.

The Decimal Point “IN” displays the incoming pulses at the input.

The Decimal Point “OUT” displays the output generated pulses.

## 4.8 STORAGE

When storing the equipment for long times, no specific interventions are required.

## 5.0 OPERATING INSTRUCTIONS

The device is designed to divide pulses and to interface different types of input signals (NPN, PNP, OPTO, reed) in a NPN, PNP, reed logic.

The division can be set for whole or fractional numbers in a 1.000 to 9999 range.

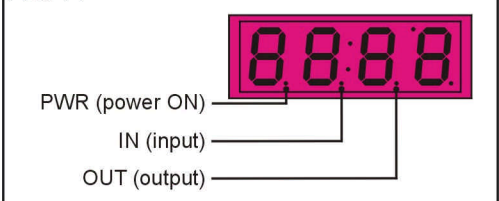
The device is suitable for transforming signals coming from a liter-counter into liters or cubic meters.

## 5.1 OPERATION

When operating, the display is off; three DPs indicate:

- PWR (power on)
- IN (active input)
- OUT (active output)

FIG. 14



### 5.1.1 CYCLE

Each input pulse is counted; the Decimal Point “IN” displays that.  
When reaching a whole number an output pulse is generated; the Decimal Point “OUT” displays that. The decimal part is stored and added up to the next pulse.  
The output pulse has a variable duration (2 to 250ms) according to the value set under parameter “t”.

*Example 1:*

Divider 8

Every eight input pulses the device generates an output pulse

*Example 2:*

Divider 53.4

When reaching 54 pulses, the device generates an output pulse and keeps the value 0.011236 [(54/53.4) -1] stored to add it up to the next count.

### 5.1.2 POWER ON

When power is supplied, the divider starts from zero.  
Any residual count won't be memorized.

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## 5.2 PROGRAMMING

As soon as you access the programming, the display lights up and allows you to set the parameters.

| Parameter      | Label on display | Range |      | Default |
|----------------|------------------|-------|------|---------|
|                |                  | min   | max  |         |
| Decimal point  | dP               | 0     | 3    | 0       |
| Divider        | diU              | 1     | 9999 | 1       |
| Pulse duration | t                | 2     | 250  | 20      |

### 5.2.1 ACCESS

Press UP to gain access.

The display will first show the label “dP” for about a second and then the previously set value.

If you press UP again, two more labels will appear in sequence:

- “diU”
- “t”

### 5.2.2 SETTING A PARAMETER VALUE

To set a parameter value, press the key SHIFT for 1 straight second; access is confirmed when the unit digit starts flashing.

From this moment on:

- You can modify the flashing digit using the key UP
- You can change the flashing digit from units to tens, hundreds or thousands using the key SHIFT (the max selection range depends on the max settable scale).

### 5.2.3 EXIT THE PARAMETER VALUE SETTING

To exit (and confirm the new set value) press SHIFT for one straight second. The digit you have selected will stop flashing.

### 5.2.4 DECIMAL POINT “dP” PARAMETER

- 0: no DP (9999)
- 1: one DP (999.9)
- 2: two DPs (99.99)
- 3: three DPs (9.999)



### 5.2.5 “diU” DIVIDER PARAMETER

The setting range of the divider is 1 to 9999.

In this setting the decimal point selected (if any) is lit.

### 5.2.6 OUTPUT PULSE “t” TIME PARAMETER

The setting range is 2... 250 ms.

### 5.2.7 EXIT PROGRAMMING

Press UP to exit the programming, after setting parameter “t”.

In any case, if no key has been pressed for 60 seconds, the device will exit the programming automatically.

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## 5.3 MANUAL CONTROLS

It is possible to locally interact with the device by means of the following manual controls (see Fig.1):

| FIG 1 | Key   | Function   |
|-------|-------|--|
| 5     | SHIFT | Enter the parameter value modification function<br>Shift the digit selected when modifying the value<br>Exit the parameter value modification function |
| 6     | UP    | Access the programming menu<br>Increase the digit selected when modifying the value  |

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## 5.4 REMOTE CONTROLS

The device is provided with the following remote controls (see paragraphs 4.4 “Connections” and 4.6 “Electrical connections”):

- Digital input (including the transmitter supply output)
- NPN/PNP static output
- REED output

### 5.4.1 DIGITAL INPUT

See figure 2; the device is provided with an optoisolated digital input (IN).

Impedance: 2000 ohm

Logic level 0: 0...3V

Logic level 1: 6...30 Vdc

Max admissible distance for cables : 3 metres.

### 5.4.2 STATIC OUTPUT

The device is provided with an optoisolated static output.

Max isolation voltage: 250V.

The connection can be either NPN (see figure 3) or PNP (see figure 4).

Voltage: 10... 30 Vdc; Max current: 30 mA.

Short-circuit protection through self-resetting fuse.

Max admissible distance for cables : 3 metres.

### 5.4.3 REED OUTPUT

SPST contact.

Max voltage: 100V.

Max current: 250 mA.

The coil is optoisolated to reduce the effects of inductive returns in the control electronics.

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## 5.4 MAINTENANCE

There are no parts that require maintenance.

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## 6.0 TECHNICAL SPECIFICATIONS

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### 6.1 GENERAL FEATURES

|   |  |
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| <p><b>PACKAGE</b><br/>Modular casing mounted on DIN EN 50022 rail (in accordance with DIN 43880 rules)<br/>Width: 2 modules (36 mm)<br/>Height: 90 mm<br/>Depth: 68 mm<br/>Weight: 100g<br/>Degree of protection: IP20<br/>Connection by means of two fixed 6-pole terminals</p> <p><b>DIGITAL INPUT</b><br/>Signals: NPN, PNP, OPTO (SENSUS), namur, optoelectronic, solaris, paddlewheel F3.00.F (FLOWX3)<br/>Impedance : 2000 ohm</p> <p><b>SENSOR POWER SUPPLY</b><br/>Voltage : 12 Vdc<br/>Current: max 100 mA</p> | <p><b>AUXILIARY POWER SUPPLY</b><br/>Power supply voltage 24 Vdc; 24 Vac<br/>Max consumption (draw) 1.5 W; 1.5 VA<br/>Tolerance: ±10%</p> <p><b>STATIC OUTPUT</b><br/>Signal: NPN, PNP<br/>Voltage 5...30 Vdc<br/>Current : max 30 mA<br/>Load: resistive, inductive<br/>Protection: 50 mA self-resetting fuse</p> <p><b>REED OUTPUT</b><br/>Signal: non-powered contact<br/>Voltage: 10...100 Vdc/Vac<br/>Current : max 250 mA<br/>Resistive load</p> |
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### 6.2 AMBIENT CONDITIONS

#### 6.2.1 TEMPERATURE

Operating temperature: -10°...50°C

#### 6.2.2 HUMIDITY

Relative humidity: 0...95% - non condensing

#### 6.2.3 ELECTROMAGNETIC COMPATIBILITY

According to EC Directive 2004/108

Generic standard: immunity for industrial environments EN61000-6-2

Generic standard: emission for industrial environments EN61000-6-4

#### 6.2.4 ELECTRICAL SAFETY

According to EC Directive 2006/95

Standard relating to instrumentation EN61010-1

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### 6.3 STORAGE

Storage temperature : -20°... +60°C

Relative humidity: 0...95% - non condensing

Dry and clean environments are recommended.

Avoid any exposure to corrosive acid exhalations.

Do not wash the apparatus with water.

Prevent liquid entrance in the internal circuits.

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## **6.4 ACCESSORIES AND OPTIONS**

Not available.

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## **6.5 POINTS OF SALE AND AFTER-SALE SERVICE**

### **6.5.1 GUARANTEE**

The device is covered by a guarantee for production defects valid for 12 months from the date of consignment. The guarantee does not cover devices that have been tampered with, improperly repaired or used in a manner that does not conform to the instructions for use.

For assistance regulations, see the “General Assistance Conditions” (ask the manufacturer or the sale point where you have purchased the device for this document).

### **6.5.2 ASSISTANCE**

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All assistance operations must be carried out by the manufacturer or by an authorized representative. Pack the instrument carefully, enclose both a brief description and a full description of the nature of the malfunction with the package, and send to the manufacturer.

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