

User's Manual

Complement to the "Manual of Installation, Maintenance and Assistance"



This product is an electronic instrument and is thus not to be considered as a machine. Consequently, it is not subject to the requirements stated in EEC Directive 89/392 (Machines Directive). It is hereby specified that, if the QEM instrument is used as a component part of a machine, it must not be switched on if the machine does not comply with the Machines Directive.

The instrument mark does not absolve the Customer from the fulfilment of his or her legal obligations regarding the finished product.

INDEX OF SUBJECTS IN THIS MANUAL

CHAP. 1 - INTRODUCTION	
- <i>Complementarity</i>	1 - 1
- <i>References</i>	1 - 2
- <i>Responsibility and validity</i>	1 - 3
- <i>Description of operation</i>	1 - 4
CHAP. 2 - OPERATOR / MACHINE INTERFACE	
- <i>Keyboard Description</i>	2 - 1
- <i>Inputs Description</i>	2 - 2
- <i>Outputs Description</i>	2 - 3
CHAP. 3 - STARTUP	
- <i>Programming (set-up)</i>	3 - 1
- <i>Calibrations</i>	3 - 2
CHAP. 4 - USE	
- <i>Working Programs and Auxiliary Functions</i>	4 - 1
- <i>Tables and Graphics of Operation</i>	4 - 2
CHAP. 5 - ASSISTANCE	
- <i>Diagnostic of inputs and outputs</i>	5 - 1
- <i>Instructions on How to Fill Up the Technical Assistance Fax</i>	5 - 2
- <i>Guarantee</i>	5 - 3

CHAPTER 1

INTRODUCTION

Complementarity

References

Responsibility and validity

Description of operation

1 - 1 COMPLEMENTARITY

This manual is to be considered as a complement to the "Manual of installation, maintenance and assistance" which supplies the indications for the performance of wirings, troubleshooting, procedures for startup and maintenance. This manual contains indications for the instrument's use and for a correct programming.

We recommend therefore a careful reading and, in case of misunderstandings, please contact QEM for any further explanation, by sending the Assistance Fax which you find enclosed to the manual.

1 - 2 REFERENCES

The documentation concerning the instruments which are designed and sold by QEM has been divided into various sheets in order to allow an effective and quick reading according to the information being sought.

<i>User's Manual</i>	<i>Hardware Structure</i>	<i>Manual of installation, maintenance and assistance</i>
<i>Explanation of the software described</i>	<i>Basic information concerning the hardware of the series and possibility of customizations.</i>	<i>All what you need for Installation, Maintenance and Assistance.</i>
<p>It is the present manual, which shows all instructions for the comprehension and the use of the instrument described. It is a manual concerning the instrument's software; it shows all instructions for the comprehension, programming, calibrations and use of the instrument described.</p> <p>Once you install the instrument by following the instructions shown on the Manual of Installation, maintenance and assistance, with this User's Manual you are supplied with all necessary instructions for the correct use of the instrument and for its programming.</p>	<p>It is a sheet enclosed to this User's manual, describing the hardware configuration concerning the series of the instrument described.</p> <p>It also shows the electrical, technical and mechanical characteristics, of the series and also the possible hardware customizations according to the software version.</p>	<p>Further explanation of all necessary subjects for a correct installation and maintenance.</p> <p>This is made to allow us to supply valid and safe instructions which shall allow you to perform products with a recognized quality and safe reliability. It is also a valid support for all those who must face a technical assistance on an application which includes a QEM's instrument.</p>

1 - 3 RESPONSIBILITY AND VALIDITY

RESPONSIBILITY

QEM is free from any responsibility for damages to people or things due to unobservance of the instructions and prescriptions contained in this manual and in the "Manual of installation, maintenance and assistance". We also state that the customer/purchaser must use the instrument according to the instructions supplied by QEM and in case of doubt he must send a written application to QEM. Any authorization for further use and replacement shall be deemed as valid by QEM, in case of contestation, only if it has been written by QEM.

No reprinting or republishing or delivery to third parties of this manual or of its parts is authorized unless a written authorization is provided by QEM. Any infraction shall provoke a request of indemnization for damages on behalf of QEM.

All rights generated by patents or models are reserved.

QEM reserves the right to partially or integrally modify the characteristics of the instrument described and the enclosed documentation

Purpose

The purpose of this manual is to indicate the general rules to use the instrument described.

Indication

Write down and carefully store all parameters concerning the settings and programming of the instrument in order to make easier the eventual operations of replacement and assistance.

VALIDITY

This manual can be applied to all designed instruments, built and tested by QEM and having the same ordering code. This document is integrally valid except for mistakes or omissions.

<i>Instrument's Release</i>	<i>Manual Release</i>	<i>Modifications made to the Manual</i>	<i>Modifications Date</i>
1	0	New manual	23 / 03 / 00

1 - 4 DESCRIPTION OF OPERATION

The instrument HM 207.26 adjusts the speed of a system sending a signal ON / OFF (Minimum frequency = 0.01 Hz, Maximum frequency = 9999.99 Hz). The speed which is read is compared with the set-point and an analog output is provided to control the speed adjust of the system. The instrument may be set as a speed adjuster or as a tachometer which generates an output in voltage being proportional to the speed which is read; in this last case the programmings related to the speed adjusts are ignored. In case of speed adjuster it is possible to select 31 different set-point speeds from digital inputs.

CHAPTER 2

OPERATOR/MACHINE INTERFACE

Keyboard Description

Inputs Description

Outputs Description

2 - 1 KEYBOARD DESCRIPTION

Key	Funzione
	<p>Normal Operation: when pressed for one second you access to the programming of the working speed. Data entering: it confirms the data displayed.</p>
	<p>Normal Operation: it shows the status of inputs and outputs. Data entering: it sets to zero the data displayed.</p>
	<p>Normal Operation: it increments impulsively or continuously the set-point . Data entering: it increments impulsively or continuously the blinking digit.</p>
	<p>Normal Operation: decrementa il set-point in modo impulsivo o continuo. Data entering: it shifts to the right the selection of the digit on the display.</p>
	<p>It is ON during the programming of the set-up parameters.</p>
	<p>It is ON during the programming of the working speed.</p>
	<p>It is ON when you reach the reading of the limit of maximum speed or in the area of adjust</p>
	<p>It is ON when you reach the reading of the limit of minimum speed . It is ON during the programming of the speed table.</p>
	<p>Access to the functions protected by password.</p>
	<p>Access to the choice of the speed from table.</p>

2 - 2 INPUTS DESCRIPTION

Inputs characteristics

Please refer to the chapter "Electrical characteristics" of the software leaflet "Hardware structure" enclosed to this manual

				<i>Name</i>	<i>Logical status of activation</i>	<i>Activation mode</i>	<i>Polarizer</i>																									
I1	ON	I / C	P1	<table border="1"> <thead> <tr> <th colspan="5" style="text-align: center;"><i>Description</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">I1</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">I / C</td> <td style="text-align: center;">P1</td> <td> Tachometer enable / Start. When working as "Tachometer" (MF=0), if parameter "LI=0" the tachometer is always enabled and input I1=OFF outputs are disabled; if parameter "LI=1" and I1=ON tachometer is enabled. With I1=OFF display is forced to 0 and outputs are deactivated. When working as "Speed Adjuster" (MF=1) and "Time regulator" (MF=2), input I1 works as Start (ON) and Stop (OFF). At Start command the analogue output increase with the programmed ramp till it reach the set-point. When a Stop occurs the analogue output decrease with the programmed ramp (Stop function) till it reach 0. </td> </tr> <tr> <td style="text-align: center;">I2</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">I</td> <td style="text-align: center;">P1</td> <td> Clock. Signal for the acquisition of the system's speed (encoder signal, proximity or mechanical contacts). Max frequency 9999.99Hz, min freq. 0.01Hz. </td> </tr> <tr> <td style="text-align: center;">I3</td> <td style="text-align: center;">OFF</td> <td style="text-align: center;">C</td> <td style="text-align: center;">P1</td> <td> Output reset. Resets the outputs that are retentive. </td> </tr> <tr> <td style="text-align: center;">I4</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">I</td> <td style="text-align: center;">P1</td> <td> Display lock. Its activation lock only the tachometer display, while regulation and comparison are still working. </td> </tr> </tbody> </table>				<i>Description</i>					I1	ON	I / C	P1	Tachometer enable / Start. When working as "Tachometer" (MF=0), if parameter "LI=0" the tachometer is always enabled and input I1=OFF outputs are disabled; if parameter "LI=1" and I1=ON tachometer is enabled. With I1=OFF display is forced to 0 and outputs are deactivated. When working as "Speed Adjuster" (MF=1) and "Time regulator" (MF=2), input I1 works as Start (ON) and Stop (OFF). At Start command the analogue output increase with the programmed ramp till it reach the set-point. When a Stop occurs the analogue output decrease with the programmed ramp (Stop function) till it reach 0.	I2	ON	I	P1	Clock. Signal for the acquisition of the system's speed (encoder signal, proximity or mechanical contacts). Max frequency 9999.99Hz, min freq. 0.01Hz.	I3	OFF	C	P1	Output reset. Resets the outputs that are retentive.	I4	ON	I	P1	Display lock. Its activation lock only the tachometer display, while regulation and comparison are still working.
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I3	OFF	C	P1																													
I4	ON	I	P1																													

Legend

C = Continuous signal.

I = Impulsive signal.

		<i>Name</i>
		+
		-
		GND
		Vac
		Vac

		<i>Description</i>
+	Positive of transducers' power supply. Positive of voltage supplied by the instrument for the supply of the instruments' inputs and of the transducers.	
-	Negative of transducers' power supply. Negative of voltage supplied by the instrument for the supply of the instruments' inputs and of the transducers.	
GND	Ground Connection. We recommend a conductor with Ø 4 mm.	
Vac	Voltage of instrument's power supply. Alternated voltage according to the code of your order.	
Vac	Voltage of instrument's power supply. Alternated voltage according to the code of your order.	

Characteristics of inputs for expansion (ordering code "I5")

Please refer to the chapter "Electrical characteristics" of the software leaflet "Hardware structure" enclosed to this manual

				<i>Name</i>	<i>Logical status of activation</i>	<i>Activation mode</i>	<i>Polarizer</i>
15	ON	I/C	P2	<p>Speed selection 2⁰ / Tick. If the parameter "Set-point transmission"=0 its activation selects the speed memorized in the table (password 789) with a weight 2⁰. If the parameter "Set-point transmission"=1, it is the synchronism signal of the transmission code of the speed (set-point). Its activation time must be greater than 50 milliseconds.</p> <p>Speed selection 2¹ / Enbl. If the parameter "Set-point transmission"=0 its activation selects the speed memorized in the table (password 789) with a weight 2¹. If the parameter "Set-point transmission"=1, it is the enable command for reading the transmission code of the speed (set-point). It must be active for all the transmission time; if it is disable the transmission will be aborted.</p> <p>Speed selection 2² / Data. If the parameter "Set-point transmission"=0 its activation selects the speed memorized in the table (password 789) with a weight 2². If the parameter "Set-point transmission"=1, it is the signal, in synchronism with I5, that receive the numeric value of the speed (set-point). Data is read when I6=ON and I5 activates.</p> <p>Speed selection 2³ / +. If the parameter "Input I8 functionality"=0 its activation selects the speed memorized in the table (password 789) with a weight 2³. If the parameter "Input I8 functionality"=1, it is the command of speed increase with the programmed functionality. N.B. If the set-up parameter "Set-point transmission"=1 and "Input I8 functionality"=0 its activation has the weight of 2⁰ instead of 2³.</p> <p>Speed selection 2⁴ / -. If the parameter "Input I9 functionality"=0 its activation selects the speed memorized in the table (password 789) with a weight 2⁴. If the parameter "Input I9 functionality"=1, it is the command of speed decrease with the programmed functionality. N.B. If the set-up parameter "Set-point transmission"=1 and "Input I9 functionality"=0 its activation has the weight of 2¹ instead of 2⁴.</p>			
16	ON	I/C	P2				
17	ON	I/C	P2				
18	ON	I/C	P2				
19	ON	I/C	P2				

Legend

C = Continuous Signal.
 I = Impulsive Signal.

2 - 3 OUTPUTS

Characteristics of outputs

Please refer to the chapter "Electrical characteristics" of the software leaflet "Hardware structure" enclosed to this manual

				<i>Name</i>	<i>Logical status of activation</i>	<i>Polarizer</i>	<i>Activation mode</i>		
				U1	ON	C1	C	Description Programmable output 1 / range of regulation. If setted as programmable output its function depends on the setting of the "P" parameter in set-up. If setted as range of regulation it is active if the error between the set-point speed and the real one is less than what is written in the parameter "Fr".	
				U2	ON	C1	C		

Legend

C = Continuous Signal.

CHAPTER 3

STARTUP

Programming (set-up)

Calibrations

3 - 1 SET-UP

WITH INSTRUMENT USED AS A TACHOMETER

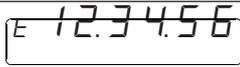
These parameters determine the operation mode of the instrument and therefore their access is reserved to the installer; for the programming we have provided the introduction of a password as follows:

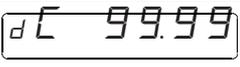
Description	Keyboard	Display
Activate the stop (I3 = OFF) and access to the programming of the set-up. Enter the access code "207" and confirm with ENTER .	[-] + [←] x 1 sec. [+] [-] [←]	H 000 PRG ○ = ON

FUNCTION	DISPLAY	DESCRIPTION
Operation Mode	P 0	0=The instrument operates as a tachometer and it generates a voltage from zero to 10 V proportional to the frequency and inside of the limits subsequently programmed. 1= The instrument operates as a tachometer and it generates a voltage from 10V to zero inversely proportional to the frequency and inside of the limits subsequently programmed. 2=The instrument operates as a time regulator where to the maximum speed and the lower time correspond 10V in the analogue output.
Operation Mode	E 0	0=The clock signal is generated from an electronic transducer (encoder, proximity, etc.) [max. 9999.99 Hz with a duty cycle 50%]. 1= The clock signal is generated from a "fast" mechanical transducer (reed) [max. 200 Hz with a duty cycle 50%]. 2=The clock signal is generated from a "slow" mechanical transducer (micro, relais) [max. 20 Hz with a duty cycle 50%].
Decimal digits Max. 3	C 0	It specifies the number of digits after the comma, with which you wish to display the speed.
Maximum frequency	F 4000.00	It is the maximum speed, expressed in Hz, which sends the transducer when the system is at the maximum speed.(max 9999.99 Hz; min. 0.01 Hz)
Minimum frequency	b 4000.00	It is the minimum speed, expressed in Hz, which sends the transducer when the system is at the minimum speed. (max 99.99 Hz; min. 0.01 Hz). Below the minimum frequency the instrument display 0.
Maximum speed Max. 99999	n 99999	It indicates the value that the instrument shows at maximum frequency. It is the maximum programmable speed. In order to exploit at maximum the system resolution, you should enter the maximum reachable value of speed under real working conditions.

FUNCTION	DISPLAY	DESCRIPTION
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These displayings appears if the parameter "Operating mode" is set to 2

Reading Averages Max. 99		It indicates the value the instrument displays at maximum speed. It's the minimum set-point programmable. In order to exploit at maximum the system resolution, you should enter the time value at the maximum reachable speed under real working conditions. (max 99 h - 59 min - 59 sec)
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Duty cycle		It is the percentage of activation of the clock input, respect to the signal period. dc = $t_{ON} \times F_{max} \times 100$ tON = Time of activation input I2
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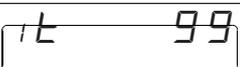
Cut frequency		It is the cutting frequency of the clock input. This value must be \geq to the maximum frequency (usually 10% more).
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Average in speed acquisition		Indicates the number of read used to calculate the speed. The bigger this value is, the slower is the update of the speed.
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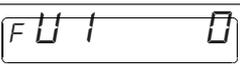
Average in speed stabilization		Indicates the number of read used to recalculate the speed if the changes of the speed are less than the value in the parameter "Range of intervention for the reading average".
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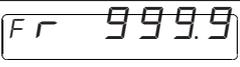
Range of intervention for the reading average		Indicates the range of intervention for the reading average. Value is inpercentage respect to the maximum speed (max. 50.0%).
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These displayings appears if the parameter "Operating mode" is set to 2

Average in time acquisition		Indicates the number of readinds used to calculate the time to be displayed. The bigger this value is, the slower is the update of the time.
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These displayings appears if the parameter "Operating mode" is set to 1 or 2

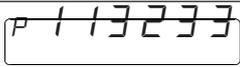
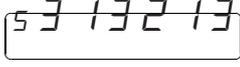
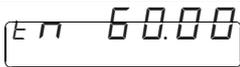
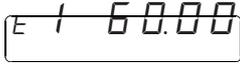
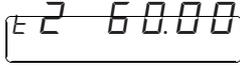
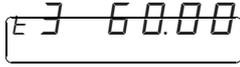
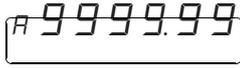
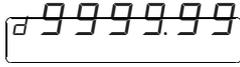
Choice for U1 operating mode		0= Output U1 is used as programmable output 1= Output U1 is used as regulation range
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Range of regulation		Indicates the error range (+/-) between the set-point and the real speed. If the error is less the output U1 will activate (max. 9999)
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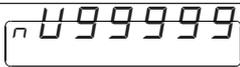
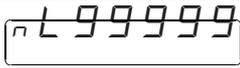
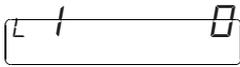
Display forcing		0= The speed or time display is free. 1= The speed or time display is forced to the set-point value when in the range of regulation.
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FUNCTION	DISPLAY	DESCRIPTION
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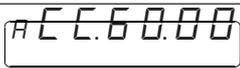
These displayings appears if the parameter "Choice for U1 operating mode" is set to 0

Ouput U1 operating mode		Each couple of number identified the setting (first number) and the range of output U1 (see dedicated paragraph "Output programming").
Ouput U2 operating mode		Each couple of number identified the setting (first number) and the range of output U2 (see dedicated paragraph "Output programming").
Starting timer		It is a timer, in seconds, that starts at I1 activation. It can be used in combination with outputs to force an opposite value to the output till the timer expires.
Timer range 1 (dD)		It is a delay time for the (dD) range. It is used to delay the activation of the programmed output.
Timer range 2 (dA)		It is a delay time for the (dA) range. It is used to delay the activation of the programmed output.
Timer range 3 (dF)		It is a delay time for the (dF) range. It is used to delay the activation of the programmed output.
Max. speed threshold		It is the maximum speed threshold used for ouputs U1 and U2 comparation.
Min. speed threshold		It is the minimum speed threshold used for ouputs U1 and U2 comparation.

These displayings appears if the parameter "Operating mode" is set to 0

Display at 10V		Indicates the speed read from the instrument when it gives out 10V. This value must be <= maximum speed.
Display at 0V		Indicates the speed read from the instrument when it gives out 0V. This value must be <= "Display at 10V" value.
Chioce of input I1 operating mode		<p>0= The speed display is always enabled.</p> <p>1= The speed display is enabled only when I1=ON.</p>

These displayings appears if the parameter "Operating mode" is set to 1 or 2

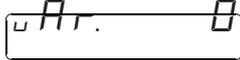
Acceleration		It is the acceleration time, from 0 to maximum speed (min. 0.1 - max. 60.00 seconds).
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FUNCTION	DISPLAY	DESCRIPTION
Deceleration		It is the deceleration time, from maximum speed to 0 (min. 0.1 - max. 60.00 seconds).
Stop operating mode		<p>0= At stop (I1=OFF), the analogue output is immediately setted to 0.</p> <p>1= At stop (I1=OFF), the analogue output is set to 0 with the deceleration ramp. The ramp is enabled till it reaches 0V.</p> <p>2= At stop (I1=OFF), the analogue output is set to 0 with the deceleration ramp till it reaches the value corresponding to the minimum speed (set-up). This is useful for those drivers like inverters or regulators that don't have a big sensibility near 0V.</p>

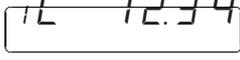
These displayings appears if the parameter "Stop operating mode" is set to 2

Stop speed		Indicates the lower speed level (after a stop I1=OFF) below which the speed is considered =0 and the regulation is stopped.
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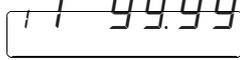
Set-point transmission with expansion		<p>This parameter must be programmed if the instrument has the input/output expansion (ordering code "I5").</p> <p>0= With inputs I5, I6, I7, I8 and I9 it is possible to set a speed from the table programmed in the instrument (value from 1 to 31).</p> <p>1= With inputs I5, I6, I7 it is possible to set a speed transmitted from an external unit (PLC).</p>
Choice of I8 operating mode		<p>0= I8 selects one of the programmed speed from the table with a weight of 2³ (if the parameter "tE"=1 the weight is 2⁰).</p> <p>1= I8 increase, impulsive or continuous (parameter "Inputs I8, I9 or key + and - variation mode") the set-point in use.</p>
Choice of I9 operating mode		<p>0= I9 selects one of the programmed speed from the table with a weight of 2⁴ (if the parameter "tE"=1 the weight is 2¹).</p> <p>1= I9 decrease, impulsive or continuous (parameter "Inputs I8, I9 or key + and - variation mode") the set-point in use.</p>

FUNCTION	DISPLAY	DESCRIPTION
Inputs I8, I9 or key + and - variation mode		<p>0= The set-point variation is continuous.</p> <p>1= The set-point variation is impulsive.</p> <p>N.B. Using the keys + and - the first variation happens after 750 ms.</p>

These displayings appears if the parameter "Inputs I8, I9 or key + and - variation mode" is set to 0

Continuous increment / decrement from inputs I8, I9 and keys + and -		It is the time necessary to pass from minimum set-point to maximum (and vice versa) at activation of inputs I8, I9. (max. 59 min. and 59 sec.)
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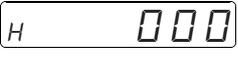
These displayings appears if the parameter "Inputs I8, I9 or key + and - variation mode" is set to 1

Impulsive increment / decrement from inputs I8, I9 and keys + and -		It is the variation of the set-point value for every activation of inputs I8 and I9. (max. 99.99 if "MF"=1 or max. 59 min. and 59 sec. if "MF"=2).
---	---	--

Once the programming of the last function is achieved, it is shown again the display in use before entering into set-up.

3 - 2 CALIBRATIONS

INTRODUCING THE PARAMETERS OF ADJUST P.I.D.

Description	Keyboard	Display
<p>Adjust a set-point. Activate the run (I1 = ON). Access to the introduction of the parameters of the adjust P.I.D.</p>	<p> +  x 1 sec.</p>	<p></p>
<p>Enter the access code "456" and confirm with ENTER.</p>	<p>  </p>	<p></p>
<p>Here is required the introduction of the number of readings used to calculate the system's speed in use for the adjust of the speed. the greater is the value introduced, the slower is the updating time of the speed. The operator may enter its value and confirm with ENTER.</p>	<p>  </p>	<p></p>
<p>Here is required the introduction of the percentage of the analog output according to the speed adjusted (feed-forward). The operator may enter its value and confirm with ENTER.</p>	<p>  </p>	<p></p>
<p>Here is required the introduction of the gain within which the instrument is in adjust P.I.D. The operator may enter its value and confirm with ENTER.</p>	<p>  </p>	<p></p>
<p>Here is required the introduction of the integral time (expressed in seconds). The operator may enter its value and confirm with ENTER.</p>	<p>  </p>	<p></p>
<p>Here is required the introduction of the time of the derivated (expressed in seconds). The operator may enter its value and confirm with ENTER. The display shows again the displayings in use.</p>	<p>  </p>	<p></p>
<p>N.B. Each value introduced is placed immediately under execution. The calibration must be executed for each range of the speed.</p>		

3 - 3 TACHOMETER CALIBRATION

In order to make easier the installation and introduction of the values of the set-up which determine the display of the speed, it is possible to show the frequencymeter (Hz) and the total count of the clock pulses.

Description	Keyboard	Display
Access to the tachometer calibration.	 +  x 1 sec.	
Enter the access code "123" and confirm with ENTER .	  	
Pressing the keys indicated it is possible to enter a value of the voltage included between 0 and 10V.	  	
Upon confirmation with ENTER it is displayed the frequencymeter.		
Pressing the key indicated , it is displayed the number of clock pulses (the count is reset to zero upon each access to the tachometer calibration).		
To reset the count press the key indicated.		
Pressing the key indicated , it is displayed again the value of the output voltage.		
To exit in any moment press the key indicated.		

3 - 4 DESCRIPTION OF CALIBRATION

In order to obtain a correct display it is necessary to define the parameters of maximum frequency and the display at maximum frequency. In order to determine maximum frequency (impulses per second) which the transducer sends, you only need to bring the transducer at maximum speed ($L = 10.0$) and, in tachometer calibration, read the frequency that the instrument displays. This value shall be introduced in set-up in the parameter "Maximum frequency". At this frequency it shall be calculated the value you wish to display. You must then determine the value in engineering units of each single clock impulse. This data may be already known by the installer, or it must be experimentally calculated; to do so, access again to the tachometer calibration, turn the system which shall move the actuating devices up to the measure known by the installer (example 1 meter, 10 meters, 100 meters etc.) and get the number of clock pulsed read by the instrument.

N° measures = Maximum Frequency / Number of read impulses
 Max. display = Numbers of measures \times known measure

The value of the maximum display calculated must be introduced in the corresponding parameter of set-up, adapting it to the unit of time in use.

N.B. The value calculated must be adapted to the number of decimal digits which you wish to display.

Example with a maximum frequency equal to 1638.4 Hz

If at 100 millimeters the count obtained is 200 impulses then: $(1638.4 / 200) = 8.192$ (n° measures / second).

In the time of a second the system runs: $8.192 \times 100 = 819.2$ millimeter / second.

The value to enter in set-up to the maximum display may be transformed into:

millimeters / minute = 49152
 meters / second = 0.8192
 meters / minute = 49.152

N.B. If the system is moving at a speed of 0.2 meters / second (real speed), the input frequency shall be:

$(\text{Max. Freq.} / \text{Max disp.}) \times \text{Real disp.} = (1638.4 / 0.8192) \times 0.2 = 400 \text{ Hz}$

The value of the minimum frequency and minimum display to be entered in the parameters of set-up, must be determined by considering the range of reading which you wish to obtain. With a maximum frequency of 1000 Hz and a maximum display of 750 it may be enough a range of 950 Hz. The minimum frequency and the minimum display shall be:

Min Freq. = Max Range Freq. = $1000 - 950 = 50 \text{ Hz}$

Min. Display = $(\text{Max. disp.} \times \text{Min. freq.}) / \text{max. freq.} = (750 \times 50) / 1000 = 37.5$

In the parameter of set-up "Minimum display" it is possible to enter a value included between 37.5 and 0.

CHAPTER 4

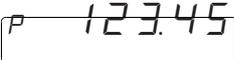
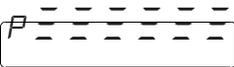
USE

Working Programs and Auxiliary Functions

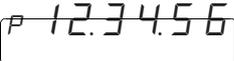
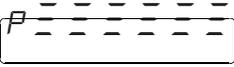
Tables and Diagrams of Operation

4 - 1 WORKING PROGRAM AND AUXILIARY FUNCTIONS

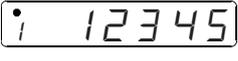
PROGRAMMING OF THE WORKING SPEED (SET-POINT) ENABLED WITH PARAMETER OF SET-UP "PF" SET TO 1

Description	Keyboard	Display
Access to the programming of the working speed.	 x 1 sec.	
Here is displayed the working speed in use (blinking). The operator may enter the level desired and confirm it with the key ENTER .	  	 = ON  = OFF
N.B. It is possible to change the set-point of work when you are not in phase of programming. During normal operation, when pressing one of the keys indicated or with the activation of inputs I8, I9, the instrument shows the working set-point which changes. The instrument during normal operation shows the speed detected (tachometer).	 	
If the display shows:		
Press twice the key CLEAR before introducing a new value.		

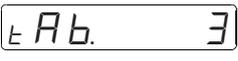
PROGRAMMING OF THE WORKING TIME (SET-POINT) ENABLED WITH PARAMETER OF SET-UP "PF" SET TO 2

Description	Keyboard	Display
Access to the programming of the working speed.	 x 1 sec.	
Here is displayed the working time (hh.mm.ss) in use (blinking). The operator may enter the level desired and confirm it with the key ENTER .	  	 = ON  = OFF
N.B. It is possible to change the set-point of work when you are not in phase of programming. During normal operation, when pressing one of the keys indicated or with the activation of inputs I8, I9, the instrument shows the working set-point which changes. The instrument during normal operation shows the speed detected (tachometer).	 	
If the display shows:		
Press twice the key CLEAR before introducing a new value.		

PROGRAMMING OF THE TABLE OF SPEED ENABLED WITH PARAMETER OF SET-UP "nF" SET TO 1 OR 2

Description	Keyboard	Display
Access to the programming of the table of speed.	 +  x 1 sec.	
Enter the access code "789" and confirm with ENTER .	  	
Here is required the introduction of the first speed of the table (max. 31) The operator may enter the value and confirm with ENTER .	  	
Here is required the introduciton of the second speed of the table. The operator may enter the value and confirm with ENTER . Upon confirmation with ENTER is required the introduciton of the third speed and so on up to the last one. Upon confirmation with ENTER of the last speed the display shows again the displayings in use.	 	
<p>Note The speed from the 10th and over are signed with letters: n.10=A, 11=B, 12=C, 13=D, 14=E, 15=F, 16=G, 17=H, 18= I, 19=L, 20=N, 21=O, 22=P, 23=Q, 24=R, 25=T, 26=U, 27=Y, 28=J, 29=C, 30=h, 31=i.</p>		
<p>Attention: if the parameter "operating mode" is set to 2 all settings are in hh.mm.ss.</p>		

CHOICE OF THE SPEED FROM TABLE ENABLED WITH PARAMETER OF SET-UP "nF" SET TO 1 OR 2

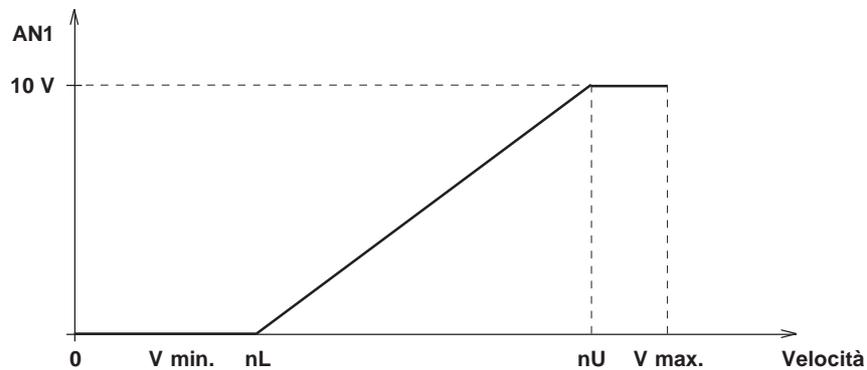
Description	Keyboard	Display
Access to the choice of the speed from table.	 + 	
The operator may choose the speed (or the time) to be processed by selecting the number corresponding to the table programmed (max. 31) and confirm with ENTER . Upon confirmaiton with ENTER it is immediately executed and the display shows again the display in use.	 	

DISPLAYINGS

Description	Keyboard	Display
Detected speed (tachometer).		123.4
If "Operating mode" = 2: detected time		t 12.34.56
By pressing this key the display shows the input and output status		I1 I2 I3 I4 I5 I6 □ - . - - - - U1 U2 I9 I8 I7
Pressing again CLEAR:		P 10000.0
if "Operating mode" = 1 the display shows the speed set-point in use		P 10000.0
if "Operating mode" = 2 the display shows the time set-point in use		P 12.34.56
Pressing CLEAR the display shows again the detected speed (time)		

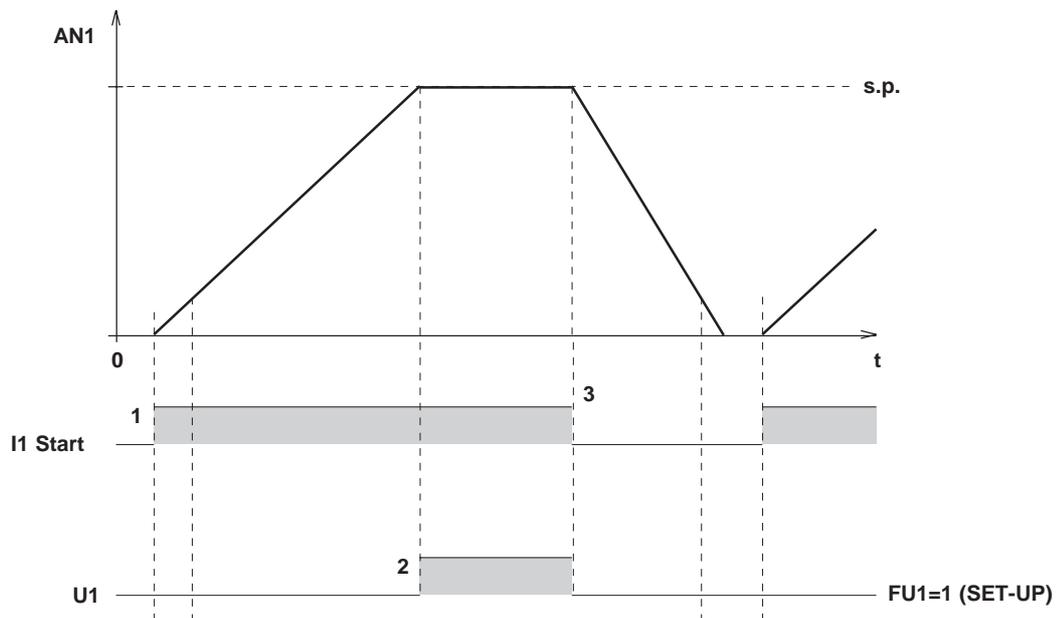
4 - 2 TABLES AND DIAGRAMS OF OPERATION

DIAGRAM OF OPERATION WITH PARAMETER OF SET-UP "nF" SET TO 0

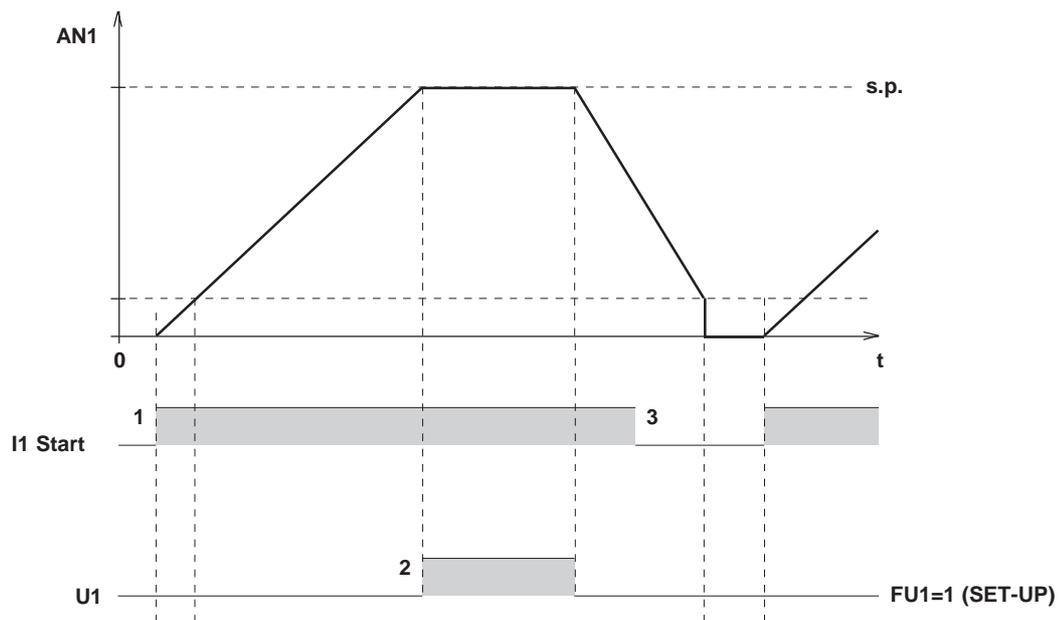


The output AN1 is proportional to the speed displayed within the limits adjusted in set-up by the parameters "nL" and "nU". The outputs U1 and U2 are in comparison with the maximum and minimum speed .

DIAGRAM OF OPERATION WITH PARAMETERS OF SET-UP "nF" AND "St" SET TO 1



- 1 = Upon activation of input I1, the system accelerates in order to reach the adjusted speed (s.p.).
- 2 = When the speed of the system reaches the area of adjust (set-up) output U1 is activated.
- 3 = Upon activation of the stop (I3 = OFF) the system is stopped with ramp of deceleration. In order to restart it is necessary to re-activate the input I1 with the input I3 = ON.

DIAGRAM OF OPERATION WITH PARAMETER OF SET-UP "P" SET TO 1 AND "SL" SET TO 2


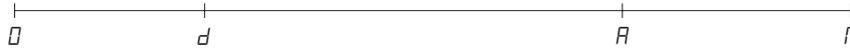
1 = Upon activation of input I1, the system accelerates in order to reach the adjusted speed (s.p.).

2 = When the speed of the system reaches the area of adjust (set-up) output U1 is activated.

3 = Upon activation of the stop (I3 = OFF) the system is stopped with ramp of deceleration. In order to restart it is necessary to re-activate the input I1 with the input I3 = ON.

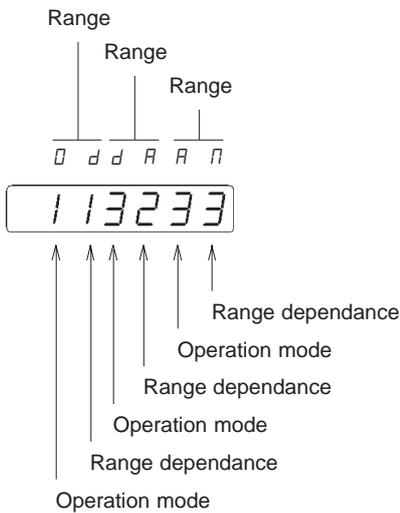
OUTPUT U1 AND U2 PROGRAMMING

The set-up parameters **P** and **S**, allow to program the operating mode of outputs U1 and U2 inside the display range, defined by display minimum and maximum (\varnothing and Π) and by the alarm threshold (d and R); the display range is the following:



There are 3 working ranges: $\varnothing d$, dR , $R\Pi$ and it is possible to program a different outputs setting for each range. It is possible to enable the operation of an output in a range only when the display has reached another range ("Range dependance"). This allows to program the activation of outputs at startup after the display has reached a stabilized value.

Parameters **P** and **S** are structured as follows:



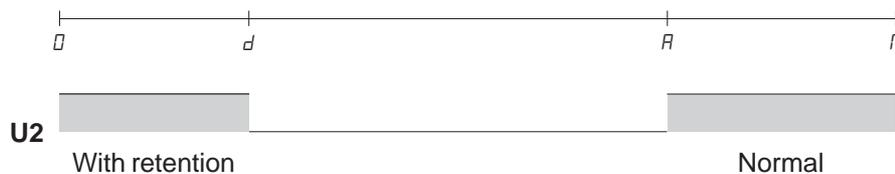
Operation mode

- 1 Enabled
- 2 Enabled with retention (resettable with **CLEAR** or input I3)
- 3 Disabled
- 4 Disabled with retention (resettable with **CLEAR** or input I3)

Range dependance

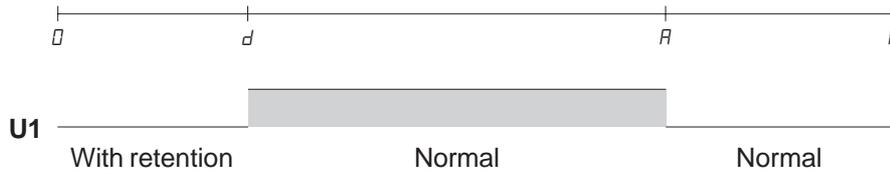
- 1 Range from \varnothing to d
- 2 Range from d to R
- 3 Range from R to Π
- 4 Dependant from starting timer (with input I1 activating)
- 5 Dependant from its own range with timer 1, 2, 3

Example:



Programming output U2 with the functionality of the above figure. The comparison of the range $\varnothing d$ at startup, must be enabled after that the visualization has reached the range $R\Pi$. The set-up parameter **S** must be 23 32 13. Output U2 will stay OFF until the visualization has reached the range $R\Pi$ and then will turn on each time it reaches the range $\varnothing d$.

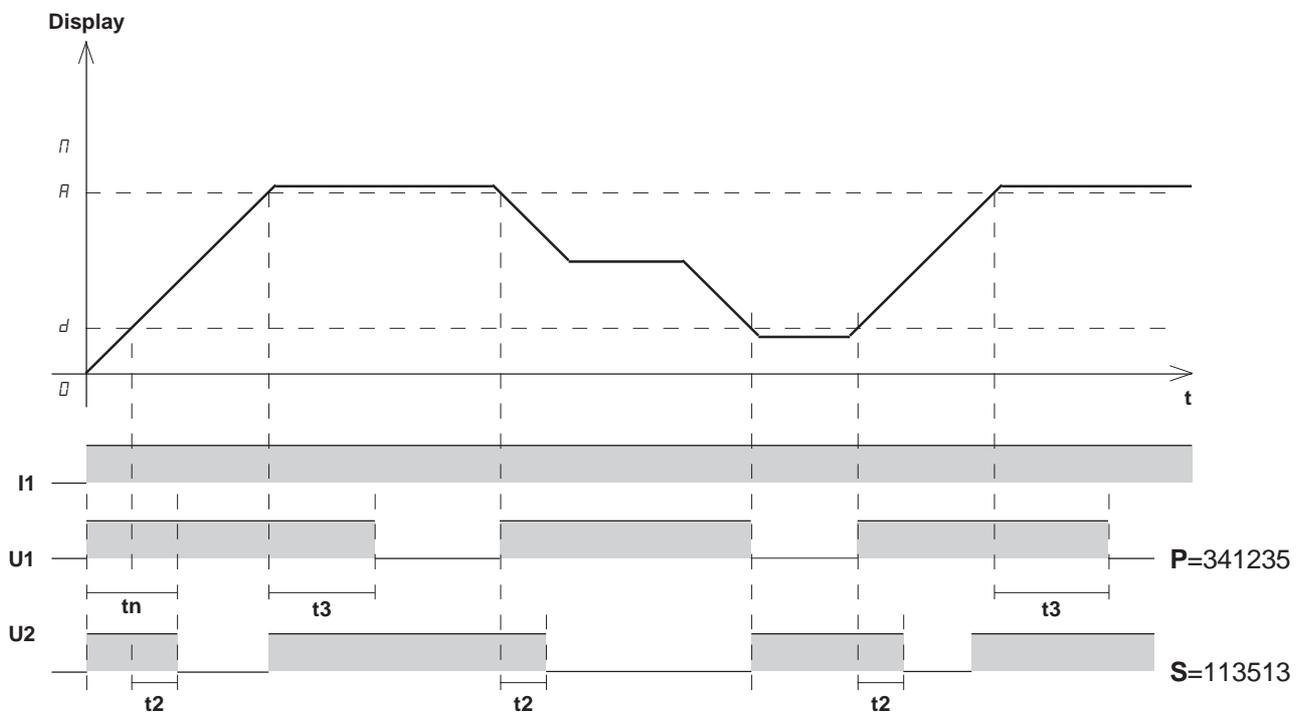
Example:



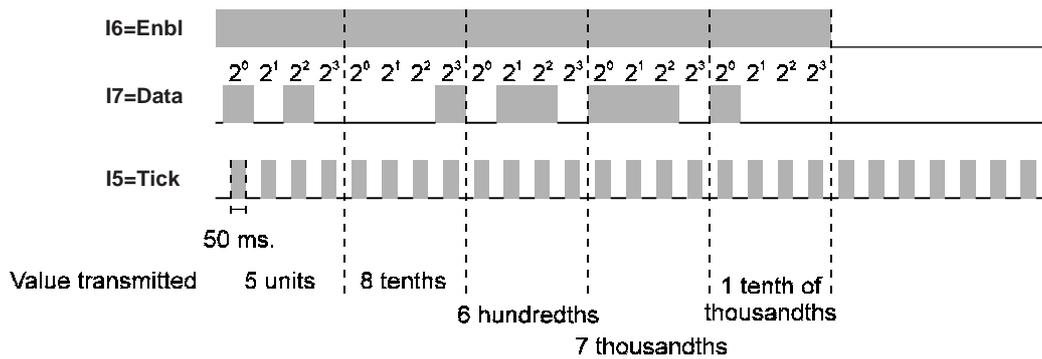
Programming output U1 with the functionality of the above figure. The comparison of the range $0d$ at startup, must be enabled after that the visualization has reached the range dR . The set-up parameter **P** must be 42 12 33. Output U2 will stay OFF until the visualization has reached the range dR and then will remain off without retention each time it reaches the range $0d$

NOTE: It is possible to delay the switching of the outputs using the timer range (set-up).

DIAGRAM OF OPERATION WITH PROGRAMMED TIMERS



TRANSMISSION SPEED WITH PARAMETER OF SET-UP "LE"=1 AND "PF"=1 OR 2



Value of speed transmitted = 17685

Minimum time of transmission speed = 2 seconds

Minimum time of transmission of table number = 0.4 seconds

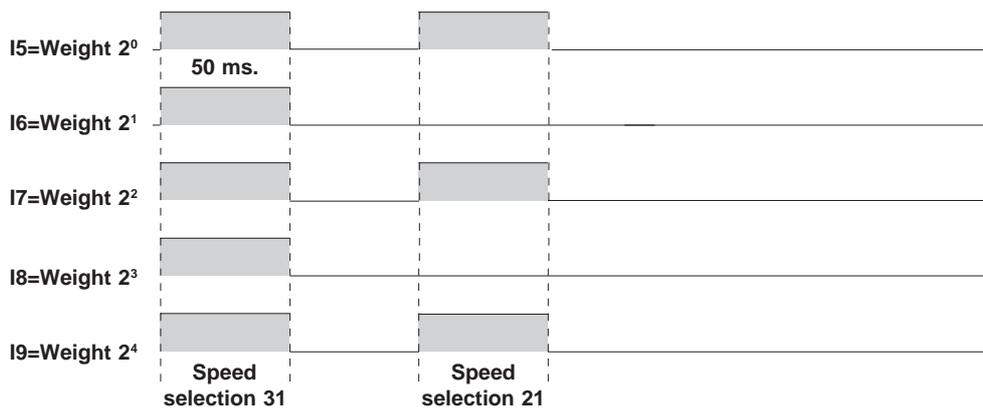
The transmission of the speed or of the table to the instrument, may be made if there is the expansion of the inputs and of the outputs (ordering code "E").

In order to get the data you must transmit in a sequence, the presence or not of the weight of the single bit starting from the less significative digit.

With the transmission of the speed you must transmit all five digits which make up the value.

N.B. If input I5 is de-activated, input I6 and input I4 are ignored.

TRANSMISSION SPEED WITH PARAMETER OF SET-UP "LE"=0 AND "PF"=1 OR 2



N.B. In order to be accepted, the transmitted data must last more than 50 milliseconds.

CHAPTER 5

ASSISTANCE

Diagnostic of inputs and outputs

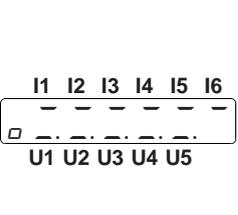
*Instructions on How to Fill Up the Technical Assistance
Fax*

Guarantee

5 - 1 DIAGNOSTIC OF INPUTS AND OUTPUTS

DIAGNOSTIC OF INPUTS

The instrument offers a diagnostic of the logical status of digital inputs and outputs; according to the segments of the display which are ON , it is possible to understand if an input arrives to the instrument and if an output has been energised. Concerning the status of inputs, if it is displayed the upper segment of the first left display, it means that input 1 has been activated: if it is displayed the upper segment of the second left display, it means that input 2 has been activated and so on. Concerning the digital outputs, it is the same as for inputs, but you must consider the lower segments of the display.

Description	Keyboard	Display
Access to the display of inputs/outputs diagnostics.		
Status of inputs and outputs. The upper segments of the display On indicate the acquisition of the related inputs ("~"). The lower segments of the display On indicate the acquisition of the related outputs ("-").		

INSTRUCTIONS ON HOW TO FILL UP THE FAX FOR TECHNICAL ASSISTANCE

In order to be able to provide a quick, specific and quality assistance, we need your help.

If you need QEM's assistance to face the eventual troubleshooting in your applications and even though you performed all instructions indicated in the manual of "Installation, maintenance and assistance", the problem still continues, please fill up every blank of the fax enclosed to the manual of Installation, maintenance and assistance and send it to QEM's Assistance Department.

In this way you shall allow our technicians to get the necessary elements to understand your problem (avoiding thus expensive telephone calls).

We thank you for your cooperation and here at QEM's we really wish you a good job.

REMARK

If you must send an instrument to be repaired, please strictly follow our instructions indicated here below:

- If possible, use the original packaging; in any case the packaging must protect the instrument against shocks due to transport.
- Insert into the package a detailed description of the malfunction you found and the part of wiring diagram which includes the instrument. In case the problem you discovered concerns data storage, please also include the instrument's programming (set-up, working levels, auxiliary parameters, etc.).
- If you need it, please explicitly require the quotation of charges for the repairing: if you do not ask for it, the charges shall be calculated as a whole.
- Our technicians shall give priority to the repairing of those instruments which have been sent according to the items listed above.

5 - 3 GUARANTEE

The guarantee is conform to the definitions of the general sales conditions.

REMARKS

REMARKS

REMARKS