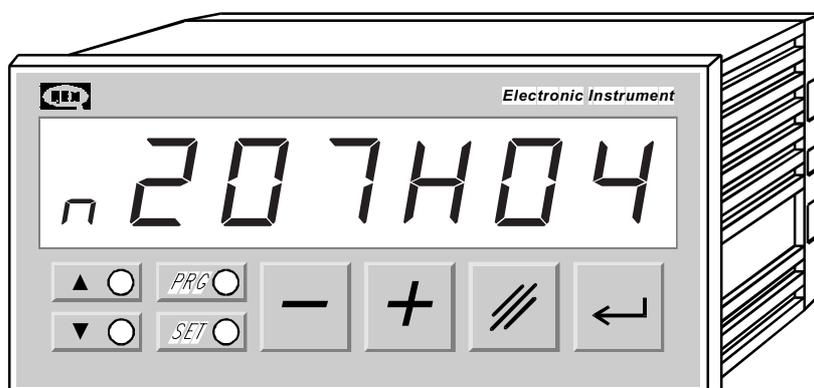


ADJUSTER FOR SPEED OR TACHOMETER WITH ANALOG OUTPUT
0÷10 V FOR DRIVES IN D.C. INVERTER OR PROPORTIONAL VALVES

HM 207.04



User's Manual

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



*Quality in Electronic
Manufacturing*

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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>
5	0	New manual	06 / 24 / 97



1 - 4 DESCRIPTION OF OPERATION

The instrument HM 207.04 adjusts the speed of a system sending a signal ON / OFF as a reading of its own speed (Minimum frequency = 1 Hz, Maximum frequency = 9999 Hz). The speed which is read is compared with the set-point being adjusted and an analog output which controls 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.



CHAPTER 2

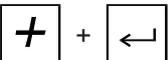
OPERATOR/MACHINE INTERFACE

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	Description Run / Wait. According to the logical status of this input it is selected the operation mode of the instrument: ON = Run (instrument ready for program execution), OFF = Wait (instrumento is waiting). With input I1 = ON it is enabled the speed adjust. If the input I1 = OFF the instrument is under adjust on the preset introduced; a variation of the preset shall be executed with a new run. After one stop, in order to enable again the adjust, it is necessary to provide a new run run (I1 = ON). I2 ON I P1 Clock. Signal for the acquisition of the system's speed (encoder signal, proximity or mechanical contacts). I3 OFF C P1 Stop. Its operation is programmable in set-up. With the parameter "5L" set to 0, if the input I3 becomes OFF, the analog outputs is taken immediately to zero. With "5L" set to 1, if the input I3 becomes OFF, the analog output is brought to zero with deceleration ramp. I4 ON I P1 Tick. Its operation is enabled if there is the expansion inputs/outputs. With the input "AbI" = ON, it is the signal of synchronism of a code of speed transmission (set-point). Its activation time must be greater than 50 milliseconds. With the parameter "LE" = 1 the input selects the value 2 ² of the binary code for the selection of the speed with which the positionings are performed.			
I2	ON	I	P1				
I3	OFF	C	P1				
I4	ON	I	P1				

Legend

C = Continuous signal.
 I = Impulsive signal.

		<i>Name</i>
		Description
+	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 "E")

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

Name				Logical status of activation	Activation mode	Polarizer
15	ON	C	P2	AbI / +. It is the command to enable the reading of the speed transmission(set-point); it is enabled if "LE" is set to 2. The signal must remain activated during the whole transmission; a de-activation during the transmission aborts the transmission itself. If in set-up the parameter "LE" is set to 0 it is the command for the speed increase with the operation programmed in set-up. With the parameter "LE" = 1 the input selects the value 2 ¹ of the binary code for the selection of the speed with which the positionings are executed.		
16	ON	I	P2	Data / -. It is enabled if in set-up the parameter "LE" is set to 2. It is the signal which in synchronism with the input "Tick" receives the numeric value of the speed (set-point). If in set-up the parameter "LE" is set to 0 it is the command to reduce the speed with operation programmed in set-up. With the parameter "LE" = 1 the input selects the value 2 ⁰ of the binary code for the selection of the speed with which the positionings are executed.		

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

Name				Logical status of activation	Polarizer	Activation mode
U1	ON	C1	C	Maximum limit of speed / Area of adjust. It is set as a limit of speed, and it remains energised until the speed read by the instrument is equal to or greater than the maximum limit adjusted in set-up. If it is set as an "area of adjust" it is activated when the error between the set-point and the real speed is smaller than the percentage which is set on the parameter "F i".		
U2	ON	C1	C	Minimum limit of speed. It is energised when the speed read by the instrument is greater than the minimum limit set in set-up. Upon activation of a run (I1 = ON), it is started a timer which was adjusted in set-up (L2); it maintains energised the output U2 even though the speed which is read remains lower than the minimum speed adjusted.		

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 forecast 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 .	$\boxed{-} + \boxed{\leftarrow} \times 1 \text{ sec.}$ $\boxed{+} \quad \boxed{-} \quad \boxed{\leftarrow}$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">H 000</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">PRG <input type="checkbox"/> = ON</div>

FUNCTION	DISPLAY	DESCRIPTION
Operation Mode	<div style="border: 1px solid black; padding: 2px; display: inline-block;">P 0</div>	<p>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.</p> <p>2 = The instrument operates as a tachometer and it generates a voltage from 10 V to zero proportional to the frequency and inside of the limits subsequently programmed.</p>
Decimal digits Max. 3	<div style="border: 1px solid black; padding: 2px; display: inline-block;">C 0</div>	It specifies the number of digits after the comma, with which you wish to display the speed.
Maximum frequency Max. 9999	<div style="border: 1px solid black; padding: 2px; display: inline-block;">F 4000.00</div>	It is the maximum speed, expressed in Hz, which sends the transducer when the system is at the maximum speed.
Maximum speed Max. 99999	<div style="border: 1px solid black; padding: 2px; display: inline-block;">n 99999</div>	It indicates the value that the instrument shows at maximum frequency. It is the maximum threshold of speed besides which the output U1 is activated. It is the maximum programmable speed. In order to exploit maximum the system resolution, you should enter the maximum reachable value of speed under real working conditions.
Minimum Speed	<div style="border: 1px solid black; padding: 2px; display: inline-block;">U 99999</div>	It is the minimum threshold of speed; when it is exceeded the output U2 is activated. It is the minimum programmable speed.

FUNCTION	DISPLAY	DESCRIPTION
Reading Averages Max. 99		It indicates every how many readings it is calculated the speed to be displayed. The greater is the number of reading an the slower is the updating of the speed. N.B. Please refer to the "Manual of Installation, Maintenance and Assistance".
Speed at 10 V or 0 V		If the parameter "P" is set to 0, it indicates the value of speed read by the instrument with which the analog output gets the value of 10 V. If the parameter "P" is set to 2, it indicates the value of speed read by the instrument with which the analog outputs gets the value of 0 V. The value must be lower or equal to the maximum speed.
Speed at 0 V or 10 V		If the parameter "P" is set to 0, it indicates the value of speed read by the instrument with which the analog output gets the value of 0 V. If the parameter "P" is set to 2, it indicates the value of speed read by the instrument with which the analog outputs gets the value of 10 V. The value must be greater or equal to the minimum speed.
Enabling serial RS 232C		0 = The serial RS 232C is disabled. 1 = The serial RS 232C is enabled.

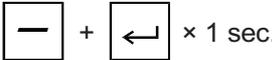
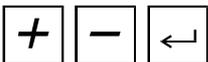
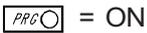
These displayings appears if the parameter "Enabling serial RS 232C" is set to 1

Speed of transmission RS 232C		<table border="0"> <tr> <td data-bbox="708 1106 852 1357"> 110 baud 150 baud 300 baud 600 baud 1200 baud 2400 baud 4800 baud 9600 baud </td> <td data-bbox="868 1106 1453 1357"> } Available speeds of transmission; if the speed is wrong, by accepting and displaying the wrong value, the default is 9600. </td> </tr> </table>	110 baud 150 baud 300 baud 600 baud 1200 baud 2400 baud 4800 baud 9600 baud	} Available speeds of transmission; if the speed is wrong, by accepting and displaying the wrong value, the default is 9600.
110 baud 150 baud 300 baud 600 baud 1200 baud 2400 baud 4800 baud 9600 baud	} Available speeds of transmission; if the speed is wrong, by accepting and displaying the wrong value, the default is 9600.			
Number of data bits		7 bits Number of data bits; if the number of bits is wrong, the 8 bits instrument takes as a default value 8.		
Number of stop bits		1 bit of stop Number of available stop bits; if the number of 2 bit of stop bits is wrong, the instrument takes as a default value 2.		
Address code		In case of connection of various instruments with configuration being Daisy-Chain, it is necessary to assign to each instrument an identificative code. In case of a transmission from master with code "00", the string which is sent is received by all instruments.		

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

WITH INSTRUMENT USED AS A SPEED ADJUSTER

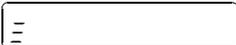
These parameters determine the way of operation of the instrument and therefore their access is reserved to the installer; for the programming we have forecast the introduction of a password as follows:

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 .	 	 

FUNCTION	DISPLAY	DESCRIPTION
Operation Mode		1 = The instrument operates as a speed adjuster where to the maximum speed correspond 10 V of the analog output. 3 = The instrument operates as a speed adjuster where to the maximum speed it corresponds zero volt of the analog output.
Decimal Digits Max. 3		It specifies the number of digits after the comma, with which you wish to display the speed.
Enbaling programming of speed change		0 = The instrument is enabled to the change of the ratios of speed. 1 = The instrument is enabled to the change of the ratios of speed and then the programming of the maximum frequency, of the maximum and minimum speed is repeated by 3 changed of speed ratio.

These displayings appear if the parameter "Enbaling programming of speed change" is set to 1

Maximum frequency range 1 Max. 9999		It is the maximum frequency, expressed in Hz, referred to the range 1. N.B. The values to enter in the ranges must be increasing from range 1 (slow range) to the range 3 (fast range).
Maximum Speed range 1 Max. 99999		Maximum speed referred to the range 1.

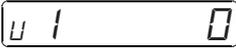
FUNCTION	DISPLAY	DESCRIPTION
Minimum Speed range 1		Minimum speed referred to the range 1.
Maximum Frequency range 2 Max. 9999		It is the maximum frequency, expressed in Hz, referred to the range 2.
Maximum Speed range 2 Max. 99999		Maximum speed referred to the range 2.
Minimum Speed range 2		Minimum speed referred to the range 2.
Maximum Frequency range 3 Max. 9999		It is the maximum frequency, expressed in Hz, referred to the range 3.
Maximum Speed range 3 Max. 99999		Maximum speed referred to the range 3.
Minimum Speed range 3		Minimum speed referred to the range 3.

These displayings appear if the parameter "Enabling programming of speed change" is set to 0

Maximum Frequency Max. 9999		It is the maximum frequency, expressed in Hz, which the transducer sends when the system is at maximum speed.
Maximum Speed Max. 99999		It indicates the value that the instrument shows at maximum frequency. It is the maximum threshold of speed besides which it is activated output U1. It is the maximum programmable speed. In order to exploit at maximum the system resolution, you should enter the maximum speed value which is reachable under real working conditions.

FUNCTION	DISPLAY	DESCRIPTION
Minimum speed		It is the minimum threshold; after it has been exceeded, the output U2 is activated. It is the minimum programmable speed.
Reading averages Max. 99		It indicates every how many readings it is calculated the speed to be displayed. The greater is the number of readings, the slower is the speed updating. N.B. Please refer to the "Manual of Installation, Maintenance and Assistance".
Acceleration Min. 0.1		It determines the time in seconds which is necessary to accelerate from zero speed to maximum speed.
De-celeration Min. 0.1		It determines the time in seconds which is necessary to decelerate from maximum speed to zero speed.
Stop operation (I3)		<p>0= Upon activation of stop (I3 = OFF), the analog outputs is immediately taken to zero.</p> <p>1= Upon activation of stop (I3 = OFF), the analog outputs is taken at zero with ramp of de-celeration. The ramp of de-celeration for the stop is enabled until the analog output reaches zero volt. This type of stop is used with drives under direct current which can adjust the speed up to those values being near zero, keeping constant the torque. In this case the minimum frequency of management in the display of speed is 1 Hz.</p> <p>2= The ramp of de-celeration for the stop is enabled until the analog output reaches the value corresponding to the minimum speed which was adjusted in set-up. This stop is used with inverter drives or adjusters which control proportional valves, which can adjust the speed only up to minimum fixed values, after which the torque immediately drops or the input sensitivity of the control is forced. In this case the min. frequency of management of the speed display corresponds to the minimum speed which was set in set-up. In the introduction of the minimum speed you must bear into consideration that the threshold of the inverter's sensitivity may change in the time, then we recommend to enter a value which should be greater than some percentage point, compared to the theoretical or calculated value.</p>

FUNCTION	DISPLAY	DESCRIPTION
Transmission set-point with expansion		<p>0=The speed programmed can be modified by the inputs I5 and I6.</p> <p>1=With the inputs I4, I5, I6 it is possible to set a speed programmed in the table of the instrument (values from 1 to 7).</p> <p>2=With the inputs I4, I5, I6 it is possible to set a speed with a value transmitted from an external unit (PLC).</p>
Type of variation from inputs I5, I6 or from keys (+), (-)		<p>0=The variation of the set-point of system's speed is made in a continuous way.</p> <p>1=The variation of the set-point of system's speed is made in an impulsive way.</p> <p>N.B. By using the keys (+) and (-) the first variation is made after 750 milliseconds.</p>
This display appears if the parameter "Type of variation from inputs I5, I6 or from keys (+), (-)" is set to 0		
Increment decrement continuous from inputs I5, I6 and keys (+), (-) Max. 99.9		It is the variation of the set-point in percentage compared to the maximum set-point (maximum speed), at each minute of activation of inputs I5 and I6. (Maximum variation = 12000 measures/minute).
This display appears if the parameter "Type of variation from inputs I5, I6 or from keys (+), (-)" is set to 1		
Increment decrement impulsive from inputs I5, I6 and keys (+), (-) Max. 9.99		It is the variation of the set-point in percentage compared to the maximum set-point upon each activation of the inputs I5 and I6.
Time of isteresis outputs U1, U2		It is the minimum time, expressed in seconds, to activate or deactivate the outputs U1 and U2 in comparison with the system's speed.
Timer to energise output U2		It is the time, expressed in seconds, during which it remains energised the output U2 upon each activation of the run (I1). If after this time, the speed is lower than the minimum speed, the output U2 becomes OFF

FUNCTION	DISPLAY	DESCRIPTION
Programming output U1		<p>0 = The output U1 operates as a maximum limit of speed.</p> <p>1 = The output operates as a detector of the range of adjust.</p>
This display appears if the parameter "U1" is set to 1		
Range of adjust		It indicates the percentage (±) of error between the set-point and the real speed. If the error is smaller, the output U1 is activated.
Enabling serial RS 232C		<p>0 = The serial RS 232C is disabled.</p> <p>1 = The serial RS 232C is enabled.</p>
This display appears if the parameter "r5" is set to 1		
Speed of transmission RS 232C		<p>110 baud 150 baud 300 baud 600 baud 1200 baud 2400 baud 4800 baud 9600 baud</p> <p>} Available speeds of transmission; if the speed is wrong, by accepting and displaying the wrong value, the default is 9600.</p>
Number of data bits		<p>7 bits Number of data bits; if the number of bits is wrong, the instrument takes as a default value 8.</p> <p>8 bits</p>
Number of stop bits		<p>1 bit of stop Number of available stop bits; if the number of bits is wrong, the instrument takes as a default value 2.</p> <p>2 bit of stop</p>
Address code		In case of connection of various instruments with configuration being Daisy-Chain, it is necessary to assign to each instrument an identificative code. In case of a transmission from master with code "00", the string which is sent is received by all instruments.
Once the programming of the last function is achieved, it is shown again the display in use before entering into set-up.		

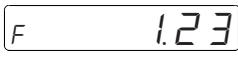
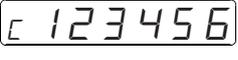
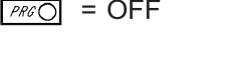
3 - 2 CALIBRATIONS

INTRODUCING THE PARAMETERS OF ADJUST P.I.D.

Description	Keyboard	Display
Adjust a set-point. Activate the run (I1 = ON). Access to the introduction of the parameters of the adjust P.I.D.	$\boxed{-}$ + $\boxed{\leftarrow}$ × 1 sec.	\boxed{H} $\boxed{000}$
Enter the access code "456" and confirm with ENTER .	$\boxed{+}$ $\boxed{-}$ $\boxed{\leftarrow}$	
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 .	$\boxed{+}$ $\boxed{-}$ $\boxed{\leftarrow}$	\boxed{Lr} $\boxed{99}$
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 .	$\boxed{+}$ $\boxed{-}$ $\boxed{\leftarrow}$	\boxed{FF} $\boxed{100.0}$
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 .	$\boxed{+}$ $\boxed{-}$ $\boxed{\leftarrow}$	\boxed{GA} $\boxed{0.010}$
Here is required the introduction of the integral time (expressed in seconds). The operator may enter its value and confirm with ENTER .	$\boxed{+}$ $\boxed{-}$ $\boxed{\leftarrow}$	$\boxed{t_i}$ $\boxed{0.500}$
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.	$\boxed{+}$ $\boxed{-}$ $\boxed{\leftarrow}$	$\boxed{t_d}$ $\boxed{0.001}$
<p>N.B. Each value introduced is placed immediately under execution. The calibration must be executed for each range of the speed.</p>		

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 a phase of the tachometer calibration.	 +  × 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.		



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 ($U = 10.0$) 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

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

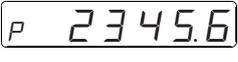
USE

Working Programs and Auxiliary Functions

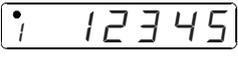
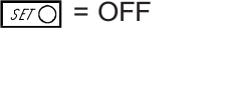
Tables and Diagrams of Operation

4 - 1 WORKING PROGRAM AND AUXILIARY FUNCTIONS

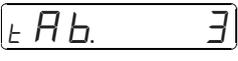
PROGRAMMING OF THE WORKING SPEED(SET-POINT) ENABLED WITH PARAMETER OF SET-UP "P" SET TO 1 OR 3

Description	Keyboard	Display
<p>Access to the programming of the working speed.</p>	 × 1 sec.	
<p>Here is displayed the working speed in use (blinking). The operator may enter the level desired and confirm it with the key ENTER.</p>	  	<p> = ON  = OFF</p>
<p>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, the instrument shows the working set-point which changes. The instrument during normal operation shows the speed detected (tachometer).</p>	 	
<p>If in set-up you enabled the operation with change of range ("RL" = 1), upon each variation of speed (from inputs, keyboard, transmission keyboard) which needs a change of range, the analog output shall be forced to zero, simulating a stop with ramp of deceleration and it shall be displayed the message indicated.</p>		
<p>To enable again the adjuster it is necessary to provide again a run (I1 = ON).</p>		

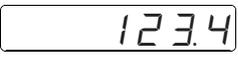
PROGRAMMING OF THE TABLE OF SPEED ENABLED WITH PARAMETER OF SET-UP "P" SET TO 1 OR 3

Description	Keyboard	Display
Access to the programming of the table of speed.	 +  × 1 sec.	
Enter the access code "789" and confirm with ENTER .	  	
Here is required the introduction of the first speed of the table (max. 7) 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 introducion 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.	 	 

CHOICE OF THE SPEED FROM TABLE ENABLED WITH PARAMETER OF SET-UP "P" SET TO 1 OR 3

Description	Keyboard	Display
Access to the choice of the speed from table.	 + 	
The operator may choose the speed to be processed by selecting the number corresponding to the table programmed (max. 7) and confirm with ENTER . Upon confirmaiton with ENTER it is immediatly executed and the display shows again the display in use.	 	

DISPLAYINGS

Description	Keyboard	Display
Detected speed (tachometer).		
If in set-up it has been enabled the change of range when pressing the key indicated the displayshows the message of change of range.		

COMMANDS IN RS 232C

If there is on the instrument the option RS 232C and in set-up it is enabled the transmission, is possible to transmit from a PC commands of writing and reading. Each string of command which is sent to the PC must always start with the character "{" (value ascii = 123) for command code or "(" (value ascii = 40) for numerical series. The first 2 characters of transmission opening or of single command which are sent must be numerical, because they represent the address code to which the message is destined or from which an information is coming. If the address "00" is sent, it means that the information is destined to all instruments in line. the following 2 characters must be 2 capital letters because they identify the operating code of the instruction. After the operating code there is the operating number, i.e. the numeric value of the variable concerned by the operating code. The characters which are sent without placing before the character "{" and at the end of the character "@" are only re-transmitted as an "ECHO" effect but they do not provide any command to the instrument receiving them. Each string which is sent by the instrument starts with the character "[" (value ascii = 91). The instrument is always slave and can re-transmit only upon the PC's request (master).

Syntaxis of general command.

{ AA YY XXX @

{ = Code of start of transmission string from PC.

AA = Address code. It identifies the instrument in transmission / reception. It may be omitted if it is not forecast a serial connection with various instruments.

YY = Command code (two letters).

The first letter identifies the type of data to be transmitted (table, message, set-point). The second letter identifies the type of command (opening, closing, request ...).

XXX = 3 digits address with the first letter of ocmmand code being = M or T. It becomes a numerical or alphanumerical data with a variable length with the other command codes.

@ = Character of string end.

Code of command of letter T.

{ AA TY XXX @

{ = Code of start of transmission string from PC.

AA = Address code. It identifies the instrument in transmission / reception. It may be omitted if it is not forecast a serial connection with various instruments.

TY = Command code (two letters).

TA = Opening a numerical table.

XXX = Number of numerical table to be opened.

@ = Character of string end.

Example: { 01 TA 001 @

To be continued on next page.

Writing operation in the instrument's memory.

(XXX XXXXX... @

(= Code of start of transmission string from PC.

XXX = Address of the data corresponding to the open table.

XXXXX... = Numerical series transmitted (1234.55..). Here are accepted various numerical values which are identified by the instrument and separated automatically, then each value must have a fixed size.

@ = Character of string end.

Example: (001 1234,5 @ 1° set point of the table of working speed.

{ AA TY XXX @

{ = Code of start of transmission string from PC.

AA = Address code. It identifies the instrument in transmission / reception. It may be omitted if it is not forecast a serial connection with various instruments.

TY = Command code (two letters).

TC = Closing a numerical table.

XXX = Number of numerical table to be closed.

@ = Character of string end.

Example: { 01 TC 001 @.

{ AA YY XXX @

{ = Code of start of transmission string from PC.

AA = Address code. It identifies the instrument in transmission / reception. It may be omitted if it is not forecast a serial connection with various instruments.

TY = Command code (two letters).

T? = Reading request of the table from the instrument to the PC.

XXX = Number of numerical table required.

@ = Character of string end.

Example: { 01 T? 001 @.

To be continued on next page

Instrument's response to a reading request of the speed table.

[TY XXX @

[= Code of start of transmission string from PC.

TY = Command code (two letters).

TA = Opening a numerical table.

XXX = Number of numerical table to be transmitted.

@ = Character of string end.

Example: [TA 001 @

Writing operation in the PC's memory

[XXX XXXXX... @

[= Code of start of transmission string from the instrument.

XXX = Address of the data corresponding to the table transmitted.

XXXXX... = Value transmitted (1234.55..).

@ = Character of string end.

Example: [0011234.5 @

[TY XXX @

[= Code of start of transmission string from the instrument.

TY = Command code (two letters)

TC = Closing a numerical table.

XXX = Number of numerical table to be closed.

@ = Character of string end.

Example: [TC001 @

To be continued on next page

Command code of letter S.

{ AA SY XXX... @

{ = Code of start of transmission string from PC.

AA = Address code. It identifies the instrument in transmission / reception. It may be omitted if it is not forecast a serial connection with various instruments.

SY = Command code (two letters).

SV = Speed writing. The following characters are not an address but a numerical series. The letter (any letter) identifies the variable transmitted.

XXX... = Numerical series transmitted.

@ = Character of string end.

Example: { 01 SV 1234,5 @

{ AA SY @

{ = Code of start of transmission string from PC.

AA = Address code. It identifies the instrument in transmission / reception. It may be omitted if it is not forecast a serial connection with various instruments.

SY = Command code (two letters).

S? = Reading request of the PC to the instrument of the numerical series (set-point and speed). The instrument shall transmit all variables.

@ = Character of string end.

Example: { 01 S? @

Writing operation in the PC's memory

[Y XXXXX... @

[= Code of start of transmission string from the instrument.

Y = **S** o **V** = The letter identifies the variable transmitted. (**S**= set-point in use, **V**= current speed)

XXXXX... = Numerical series transmitted. Max. 32 characters.

@ = Character of string end.

Example: [S 1234,5 @

To be continued on next page

Command code letter C.**Used in the commands in line**

{ AA CY XXX... @

{ = Code of start of transmission string from PC.

AA = Address code. It identifies the instrument in transmission / reception. It may be omitted if it is not forecast a serial connection with various instruments.

CY = Command code (two letters).

CT = Command to execute the value of table (set-point). The following characters are not an address but a letter followed by two numbers.

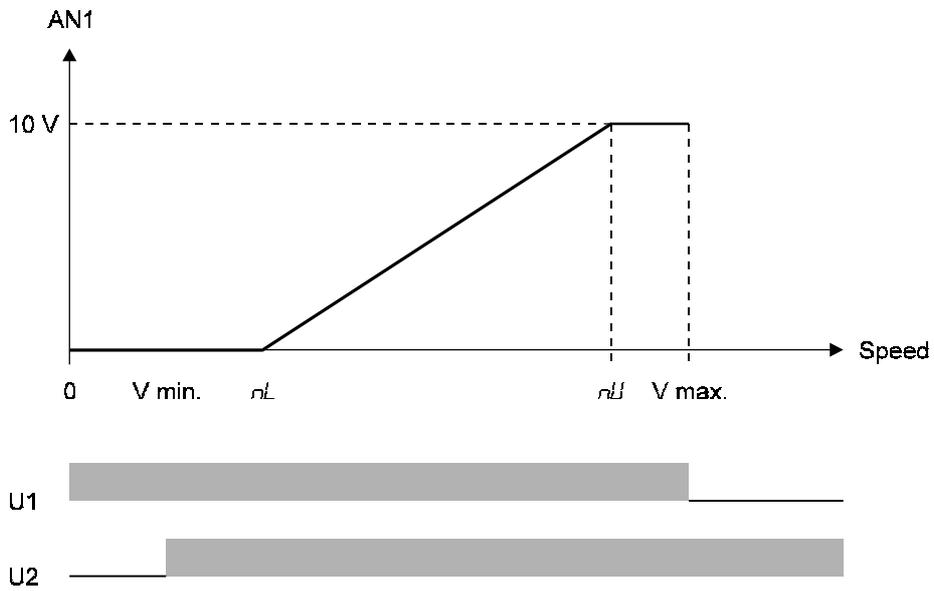
XXX = Number of command code made of a letter followed by two numbers.

@ = Character of string end..

Example: { 01 CTV 03 @ address of speed table.

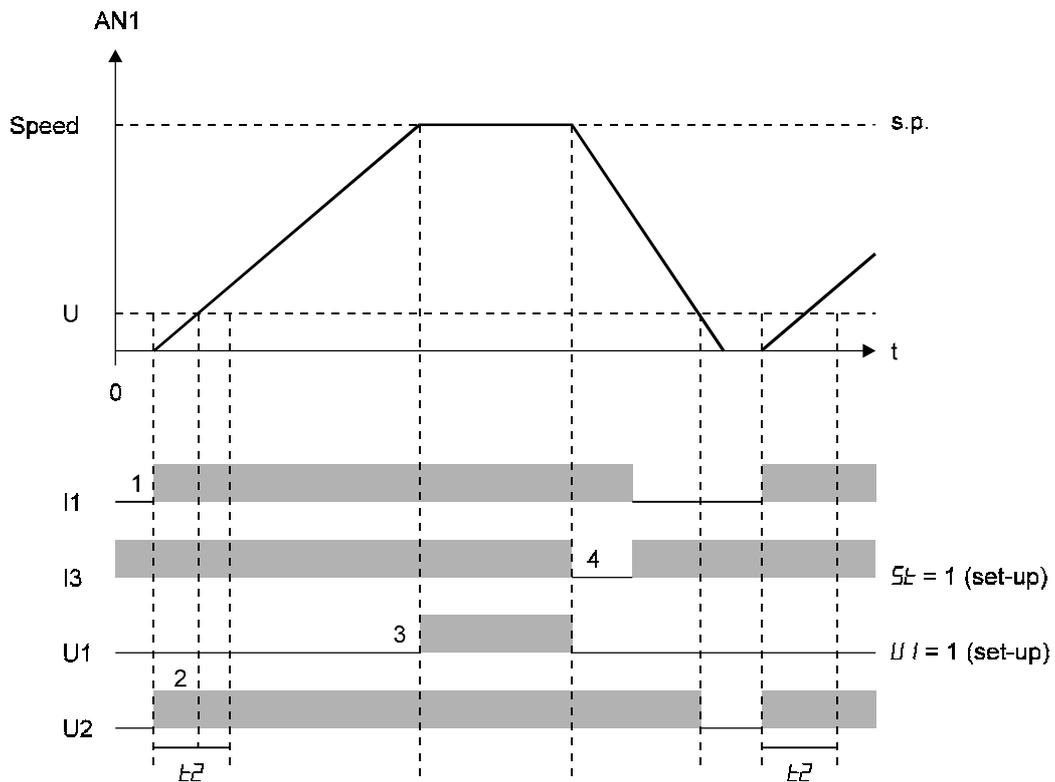
4 - 2 TABLES AND DIAGRAMS OF OPERATION

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



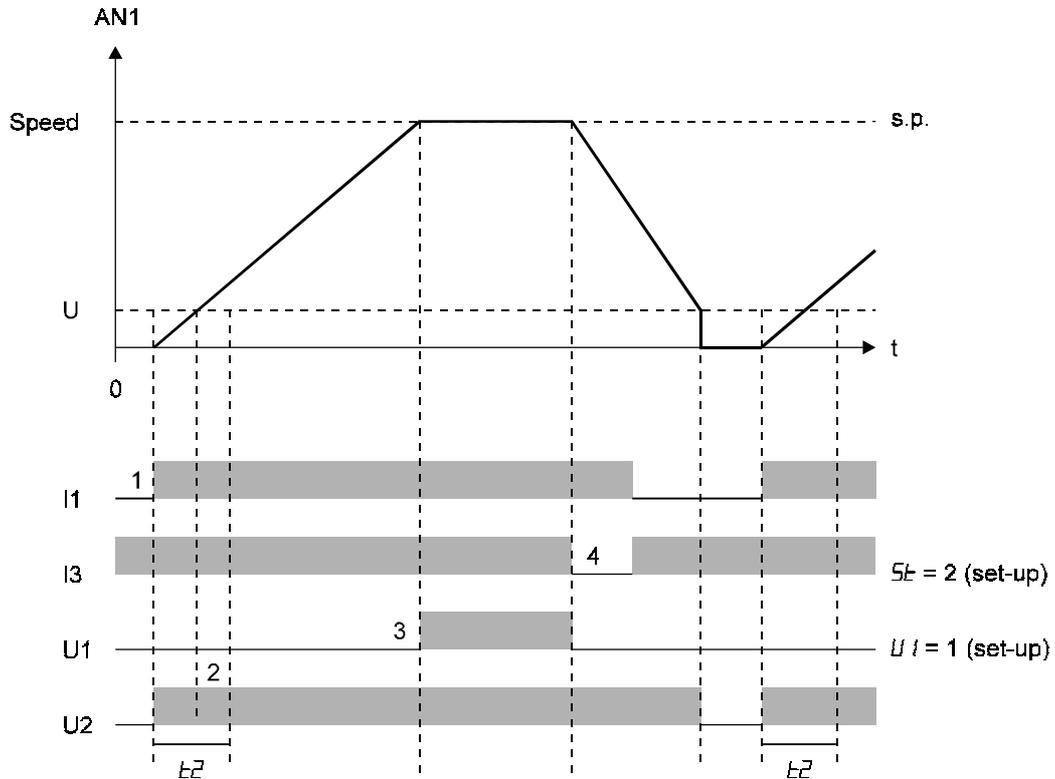
The output AN1 is proportional to the speed displayed within the limits adjusted in set-up by the parameters "nL" and "nU". The outputs U1 and U2 are in comparison with the maximum and minimum speed .

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



- 1 = Upon activation of input I1, the system accelerates in order to be positioned at the adjusted speed (s.p.).
- 2 = It is activated the timer " t_2 " which energises output U2. If upon time expiration the speed is still lower than U, the output is de-energised.
- 3 = When the speed of the system reaches the area of adjust (set-up) it is energised the output U1.
- 4 = 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 "5t" SET TO 2



- 1 = Upon activation of input I1, the system accelerates in order to be positioned at the adjusted speed (s.p.).
- 2 = It is activated the timer " t_2 " which energises output U2. If upon time expiration the speed is still lower than U, the output is de-energised.
- 3 = When the speed of the system reaches the area of adjust (set-up) it is energised the output U1.
- 4 = 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 2

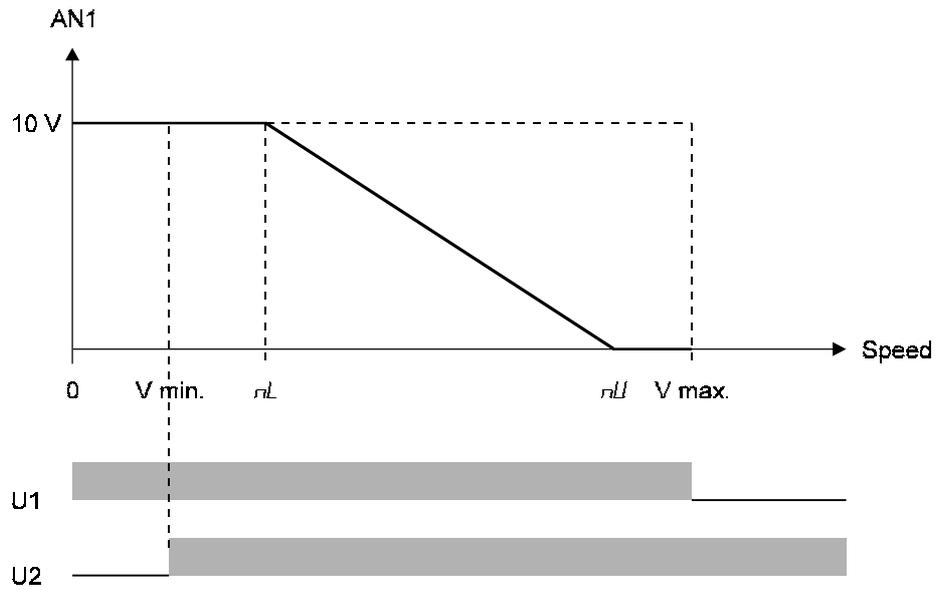
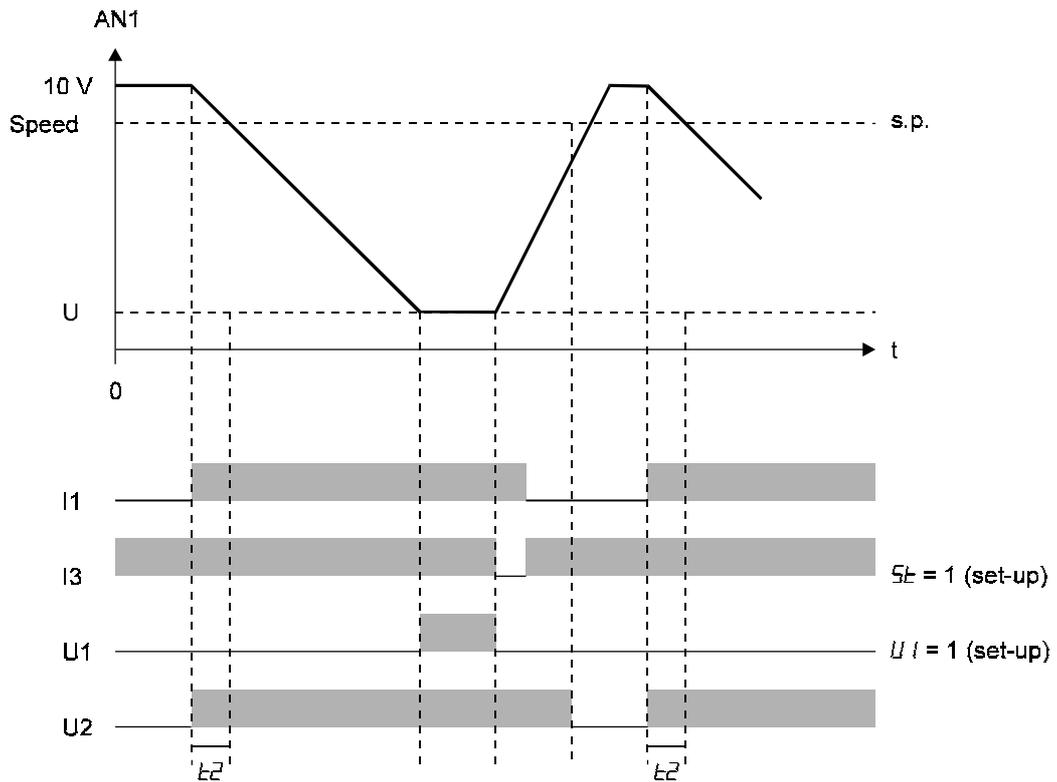
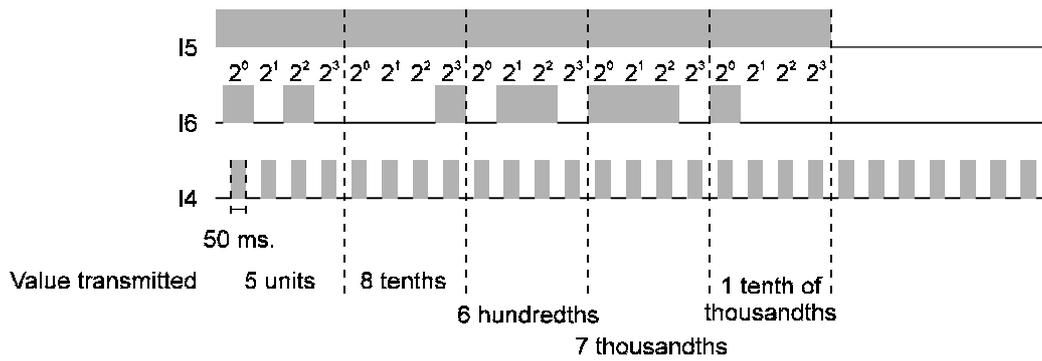


DIAGRAM OF OPERATION WITH PARAMETER OF SET-UP "P" SET TO 3 AND "St" SET TO 1



TRANSMISSION SPEED WITH PARAMETER OF SET-UP "LE" SET TO 2



Value of speed transmitted = 17685

Minimum time of transmission speed = 2 seconds

Minimum time of transmission of table number = 0.4 seconds

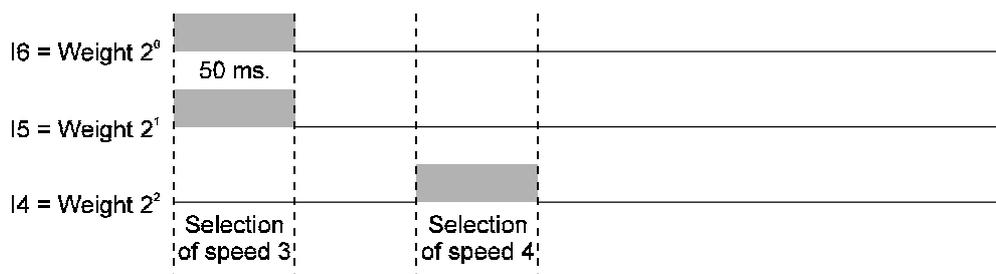
The transmission of the speed or of the table to the instrument, may be made if there is the expansion of the inputs and of the outputs (ordering code "E").

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" SET TO 1



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



CHAPTER 5

ASSISTANCE

Diagnostic of inputs and outputs

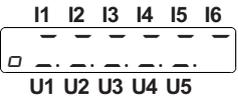
*Instructions on How to Fill Up the Technical Assistance
Fax*

Guarantee

5 - 1 DIAGNOSTICA INPUTS E 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