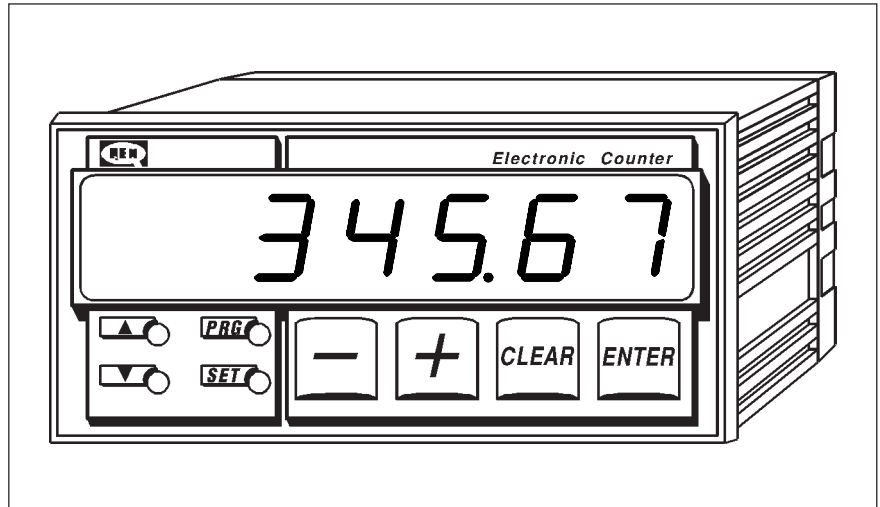




SPEED VISUALIZER WHICH IS DIRECTLY OR INVERSELY PROPORTIONAL TO THE READING FREQUENCY WITH PROGRAMMABLE ALARM OUTLETS

HM 207.02

- *DIN Dimensions 48 x 96*
- *Visualization with 6 decimal or sexagesimal figures*
- *EEPROM memory*
- *Anti-scratch feedback keyboard*
- *Removeable polarised keyboard*
- *Programmable timed outputs*
- *Programmable cutting frequency (immunity to disturbances)*
- *Customised software*



DESCRIPTION OF HOW THE INSTRUMENT WORKS

The instrument HM 207.02 visualizes the speed of a system which sends an ON / OFF signal which reads its own speed (Fmin. 0,001 Hz, Fmax. 9999 Hz). The speed read is compared with the alarm set-points fixed for the minimum and maximum speeds and the programmed corresponding outlets are activated. It is possible to visualize a decimal or sexagesimal value which is directly or inversely proportional to the input frequency. The











keyboard, which is in anti-scratch polycarbonate, is realised with mechanical actuators which give the operator the tactile sense of pressing the keys (feedback keyboard). The counting function, the preselections and the working parameters are memorized on the EEPROM memory to guarantee maximum reliability and safety even when working at capacity.



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.

DESCRIPTION OF KEYBOARD

	Green	Confirms data introduction When pressed for 2 seconds, it makes it possible to programme the speed thresholds. Pressed together with the (-) key + PASSWORD it is possible to get entry to the SET-UP parameters.
	Red	During data introduction, it puts the data visualized back to zero. When pressed for 2 seconds during normal functioning, it cancels the activation of the U1 or U2 outputs.
	Black	During data introduction, it increases the figure selected (the one flashing) either impulsively or continuously. When pressed during normal functioning, it visualizes the input and output states.
	Black	During data introduction move the figure selection towards the right Pressed together with the ENTER key + PASSWORD it is possible to get entry to the SET-UP parameters.
	Led prg	On during the programming of the SET-UP parameters
	Led set	Not used
	Led	On when the Vmin limit reading is reached.
	Led	On when the Vmax limit reading is reached.
	Led lcf	Not used
		

DESCRIZIONE DEGLI INGRESSI

Name	Signal	Input activation	Description
I1	C	ON	TACHOMETER ENABLING. When L1=1 (SET-UP) and the input I1=ON, the tachometer is enabled. When the input I1=OFF the visualization is forced to zero and the outputs are disabled. When L1=0 the tachometer is still enabled and when the input I1=OFF, the outputs are disabled
I2	I	ON	CLOCK. Transducer speed reading input signal (encoder signal or proximity). Maximum frequency 9999 Hz
I3	C	ON	OUTPUT RESET. It resets the state of the outputs U1 e U2 if they are programmed with autohold

I=Impulsive input C=Continuous input






DESCRIPTION OF THE OUTPUTS

Name	Signal	Duration	Descrizione
U1	C	/	U1. Its functioning depends on the type of programming set up in the P parameter SET-UP
U2	C	/	U2. Its functioning depends on the type of programming set up in the S parameter SET-UP


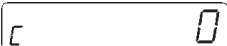
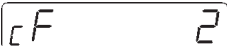

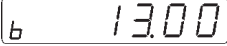
I=Impulsive output C=Continuous output

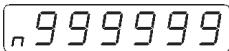
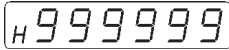
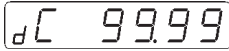
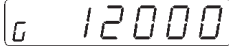
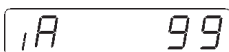


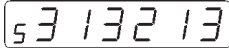
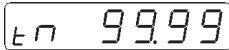

INTRODUCTION OF THE SET-UP PARAMETERS


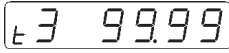
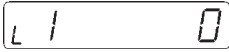

To get to the programming of the following parameters it is necessary to introduce a 3-figure code as follows:

- Simultaneously press the keys  +  for 1 second
- On the display appears:  This is the request for the access code
- Introduce the value 207 with the keys (+) and (-) and confirm with  ; the led  lights up

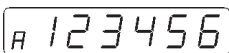
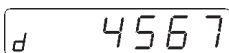
(At the end of the introduction of every function press **ENTER** to confirm and move on to the next one)

FUNCTION	DISPLAY	DESCRIPTION
Functioning of the instrument		<p>0=The visualizer is directly proportional to the input frequency (I2). Vis.=F x K</p> <p>1=The visualizer is inversely proportional to the input frequency (I2). Vis.= (1 / F) x K</p>
Speed visualization in decimal figures		<p>0=Maximum visualization 999999</p> <p>1=Maximum visualization</p> <p>2=Maximum visualization 9999,99</p> <p>3=Maximum visualization 999,999</p> <p>4=Maximum visualization 99,59,59 (hours, minutes, seconds)</p> <p>5=Maximum visualization 9999,59 (hours, minutes, seconds)</p> <p>N.B. When C=4 or 5 any following data introductions are in sexagesimal figures</p>
Frequency in decimal figures		<p>2=It is possible to introduce a frequency value to a hundredth of a Hz. It is used with a reading frequency comprised between 100.00 e 9999.00 Hz</p> <p>3=It is possible to introduce a frequency value to a thousandth of a Hz. It is used with a reading frequency comprised between 99 e 0,001 Hz</p>
Maximum frequency		<p>This is the max. frequency which the transducer transmits when the system is at maximum speed (max. 9999 Hz, min. 0,001 Hz)</p> <p>When E=0, this is the maximum frequency over which the display visualizes the value n (SET-UP)</p> <p>When E=1, this is the maximum frequency over which the display visualizes the value H (SET-UP)</p>
Minimum frequency		<p>This is the minimum frequency that one wants to read</p> <p>When E=0, this is the minimum frequency under which the display visualizes the value H (SET-UP)</p> <p>when E=1, this is the minimum frequency under which the display visualizes the value n (SET-UP)</p>

FUNCTION	DISPLAY	DESCRIPTION
Maximum visualization		When E =0, the instrument visualizes the maximum frequency value When E =1, the instrument visualizes the minimum frequency value When C =4, the instrument is set up in hours, minutes and seconds When C =5, the instrument is set up in hours, minutes and seconds
Minimum visualization		When E =0, the instrument visualizes the minimum frequency value. This value must be $\leq (V_{max} \times F_{min} / F_{max})$ When E =1, the instrument visualizes the maximum frequency value. When C =4 the instrument is set up in hours, minutes and seconds When C =5 the instrument is set up in hours, minutes and seconds
Duty cycle		This is the clock input enabling percentage, in relation to the signal period. $dc = t_{ON} \times F_{max} \times 100$ tON =Time in seconds of input I2 enabling
Cutting frequency		This is the cutting frequency of the clock input, beyond which no measurement is taken. This value has to be at that of maximum frequency (usually at least 5% more). With CF =2 $G_{max} = 15000.0$ With CF =3 $G_{max} = 9999.99$
Average no. of readings in the data acquisition stage		This indicates after how many readings the speed of visualization is calculated (tachometer). N.B. The higher the number of readings, the slower the speed up-dating time.
Average no. of readings in the data stabilization stage		This indicates after how many readings in stabilization the speed to be visualized is calculated if the reading variations are inferior to $\pm 2,5\%$ of the maximum speed
Functioning of output U1		Every pair of numbers identifies the type of setting (first number) and the dependence of the output U1 band (see paragraph on "Programming outputs")
Functioning of output U2		Every pair of numbers identifies the type of setting (first number) and the dependence of the output U2 band (see paragraph on "Programming outputs")
Initial timer		It is a time, expressed in seconds, which is enabled when the input I1 becomes ON. If the dependence on this timer (4) is introduced during the programming of the output functioning, while the timer is active, the output is forced to the opposite level of that of comparison.
Band 1 (Hd) timer		It is the delay time, expressed in seconds, of comparison of the band (Hd), when the reading enters it. It is used to delay the commutation of the programmed output level.

FUNCTION	DISPLAY	DESCRIPTION
Band 2 (dA) timer		It is the delay time, expressed in seconds, of comparison of the band (dA), when the reading enters it. It is used to delay the commutation of the programmed output level.
Band 3 (An) timer		It is the delay time, expressed in seconds, of comparison of the band (An), when the reading enters it. It is used to delay the commutation of the programmed output level.
Functioning choice I1		0 =L The speed visualization is always enabled 1 =The speed visualization is enabled only when input I1=ON
Enabling of threshold programming		0 =The programming of the alarm thresholds A and d is enabled only in SET-UP 1 =The programming of the alarm threshold A is enabled only via the keyboard, with the ENTER key while the alarm threshold d is enabled only in SET-UP 2 =The programming of the alarm threshold A is enabled only in SET-UP while the alarm threshold d is enabled only via the keyboard 3 =The programming of the alarm thresholds A and d is enabled only with the ENTER key

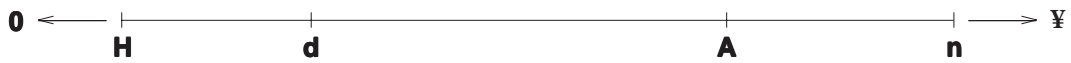
With the parameter "Enabling of threshold programming" "0 one or both the visualizations are present

Maximum speed threshold		This is the maximum speed threshold, used for the comparison of the outputs U1 and U2
Minimum speed threshold		This is the minimum speed threshold, used for the comparison of the outputs U1 and U2

Having finished programming the last function the visualization in use before moving into SET-UP returns and the led prg goes off

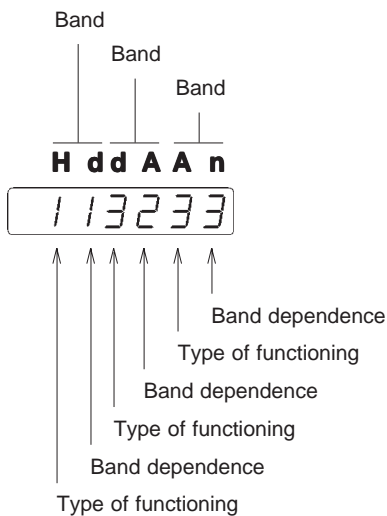
PROGRAMMING OF THE OUTPUTS

The parameters **P** and **S** in SET-UP make it possible to programme the type of functioning of the outputs U1 and U2 within the visualization bands determined by the maximum and minimum visualizations (**H** and **n**) and by the alarm thresholds (**d** and **A**); in this way the visualization variation field becomes:



3 work bands are identified: **Hd**, **dA**, **An**, and at each band it is possible to programme a different setting of the outputs U1 and U2. It is also possible to enable the functioning of an output within a band, but only when the visualization has already effected another band ("band dependence"). This latter type of functioning makes it possible to enable a specific functioning of the outputs when, after the instrument is turned on, the visualization is stabilized; for example, it is possible to programme the functioning of the instrument so that the output U1 is not enabled in the **Hd** band, until the visualization has reached the **dA** band.

The programming parameters P and S have been structured in this way:



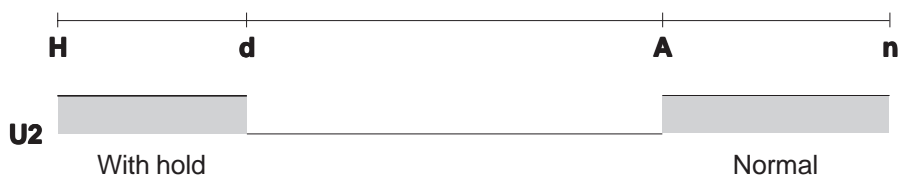
Type of functioning

- 1 Enables
- 2 Enables with hold (re-settable with **CLEAR** key or with the input I3)
- 3 Disenables
- 4 Disenables with hold (re-settable with **CLEAR** key or with the input I3)

Dependence on the band

- 1 Band from **H** to **d**
- 2 Band from **d** to **A**
- 3 Band from **A** to **n**
- 4 Dependence on initial timer (with input I1 enabled)
- 5 Dependence on its own band with timers 1, 2, 3

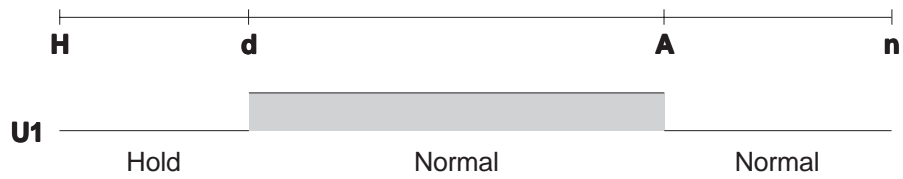
Example:



If one wants to programme the output U2 as a graph, the comparison to the activation of the **Hd** band has to be enabled after the visualization has reached the **An** band. The parameter **S** of SET-UP becomes 23 32 13. Until the visualization has reached the **An** band and remains within **Hd**, the output U2 remains OFF

PROGRAMMING OF THE OUTPUTS

Example:



If one wants to programme the output U1 as a graph, the comparison to the activation of the **Hd** band has to be enabled after the visualization has reached the **dA** band. The parameter **P** of SET-UP becomes 42 12 33. Until the visualization has reached the **dA** band and remains within **Hd**, the output U1 remains OFF and without hold

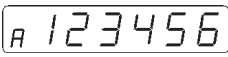
N.B. It is possible to delay the output commutation times by using the band timers (SET-UP)

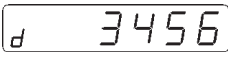
PROGRAMMING OF THE ALARM THRESHOLDS


To carry out the programming of the alarm thresholds, proceed as follows:

The parameters in SET-UP **A** (maximum speed threshold) and **d** (minimum speed threshold) have to be =1

Press the key  for 2 seconds; the display will visualize:

 The operator can introduce the maximum speed threshold through the keys (+) e (-). After confirming with **ENTER**, the display will visualize:

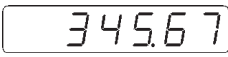
 The operator can introduce the minimum speed threshold through the keys (+) e (-). After confirming with **ENTER**, if the minimum threshold is less than the maximum one, the display will start showing the visualizations in use again, otherwise the display will visualize for one second:


 The instrument repropose the programming of both the thresholds.

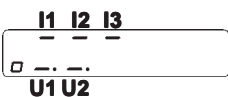
N.B. The thresholds determine 3 types of band for the programming of the outputs U1 e U2

VISUALIZATIONS

During normal functioning the display will visualize:

 Speed read

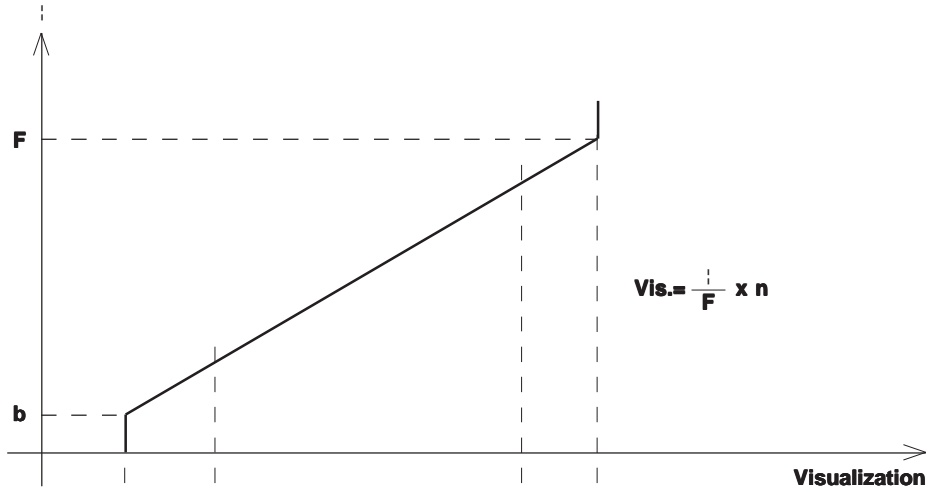
Press the key  and the display will visualize:

 The display will visualize the state of the inputs and the outputs. The lit led _ indicates the activation of the input and the output

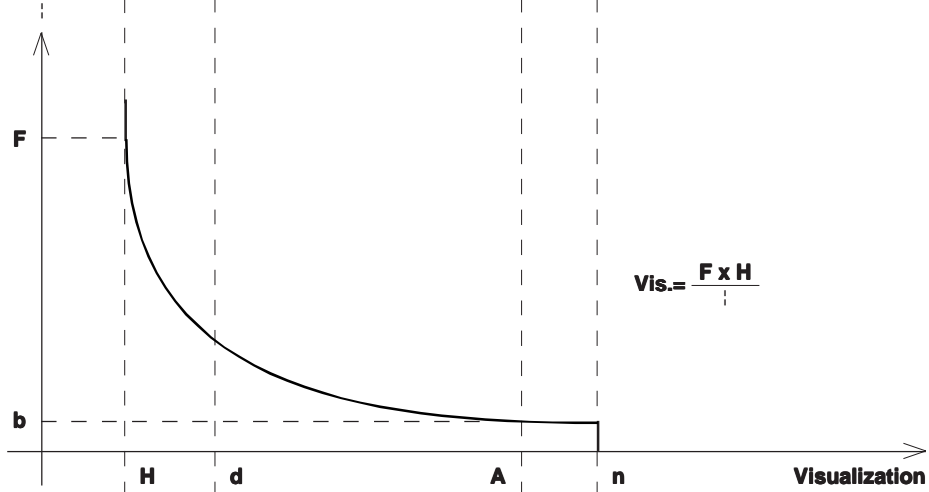
Press the key , and the display will show the speed read again.

GRAPHS OF FUNCTIONING

E=0 (SET-UP)



E=1 (SET-UP)



P=113233



S=313214



P=311213



S=313223



P=113433



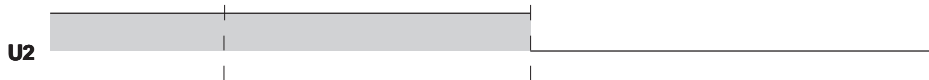
S=111233



P=312223

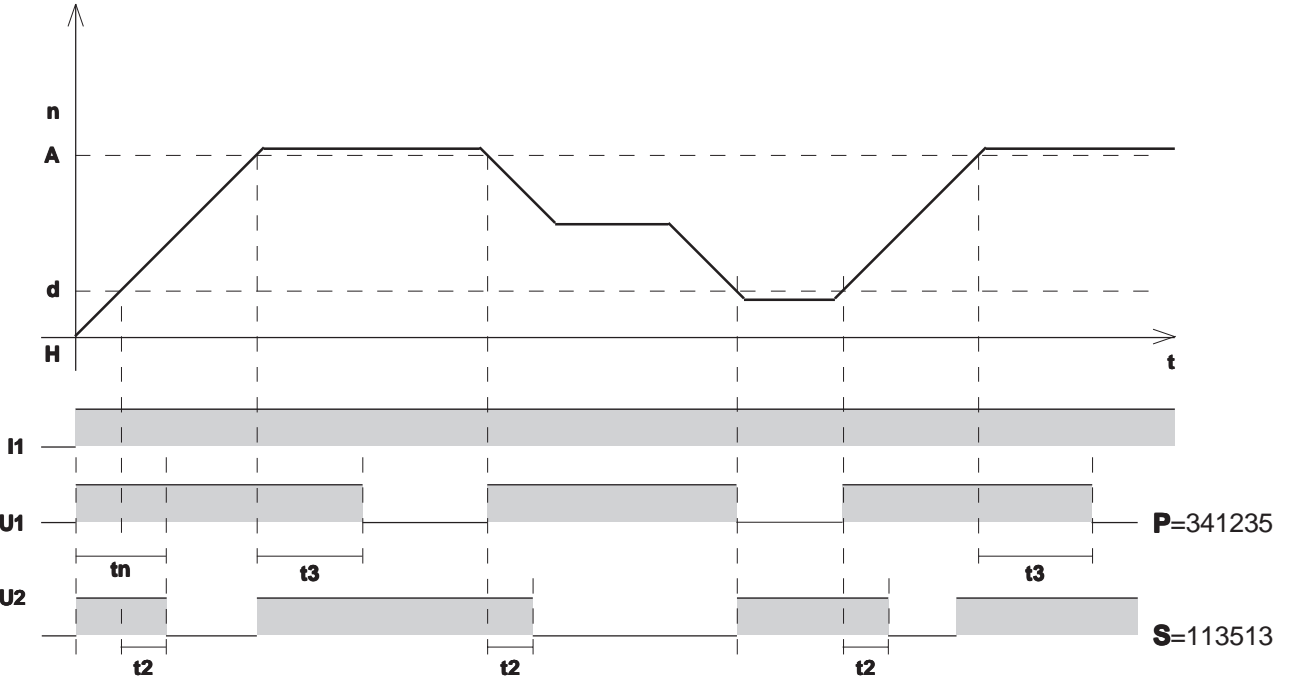


S=212233





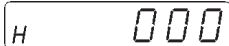

GRAPHS OF FUNCTIONING WITH PROGRAMMED TIMERS


Visualization




THOMETER CALIBRATION

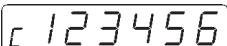
For ease of installation, at the introduction of the SET-UP values which determine the speed visualization, it is possible to visualize the frequency meter (Hz) and the total number of clock impulses by acting as follows:


- Simultaneously press the keys  +  for about 1 second
- On the display appears  This is the request for the access code
- Introduce the value 456 with the keys (+) e (-) & confirm with  ; the display will visualize:


 Frequency meter

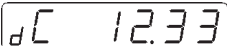
By keeping the key down  , a frequency visualization filter is introduced


By pressing the key  the display will visualize:


 Clock impulses (the counter will go back to zero whenever the tachometer calibration function is selected)


To put the counter back to zero, press the  key

By pressing the key  , the display will visualize:

 Duty cycle of the clock signal (max. 99.99%)

By pressing the key  , the display will go back to visualizing:

 Frequency meter

To exit, press the key 

To get a correct visualization (with **E**=0 and **C** comprised between 0 and 3) it is necessary to define the max. frequency parameters, max. frequency visualization, and the duty cycle. To determine the maximum frequency (impulses to the second) that the transducer is producing it is sufficient to bring the transducer to max. speed and, in the tachometer calibration function, (key-)+(ENTER)+(Password 456), read the frequency that the instrument visualizes. This value will be introduced in the SET-UP function in the "Max. frequency" parameter. At this frequency the value to be visualized will be calculated. It is therefore necessary to determine the value in engineering units of each clock impulse. This information may already be known to the installer, or it must be experimentally calculated. To do this, it is necessary to go back to the tachometer calibration function, make the system turn and this will move the actuating organs, up to a measurement known to the installer (e.g. 1 mt, 10 mt, 100 mm, etc. ecc.) and the number of clock impulses read by the instrument.

N° misure= Max. f. / N° impulses read

Vis. max.=N° measurements x known measurement

The value of the Max. vis. calculated should be introduced in the corresponding SET-UP parameter, adapting it to the unit of time used.

N.B. The value calculated must be adapted to the number of decimal figures which have to be visualized.

E.g. Max. f.=1638,4 Hz

At 100 mm. the measurement acquired is equal to 200 impulses, thus $1638,4 / 200 = 8,192$ (n° measurements / sec.)
In the space of a second the system covers $8,192 \times 100 = 819,2$ mm. / sec.

The value to introduce in the set-up function at max. visualization can be transformed into:

mm. / minute=49152

mt. / second=0,8192

mts. / minute=49,152

N.B. If the system is approaching a speed of 0,2 meters / second (real speed), the input frequency will be :

(Max.f. / Max vis. .) x Real vis. = $(1638,4 / 0,8192) \times 0,2 = 400$ Hz

TACHOMETER CALIBRATION

The value of the minimum frequency and the minimum speed to be introduced into the SET-UP parameters should be determined by considering the reading range to be obtained. With a maximum frequency of 1000 Hz and a max. vis. of 750, a range of 950 Hz can be sufficient. The minimum frequency and the minimum visualization will be:

F. min=F. max.-range=1000-950=50 Hz

Min. vis. =(Vis. max. x F. min.) / F. max.=(750 x 50) / 1000=37,5

N.B. In the "Minimum visualization" parameter in SET-UP it is possible to introduce a value between 37,5 and 0. The " Minimum frequency" and "Minimum visualization" parameters only put pressure on the visualization.

For a correct visualization with the parameter **E=1** (SET-UP), it is necessary to define the maximum frequency parameters and maximum frequency visualization (minimum visualization). To determine the maximum frequency of the transducer impulses it is enough to read the frequency displayed on the instrument at maximum speed and in tachometer calibration (key) + (ENTER) +(Password 456). This value will be introduced in SET-UP in the "maximum frequency" parameter. To determine the value to introduce on the minimum visualization, it is important to know how much time is needed to **go through an engineering unit** of the system at maximum frequency. It will therefore be necessary to determine **the value in engineering units** of each clock impulse. This information can already be known to the installer, or it has to be experimentally calculated; to do this, it is necessary to go back to the tachometer calibration stage, turn the system which will then move the actuating organs until a value known to the installer is reached (e.g. 1 mt., 10 mt., 100 mt., etc.) so that the number of clock impulses read by the instrument can be determined.

K=N° of impulses read / Unit of measurement known

The value K calculated, divided by the frequency read on the instrument determines the time necessary to go through the known measurement.

Known measurement time=K / F

The known measurement time, multiplied by the total distance on which the minimum visualization is calculated, determines the value of the latter, to be introduced in the SET-UP function.

Esempio: There is an oven 10,35 meters' long, with a conveyor belt that transports the material. There is a sensor that sends a maximum frequency read on the instrument of 35 Hz. In a known measurement (1 mt.) the instrument reads 460 impulses.

K=460 / 1,00=460

460 / 35 =13,14 sec. (time to cover 1 mt.)

The total time to cover the entire length of the oven is given by:

(Time x 1 mt.) length of oven = 13,14 x 10,35=136 sec.

If the organisation of the decimal figures = 4 (hours,minutes,seconds),the "Minimum visualization " value will be 00,02,16

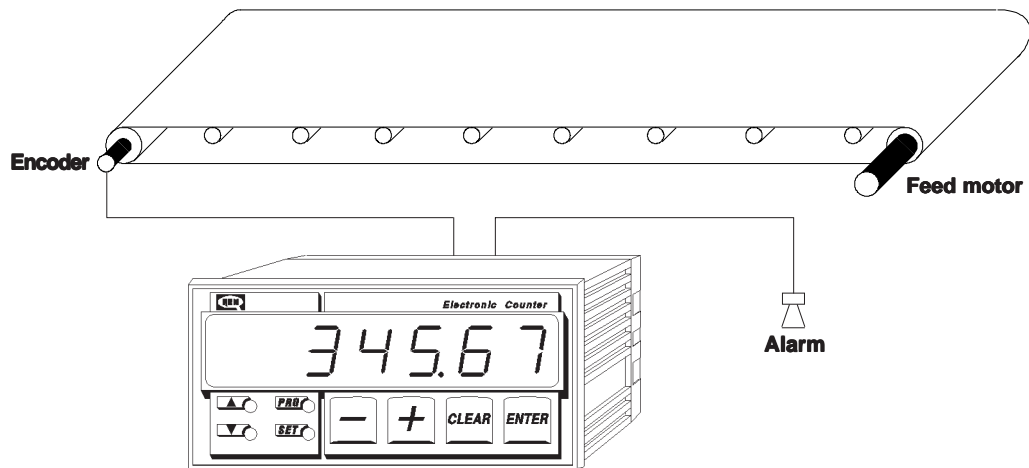
If the organisation of the decimal figures = 5 (hours,minutes,seconds),the "Minimum visualization " value will be 0002,16

If the organisation of the decimal figures = 0 (hours,minutes,seconds),the "Minimum visualization " value will be 000136

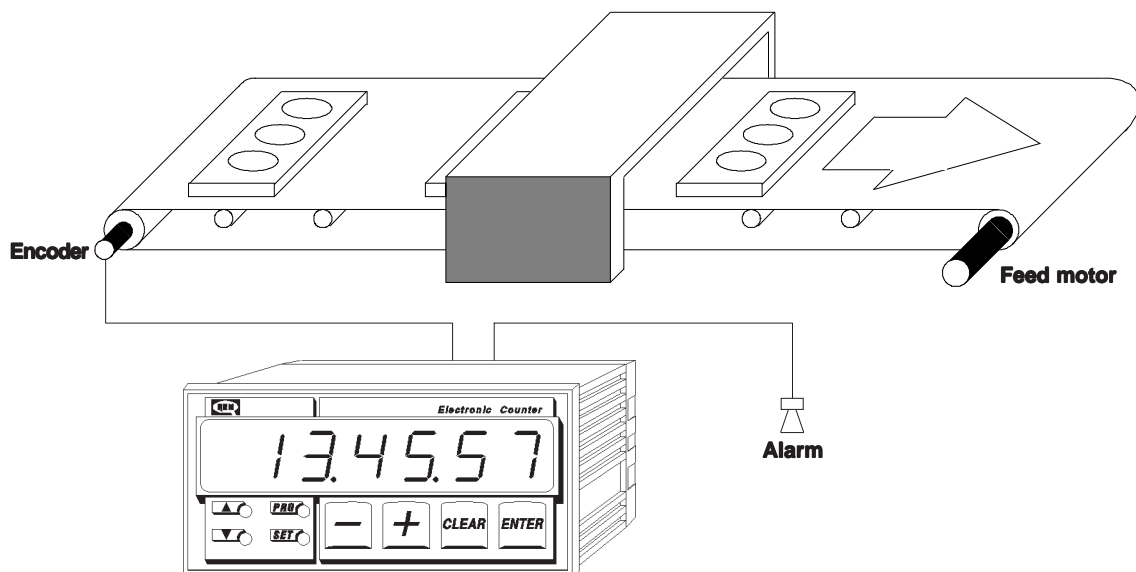
Thus in SET-UP it is necessary to introduce the minimum visualization and the maximum frequency (35 Hz).The " Minimum frequency" and "Minimum visualization" parameters only put pressure on the visualization.

With the parameter " Decimal figure visualization speed"=0 the transducer sends out 20 Hz and the display visualizes 238

APPLICAZIONI



N.B. With functioning method **E=0**, the instrument visualizes the **speed plug**



N.B. With functioning method **E=1**, the instrument visualizes the product cooking speed which is inversely proportional to the input speed

INPUTS AND OUTPUTS ELECTRICAL CONNECTIONS

1	+	Transducers positive supply 12 V 100 mA
2	-	Transducers positive supply
3	P1	Input polarization terminal board I1÷I4 (+ NPN, - PNP)
4	I1	(C) Tachometer enabling
5	I2	(I) Clock
6	I3	(I) Output reset
7	I4	Not used
8	C1	Output polarization terminal board U1-U2 (+ PNP, - NPN)
9	U1	(C) Output U1
10	U2	(C) Output U2
11	GND	Earth (a conductor of ϕ 4 mm is advisable.)
12	XXX	Supply voltage Vac \pm 15% 50 / 60 Hz
13	XXX	Supply voltage Vac \pm 15% 50 / 60 Hz
14	P2	Input polarization terminal board I5-I6 (+ NPN, - PNP)
15	I5	Not used
16	I6	Not used
17	C2	Output polarization terminal board U3, U4, U5 (+ PNP, - NPN)
18	U3	Not used
19	U4	Not used
20	U5	Not used
21	GND	Door of the analogue exits
22	AN1	Not used
23	AN2	Not used
24	GND	Door of the serial gate
25	RX	Not used
26	TX	Not used

GENERAL CHARACTERISTICS OF ELECTRICAL CONNECTIONS

INPUTS

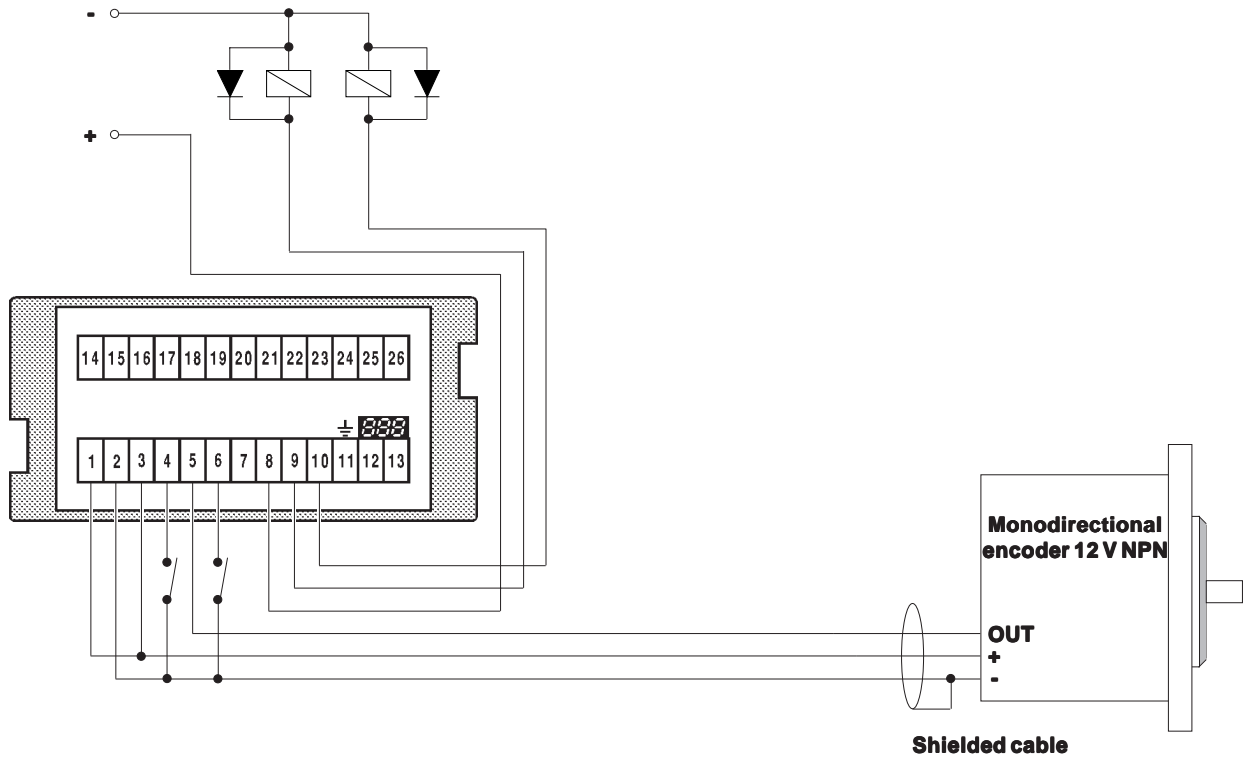
Every ON/OFF input is universal, optoinsulated and can receive digital signals both in NPN and PNP logics. By connecting the terminal boards P1 and P2 to + all the inputs will accept NPN-type signals, that is, with closure towards negative supply voltage. By connecting the terminal boards P1 and P2 to - all the inputs become the PNP type, that is, with closure towards positive supply voltage. Every input is protected against short circuiting in both supply poles, so that the instrument is practically indestructible. Several inputs with the same logic can be parallel connected, if the output which is controlling them is able to withstand the total current required, which is equal to the number of the inputs connected together and multiplied by 10 mA.

OUTPUTS

The dc outputs are optoinsulated in continuous current and all have a terminal in common (C1, C2). By connecting this terminal to a positive voltage + all the outputs become the PNP type, and by connecting it to a minus voltage - they become the NPN type. The maximum continuous voltage applicable is of 50 V. The outputs are able to withstand currents up to 70 mA with a typical voltage drop of 3,5 V between the output and the door. With the dc outputs, relays of 24 Vac can also be controlled.

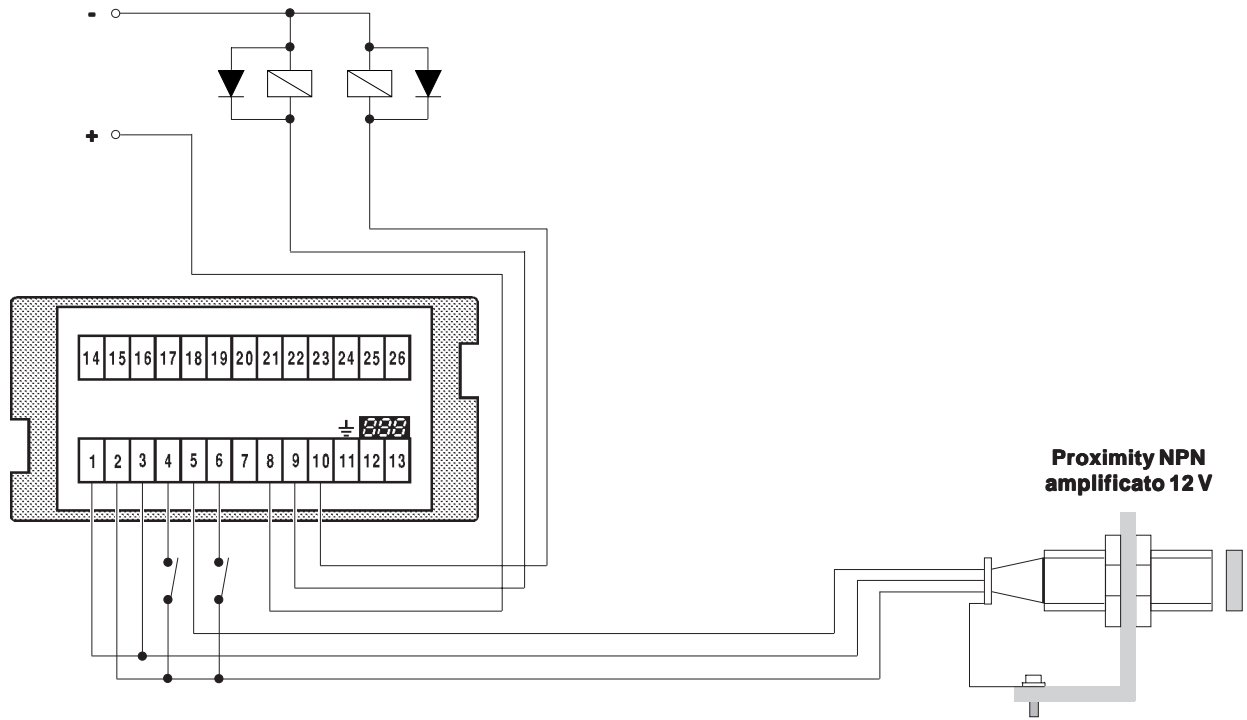
CONNECTION DIAGRAM

FIG. 1: Connection of a HM 207.02 with a relay in continuous current and **NPN** inputs



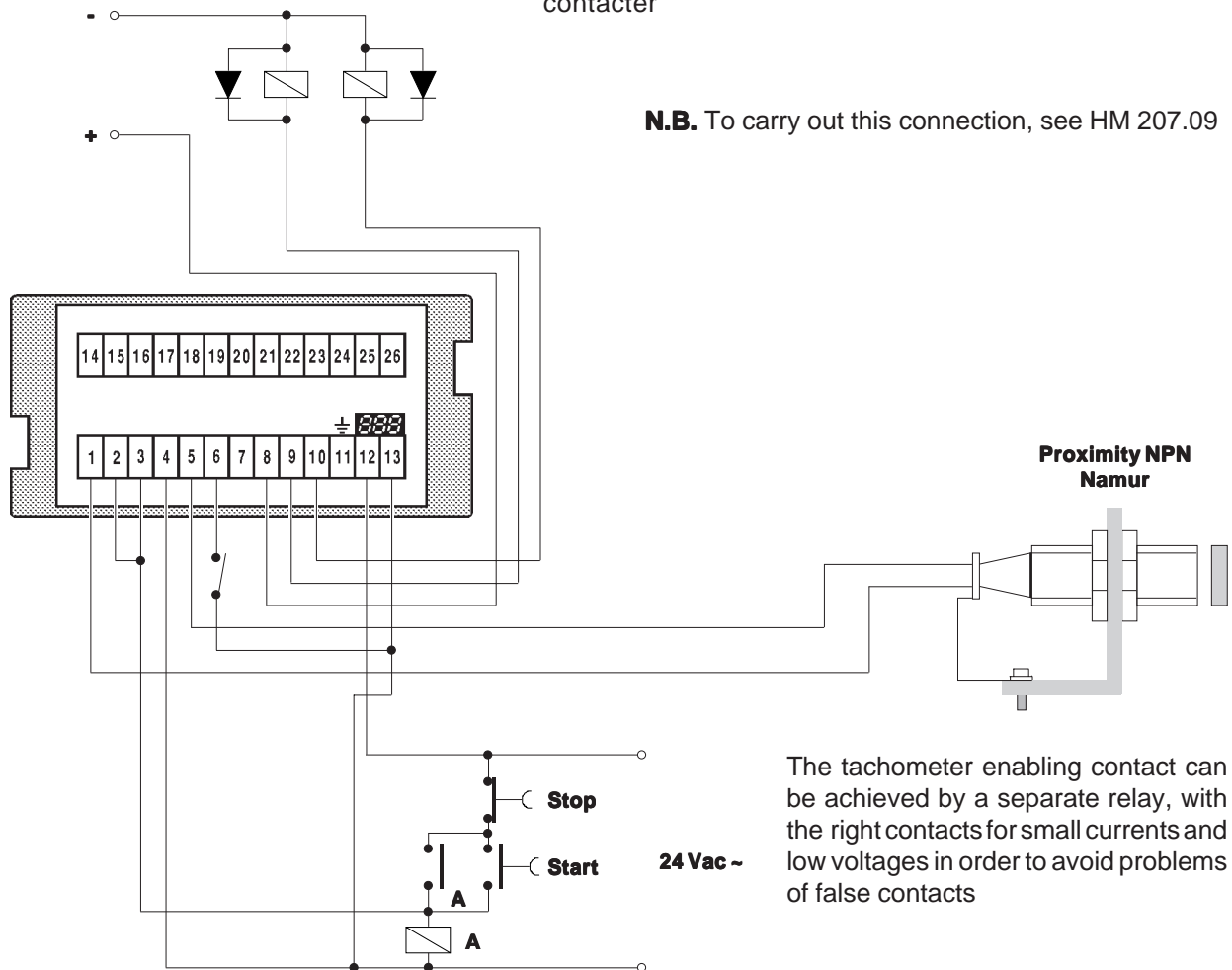
CONNECTION SYSTEM

FIG. 2: Connection with a HM 207.02 with a relay in continuous current and **NPN** inputs



CONNECTION DIAGRAM

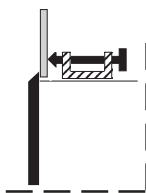
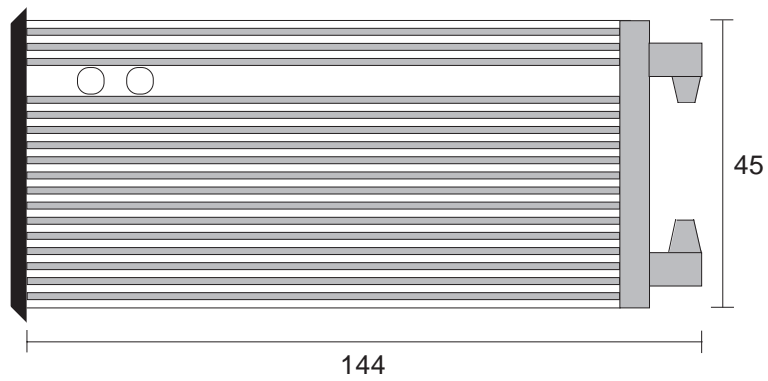
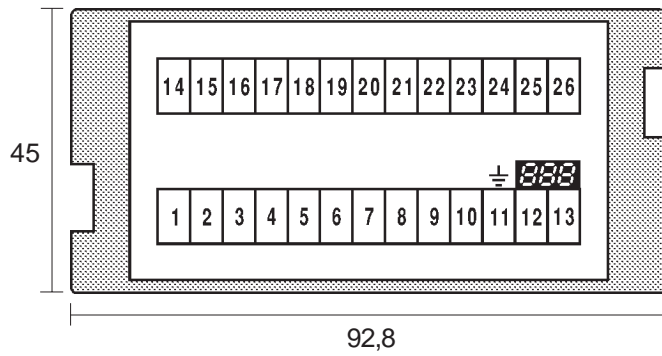
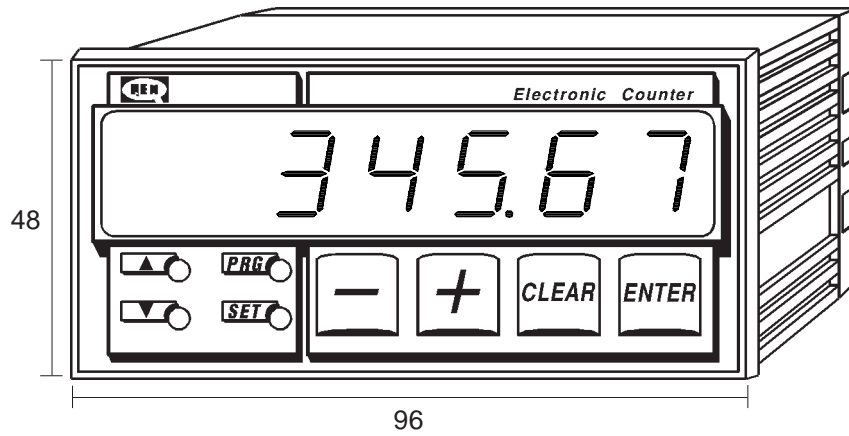
FIG. 3: HM 207.02 with the engineer Namur and tachometer enabling, conditioned to the gear of a power contactor



N.B. To carry out this connection, see HM 207.09

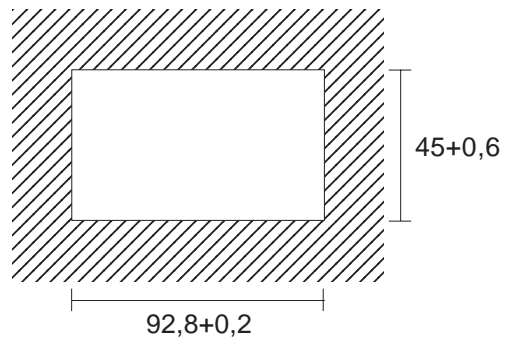
The tachometer enabling contact can be achieved by a separate relay, with the right contacts for small currents and low voltages in order to avoid problems of false contacts

DIMENSIONS



WARNING!

After having placed the pin of the hook on the panel, only give it half a turn so as not to tear the frame.



N.B. All the measurements are in millimeters.

ORDER CODE

H M 2 0 7 . 0 2 / T / 110

Supply voltage: 24=24 Vac
110=110 Vac
220=220 Vac

T = Polycarbonate front panel with keyboard
P = Front panel without keyboard
PC = Front panel without keyboard but with a CLEAR button
PE = Front panel without keyboard but with an ENTER button

**The producer witholds the right to modify the characteristics of the instruments described, without previous warning
The producer denies all responsability for any damage caused by an incorrect or improper use of the instrument.**



Quality in Electronic Manufacturing  **Data 18/03/93 Technical sheet M207H02.3**

**QEM s.n.c.-Località Signolo SS. 11 Montebello Vicentino (VI)-Italy
Tel. 0444-440061 (3 linee r.a.)-Telefax 0444-440229**