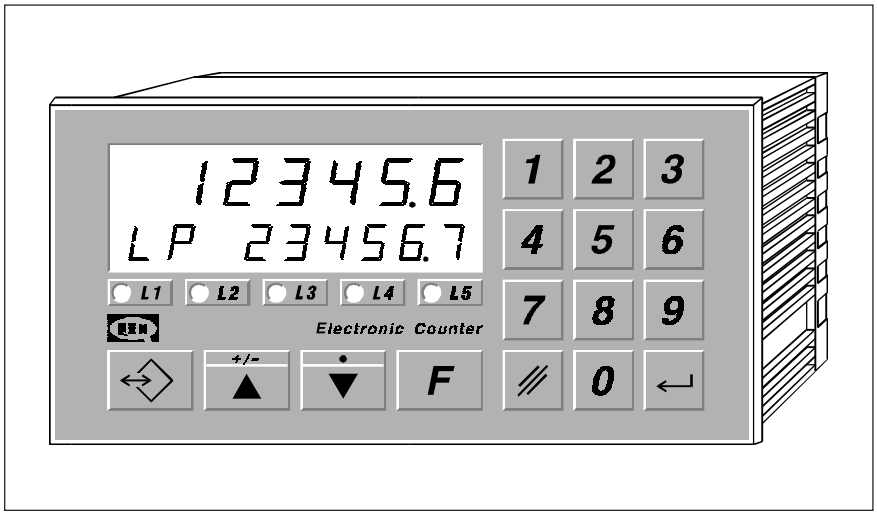
BI-DIRECTIONAL MEASURING DEVICE FOR N-REPEATABLE DIMENSIONS.

HB 548.31

- *Dimensions DIN 72 × 144.*
- *Encoder resolution multiplier.*
- *Keyboard with scratch-proof membrane.*
- *Incorporated encoder power supply unit.*
- *Static AC/DC outputs.*
- *Non-volatile memory.*



OPERATION DESCRIPTION

The HB 548.31 is a measuring device for n-repeatable dimensions that can be set up for a maximum of 9 work programs able to contain 80 steps overall. The compilation of the work programs is also possible during machine operation and the cutting blade thickness can be corrected at any moment recalling the set value by pressing the appropriate key. The parameters that determine the function mode are accessible only to the installer due to the necessity to enter an access code that enables the program. During normal operation by pressing the arrow keys, it is possible to see in sequence all the figures regarding the execution of the cutting program. The scratch-proof polycarbonate keyboard is provided with mechanical actuators that give the operator a tactile sense of the key operation. The calculations, the pre-selections and the operating parameters are memorized on a non-volatile memory to guarantee maximum operational reliability and safety also under limited conditions.

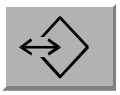
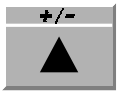
CE

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 fromthe fulfilment of his or her legal obligations regarding the finished product.

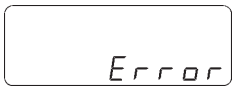
The catalogue describes the method for using the product and is not limited to the instrument operation.

KEYBOARD DESCRIPTION

1 ÷ 9	Used for data entry. Pressed together with key **F** select the functions described on page 4.
	**MENU key.** Used to enter work programs.
	If pressed displays the preceeding window. Inserts or cancels the **+ / -** symbol on data entry.
	If pressed displays the subsequent window. Inserts the decimal point on data entry.
F	Enables the selection of functions indicated on page 4.
	**CLEAR key.** Resets the value given on data entry and recalls the old value. Pressed and held for a second it resets the counter.
	**ENTER key.** Confirms the data entered.
	Lights up during programming of work programs.
	Lights up when counter reverse is operating.
	Lights up in tolerance.
	Lights up at the end of work being executed.
	Lights up during the selection of one of the functions on page 4.

ERROR MESSAGE

If, while entering any data, the operator enters a value not included within the acceptable limits, the display shows the following message, for one second:



On completing the error message display time, the screen returns to show the data to enter, recalling the old value.

DESCRIPTION OF INPUTS				
terminal No.	Name	Signal	Input activation	Description
17	I1	I	ON	**COUNT RESET.** Upon activation resets the counter.
18	I2	I	ON	**RESTART.** Upon activation, resets the counter and starts the first step of the program.
19	I3	I	ON	**PIECE COUNTER INCREASE.** Upon activation increases the piece counter.
20	I4	I	ON	**PIECE COUNTER RESET.** Resets the piece counter.
21	I5	C	ON	**PROGRAMMABLE INPUT.** Reverses the increase of the counter if the set-up parameter "Input operation selection 15" = 0. If the set-up parameter "Input operation selection 15" =1, its activation enables the count reading.
22	I6	I	ON	**PROGRAM REPETITION.** Upon activation repeats the current program.
15	Z	I	ON	**PRE-SET LOADING.** Upon activation loads the set value in the count of the set-up parameter "Set-up dimension".
I=Pulse input **C**=Continuous input				

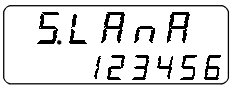
DESCRIPTION OF OUTPUTS				
terminal No.	Name	Signal	Duration	Description
7	U1	C	/	**SLOWING.** Activates upon reaching the measurement (dimension-slowing-enertia)
8	U2	C	/	**STOP.** Activates upon reaching the measurement (dimension-enertia).
9	U3	C	/	**TOLERANCE.** Activates when the counter is between (dimension**-** tolerance-)and (dimension**+** tolerance+).
10	U4	I	300ms	**END OF STEP.** Activates for a duration of 300 milliseconds at the end of every stage of the progam.
11	U5	C	/	**END PROGRAM.** Activates at the end of the execution of the work program.
I=Impulsive output **C**=Continuous output				

DESCRIPTION OF F KEY FUNCTIONS

The operator can choose the desired functions as follows:

The operator can select by means of the numeric keyboard the desired functions. By pressing simultaneously for 1 second the key F+Nº, the display shows the function selected and the L5 LED light goes on.
The interchangeable functions are:

F for 1 second.

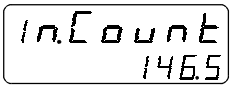


Entry function for blade thickness.

F and **1** for 1 second.

Program choice function (enabled if there more than one work program is in set-up).

F and **2** for 1 second.



Entry function for a value on the counter.

F and **6** for 1 second.

Output and input diagnostic function.

F and **0** for 1 second.

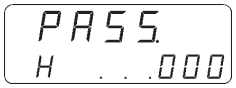
Set-up function with password.

To exit functions press again key **F** ; L5 LED light goes off and the display goes back to the current screen.

ENTERING SET-UP PARAMETERS

These parameters determine the function mode of the instrument and its access is therefore limited to the installer; to have access to programming, a password must be entered:

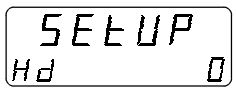
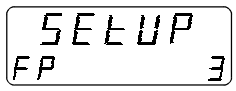
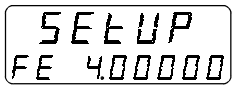
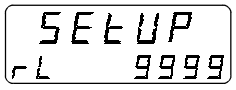
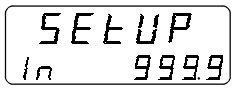
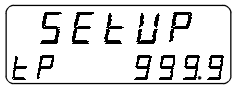
- Press key **F** and simultaneously key **0** ; L5 LED light goes on.

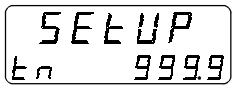
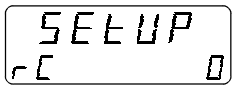
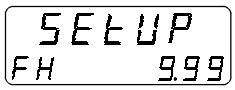
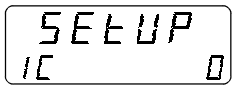
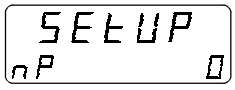
- The display shows 

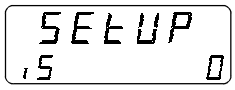
that is the request for the access code.

- Enter 548 using the numeric keys and press ↵ ; the parameters thereafter become accessible.

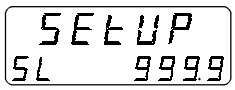
(After each function has been entered, press **ENTER** to confirm and go to the next one).

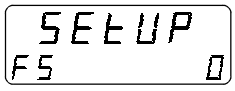
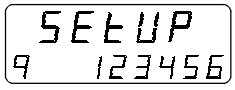
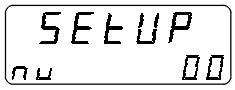
FUNCTION	DISPLAY	DESCRIPTION
Visualization mode		**0**= Normal visualization. **1**= Display with HDR-1 system (High Definition Reading) See reference paragraph on page 12. **2**= Display with HDR-1 system (High Definition Reading) See reference paragraph on page 12.
Decimal figures		Specifies the number of figures after the comma that are required to be visualized with regard to the axis measurements (max 3).
Encoder resolution		This parameter indicates how much the impulses/rev. of the encoder are multiplied to allow for the visualization of the length of the unit of measurement required. It is possible to enter values from 0.00001 to 4.00000 keeping in mind that the frequency of the PH phases must not exceed 20 Khz. The formula to calculate the resolution is as follows:: **R**= Movement achieved with the rotation of one encoderrev. (Whole No.) / No. impulses/rev. on encoder If for example there is a movement of 123.4 and an encoder of 500 imp./rev. **R**= 1234 / 500 = 2,468
Slowing		This is the slowing value that, added to the inertia, represents the distance from the arriving dimension at which point output U1 activates the slowing of the axis (max. 9999).
Inertia		This is the space covered caused by the mechanical inertia of the system from the axis (max. 999.9). This parameter has always an additonal decimal figure to that programmed in the parameter "Decimal figures" to allow for the operating of QPS (QEM POSITIONING SYSTEM).
Positive tolerance		Positive tolerance limits allow for the positioning of the axis (max. 999.9). This parameter has always an additonal decimal figure to that programmed in the parameter "Decimal figures" to allow for the operating of QPS (QEM POSITIONING SYSTEM).

FUNCTION	DISPLAY	DESCRIPTION
Negative tolerance		Negative tolerance limits allow for the positioning of the axis (max. 999.9). This parameter has always an additonal decimal figure to that programmed in the parameter "Decimal figures" to allow for the operating of QPS (QEM POSITIONING SYSTEM).
Counter reset		**0** = The count reset occurs impulsively activating the input I1 (normally-open contact). **1** = The count reset occurs continuously activating the input I1 (normally-open contact). **2** = The count reset occurs impulsively disactivating the input I1 (normally-open contact). **3** = The count reset occurs continuously disactivating the input I1 (normally-open contact). **4** = The counter reset occurs automatically at the end of the "TIMER" and impulsively activating the input I1. **5** = The count reset occurs automatically at the start of the "TIMER" (i.e. when the counter has reached the "dimension-inertia") and impulsively activating the input I1. **6** = The count reset occurs by subtraction at the end of the "TIMER" and impulsively activating the input I1. **7** = The count reset occurs by subtraction at the start of the "TIMER" (i.e. when the counter has reached the "dimension-inertia") and impulsively activating the input I1.
Timer		Timer that starts when output U2 is energized (STOP). During this time all the outputs energized remain in their current status (max.9.99 sec.).
Increase piece counter		**0** = The piece counter increases upon activation of input I3 (normally-open contact). **1** = The piece counter increases upon disactivation of input I3 (normally-open contact). **2** = The piece counter increases automatically when the counter is reset (resetting the counter using the **CLEAR** key does not increase the piece counter).
Selection of number of programs		Determines the number of programs intended for use. The total memory available is for 80 stages, and dividing this number by the number of programs that are desired to be used, therefore achieves the number of steps available for each program. **Example:** The steps remaining from the division will be added to the last program that will have in this case a dimension of 14 steps. **nP** =7 **Nº of steps per program** = 80 / 7=11 **N.B.** - On each variation of the memory configuration, the memory programmed (menu key) must be re-writtten. - Maximum number of programs = 9. - If a single program is selected it is immediately executed without needing to be recalled from function "F + 1" that is therefore disabled.

FUNCTION	DISPLAY	DESCRIPTION
Selection of blade thickness entry		**0** =Blade thickness entry is enabled using the function key "F". **1** =Blade thickness entry is enabled in set-up.

If the parameter "Selection of blade thickness entry" = 1this screen is also shown

Blade thickness		The thickness of the blade that is automatically added to the measurement (max. 999.9). This parameter has always an additonal decimal figure to that programmed in the parameter "Decimal figures" to allow for the operating of QPS (QEM POSITIONING SYSTEM).

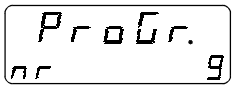
Selection of input operation I5		**0** =Upon activation of input I5 this reverses the increase direction of the counter ("Counter reversal" function). **1** = The activation of input I5 enables the counter ("Counter enabling" function).
Pre-set dimension		The dimension that is loaded onto the counter if input Z is activated (-999999 ÷ +999999).
No. of check on input Z		Determines the acquisition of input Z. Each check enters an input aquisition delay time equal to 5 milliseconds. If the value "00" is entered, the aquisition time is immediate.

To exit at any moment from the parameter set-up press key F

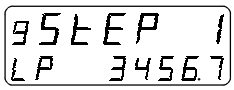
ENTERING WORK PROGRAMS

The operator can enter work programs as follows:

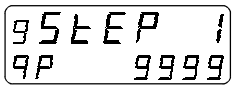
Press key  , the  LED light goes on; if the set-up parameter "Selection of number of programs">1, the display shows



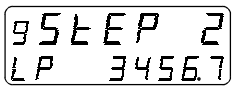
The operator can enter the number of the desired work program using the numeric keyboard. Upon confirmation by **ENTER**; the display shows:



The operator can enter the number of the first stage of the program (max. 999999, min. 0) using the numeric keyboard. Upon confirmation by **ENTER**; the display shows:



The operator can enter the number of the second step of the program (max. 9999) using the numeric keyboard. Upon confirmation by **ENTER**; the display shows:



The operator can enter the number of the second step of the program (max. 999999, min. 0) using the numeric keyboard. Upon confirmation by **ENTER**. the display shows the number of pieces entered for the second step and so on, up until the last step.

To exit at any moment from programming press key  ; the  LED light goes off and the display goes back to the current screen.

N.B. If the set-up parameter "Selection of number of programs"=1, the number of the program to be programmed is not requested, but the instrument passes automatically to the request for the dimension of the first step of the program.

It is possible to pass successively the program steps by pressing impulsively key  or 

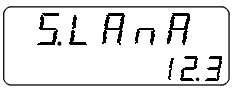
To end the execution of a program of a determined step it is sufficient to press, for one second, the key **F** at the next step, and the display shows:

Entry of the end program does not cancel the pre-selection of the step where it has been entered; and is therefore possible to retrieve it by pressing key **F**

ENTRY OF THE BLADE THICKNESS

To enter the blade thickness proceed as follows:

Press the key **F** for one second; led light turns on L5



The actual blade thickness in use is displayed. The operator can enter, with the numeric keys, the thickness of the blade used (max. 999.9). This parameter has always an additional decimal figure to that programmed in the set-up parameter "Decimal figures" to allow for the operating of QPS (QEM POSITIONING SYSTEM). Upon confirmation by **ENTER** the display goes back to the current screen.

To exit at any moment from the entry of the blade thickness, press the key **F** led L5 turns off and the the display goes back to the current screen.

PROGRAM SELECTION FOR EXECUTION

Qualified if in parameter set-up "Selection of number of programs">1.

The operator can select the number of programs to execute as follows:

Press simultaneously for one second the keys **F** & **1** led light turns on L5 ; on the display appears

The operator can enter the number of the programs selected using the numeric keys. Upon confirmation by **ENTER** the display goes back to the current screen.

To exit at any moment from the entry of the number of programs, press the key **F** led L5 turns off and the display goes back to the current screen.

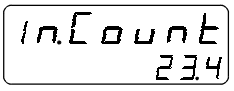
ENTRY OF A VALUE ON THE COUNTER

The operator can enter a value on the counter as follows:

Press simultaneously the keys **F** & **2** led light turns on L5 On the display appears:

The current counter is visualized flashing.

flashing



The operator can modify, using the numeric keys, the value of the counter (min.-999999 max.999999). Upon confirmation by **ENTER**; on the display appears:

flashing

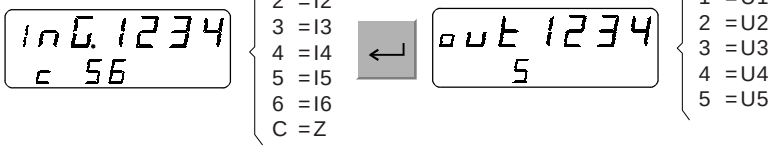
The new updated counter is visualized and the flashing stops.
N.B. If the **CLEAR** key is pressed the counter returns to flashing mode indicating that further modification of the values can be made.

To exit at any moment from the entry of a value on the counter, press the key **F** led light L5 turns off and the display goes back to the current screen.

VISUALIZATION OF INPUTS / OUTPUTS

To display the state of the input and outputs proceed as follows:

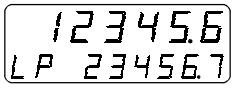
Press simultaneously the keys **F** & **6** for 1 sec.; led light turns on L5 and the display visualizes:



To exit at any moment the visualization of inputs / outputs press **F** led light L5 turns off and the display goes back to the current screen.

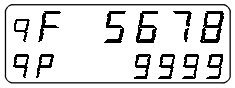
SCREENS

With keys ▲ & ▼ it is possible to display the messages in sequence.



Counter

Measurement pre-selection



Quantity executed

Quantity pre-selected

▼

If the set-up parameter "Selection of number of programs"=1, the display shows:

Current step

End of program step

If the set-up parameter "Selection of number of programs">1, the display shows:

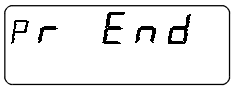
▲

Current program

Current step

End of program step

When the cycle reaches the end of the program the display shows:

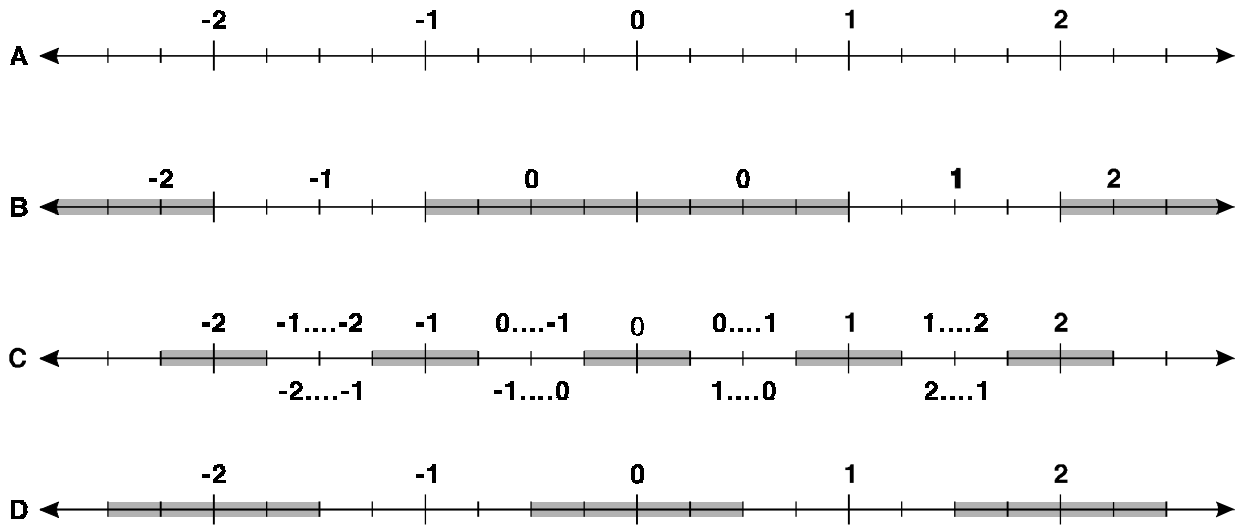


Display system with HDR=1 (High definition reading).

This system allows for the display of the running of a bi-directional counter with a higher definition with respect to that of the traditional reading because it also allows for the evaluation, if the transducer resolution permits it, of the space interval that elapses between the unit shown and the previous or successive.The space included between each unit read on the display is divided into 4 equal parts; the two extreme parts are areas in which the display shows the figures in a stable mode, alternatively in the two central areas the display shows alternatively first one figure then the other emphasising the fact that the half way point between the two has been reached.
The HDR=1 system is fully efficient if the transducer resolution demands a multiplicative co-efficient of less than, or equal to 2,00000 whereas if the multiplicative co-efficient is between 2,00001 and 4,00000 the values shown are centered but the intermediate section in which the figure swings from one visualization to another is not noted (or is noted only for certain values).
As can be seen from the diagram, the HDR=1 system centers the displays in the actual position also allowing the evaluation of the intermediate distances between the unit without necessarily having to resort to displaying or setting up data of a unit of measurement 10 times smaller than necessary.

Display system with H.D.R.=2

This is used in the positioning where it is not wanted that the figures shown are lit up as in HDR1 display but that a centered counter face is created in respect to the actual movements, that assumes the value of the physical position. This display is used in the positioning in which the difference of only one impulse between the actual position of the axis and that set must not be emphasised by one shifting of value.



A = Actual movement
B = Normal display
C = Display with HDR=1
D = Display with HDR=2

ELECTRICAL CONNECTION OF INPUTS

1	**XXX**	Electrical supply voltage Vac ±15% 50 / 60 Hz.
2	**XXX**	Electrical supply voltage Vac ±15% 50 / 60 Hz.
3	**GND**	Earth connection (recommended conductor wire f 4 mm.).
4	**+**	Transducers power supply 12 V 150 mA positive pole
5	**-**	Transducers power supply negative pole

INPUTS ENCODER ONLY 12 V

12	**PE**	Encoder polarization terminal (**+** NPN, **-** PNP).
13	**PH**	Input phase 1 incremental encoder.
14	**PH**	Input phase 2 incremental encoder.
15	**Z**	(I) Pre-set load

INGRESSI 12 V ÷ 24 V

16	**P1**	Polarization terminal of inputs (**+** NPN, **-** PNP).
17	**I1**	(I) Counter reset
18	**I2**	(I) Restart
19	**I3**	(I) Production counter increase
20	**I4**	(I) Piece counter reset
21	**I5**	(C) Programmable input
22	**I6**	(I) Program repetition

CONNECTION OF ELECTRICAL OUTPUTS

6	**C1**	Polarization terminal of outputs (**+** PNP, **-** NPN).
7	**U1**	(C) Slowing
8	**U2**	(C) Stop
9	**U3**	(C) Tolerance
10	**U4**	(I) End of stage (300 msec.)
11	**U5**	(C) End of program

GENERAL CONNECTION CHARACTERISTICS

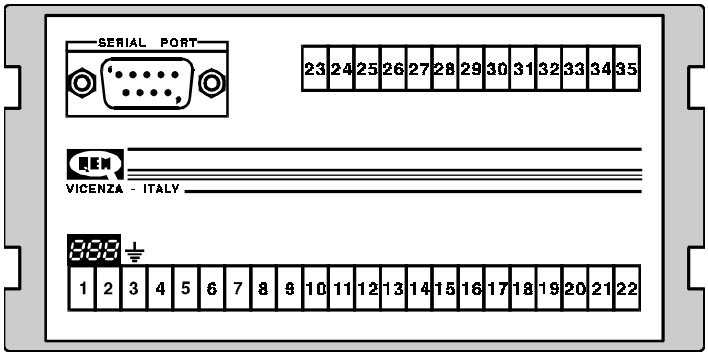
INPUTS

Each input ON/OFF is universal, optoisolated and can receive digital signals both in NPN and PNP. Connecting the terminals P1, P2, PE to + all the inputs accept the NPN type signals, that is with closure towards the negative of the electrical supply voltage. Connecting the terminals P1, P2, PE to - all the inputs become NPN type that is with closure towards the positive of the electrical supply voltage. Each input is protected against short circuit towards both of the supply poles, so as a result are practically indestructible. It is possible to connect in parallel more inputs having the same logic, if the output that is controlled is able to support the total current required, that is, equal to the number of inputs connected together multiplied by 10mA.

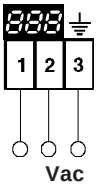
OUTPUTS

The dc outlets are optoisolated in continuous voltage and all have a common terminal between them (C1, C2). Connecting this terminal to + voltage the outputs become type PNP, connecting it to - voltage they become type NPN. The maximum continuous current appliable is 50 V.The outputs are able to support current upto 70 mA with a typical current drop of 3.5 V between the output and the common terminal. With the dc outputs it is also possible to control relays upto 24 Vac.

CONNECTIONS



Electrical supply voltage connection

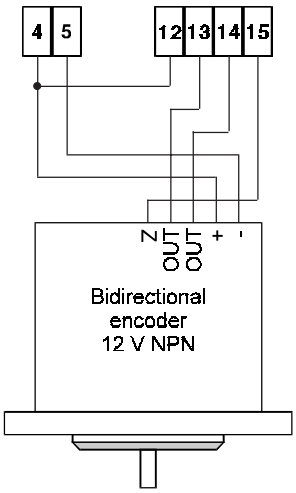


Electrical supply voltage: 24 Vac, 420 mA
110 Vac, 95 mA
220 Vac, 50 mA

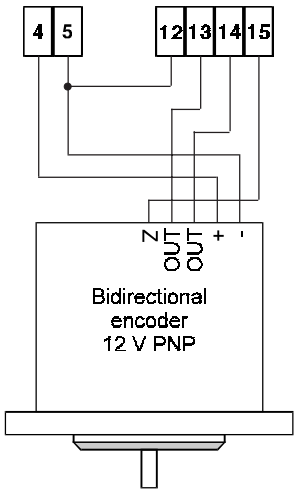
CONNECTION OF INPUTS ON/OFF

Connection of encoder with the instrument power supply

Connection with encoder NPN



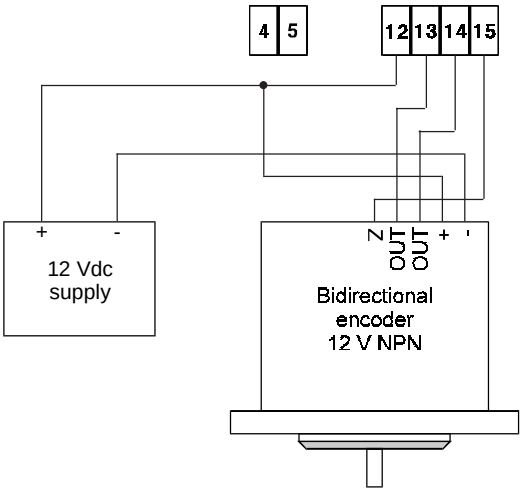
Connection with encoder PNP



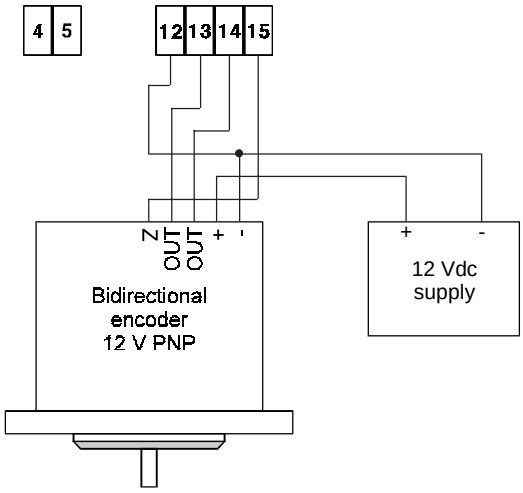
N.B. Connection of transducers (encoder, proximity switch) and electro-mechanical contacts to the instument inputs, using the 12 V power supply present on terminals 4 and 5, must consider the maximum current that the power supply can supply.

Connection of encoder with external power supply

Connection with encoder NPN

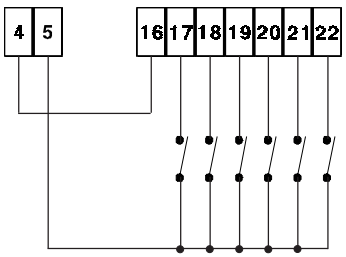


Connection with encoder PNP

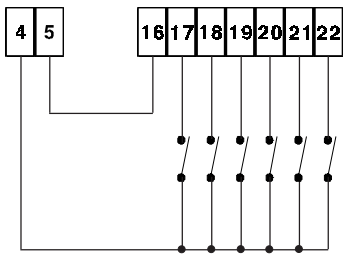


Connection of inputs ON / OFF with the instrument power supply

Connection with inputs NPN



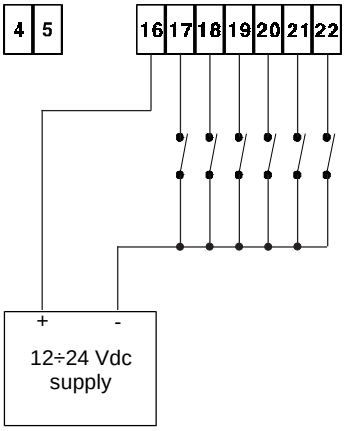
Connection with inputs PNP



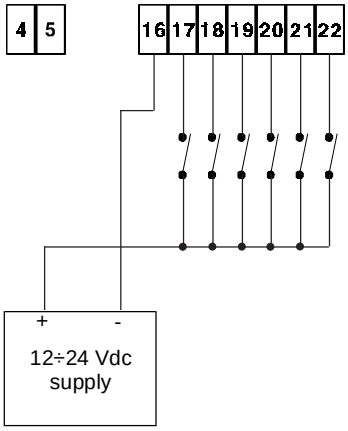
CONNECTION OF INPUTS ON/OFF

Connection of inputs with external power supply

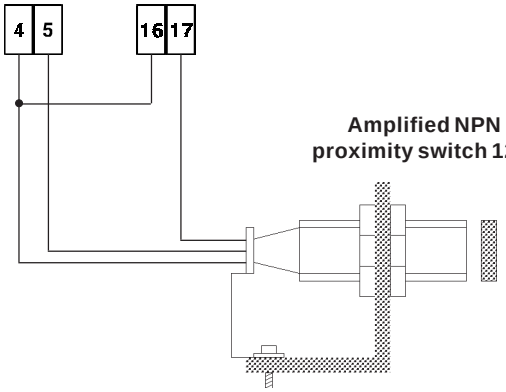
Connection with inputs NPN

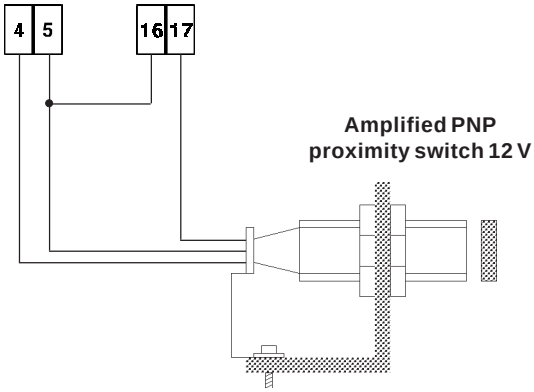


Connections with inputs PNP



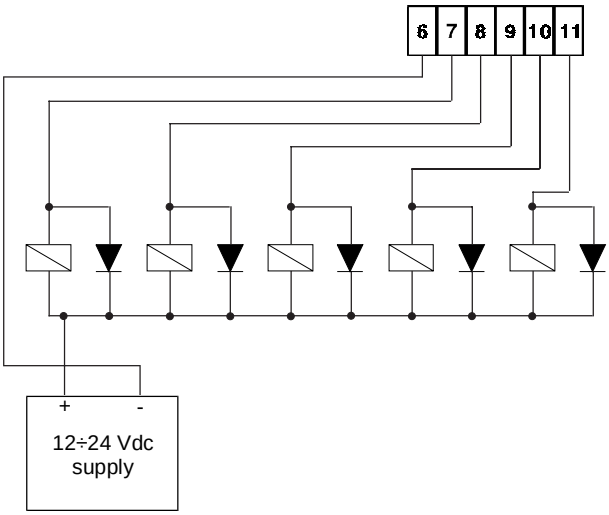
Connections with proximity amplified



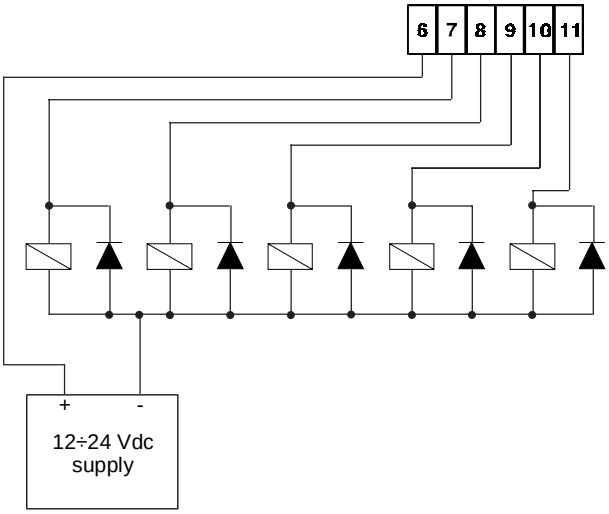


CONNECTION OF OUTPUTS ON/OFF

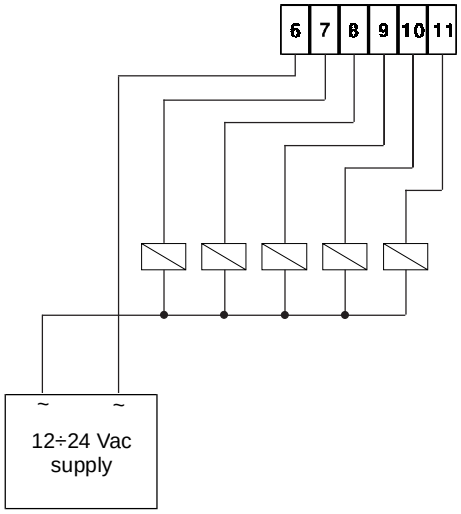
Connection with NPN outputs



Connection with PNP outputs

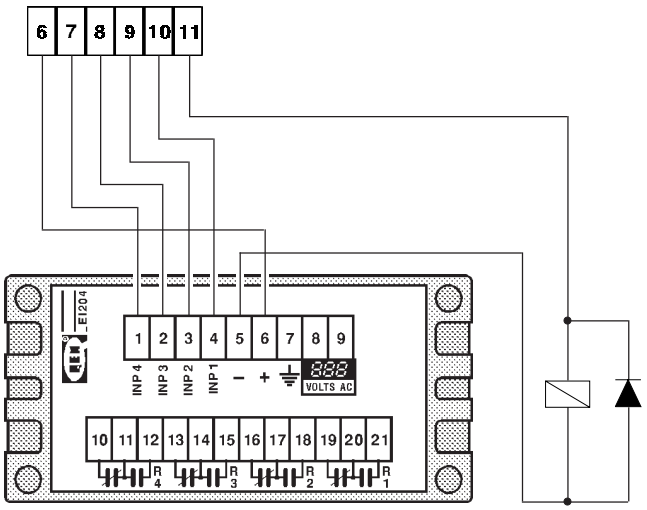


Alternate connection with relay



CONNECTION OF OUTPUTS ON/OFF

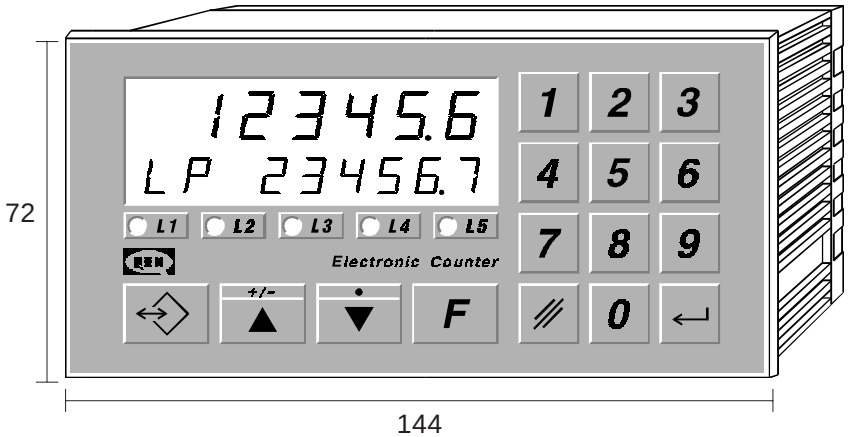
Connection of outputs with relay interface EI 204

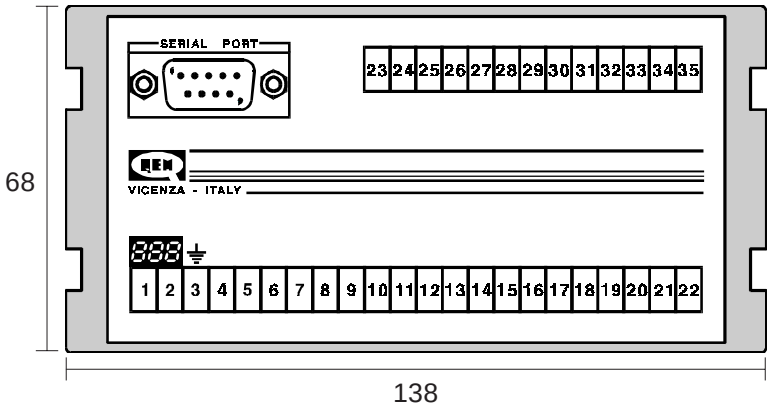


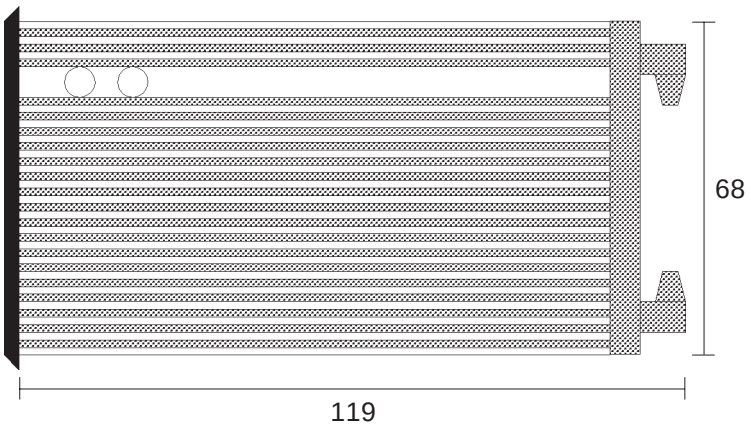
Relay 24 Vdc, max. 70 mA

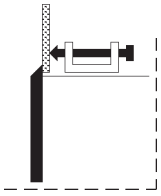
EI 204
The EI 204 has inside 4 relays (5 A/ 250 V) fed at 24 V for which the power supply voltage is drawn from the inside of the same interface. The relays are connected as in figure 2; the assembly is shown in the DIN standard. The overall dimensions are 45 x 93 x 85 mm.

DIMENSIONS

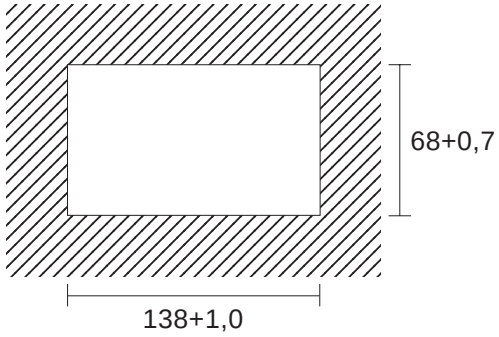








ATTENTION !
Having positioned the hooking pivot to the panel, carry out only a half -turn so as not to damage the frame.



N.B. All the measurements are in millimeters.

ORDER CODE

H	B	5	4	8	.	3	1	/	T006	/	110

Power supply voltage 24 = 24 Vac.
110 = 110 Vac.
220 = 220 Vac.

T006 = Keyboard with key simbols as per ISO regulations.

QEM srl - Località Signolo SS. 11 - Km 339 - Montebello Vicentino (VI) - Italy
Tel. 0444 - 440061 (3 linee r.a.) - Telefax 0444 - 440229