Description

The P2X_T instrument is a microprocessor programming single-axis positioner with analog outputs that processes signals supplied by incremental transducers such as rotative and linear encoders. The current dimension is displayed with six digits and high brightness (reading scale -99999, +999999). The instrument setting is obtained by means of four keys on the front panel; an auxiliary two digit display allows an assisted programming and moreover it visualises certain parameters during working.

The control of the positioning is made through the voltage analog output, that may be set-up as -10/+10V or 0/10V or current output 4/20mA. Other features are the relais outputs of Start/Forward/Backward, End of positioning, and the inputs: Start, Emergency, Preset, Pieces-counter, all optoisolated.

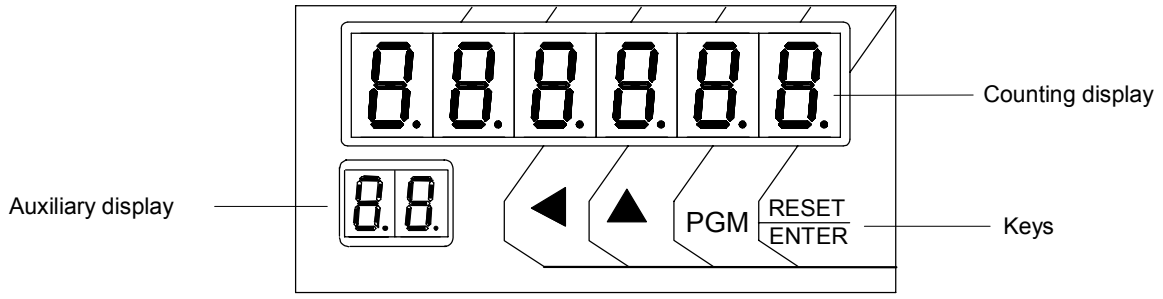
To optimize the accuracy of the positioning, P2X_T requires entering a few parameters in order to compensate the inertia of the system, the clearances and the wear of the mechanical couplings.

Other features of the instrument are: semiautomatic/automatic, manual, absolute/relative and line working modes, 99 positioning dimensions memory and possibility to program the number of pieces to be manufactured in sequence and the number of cycle repeats; test function to check inputs and outputs; serial port RS232 o RS485 (optional).

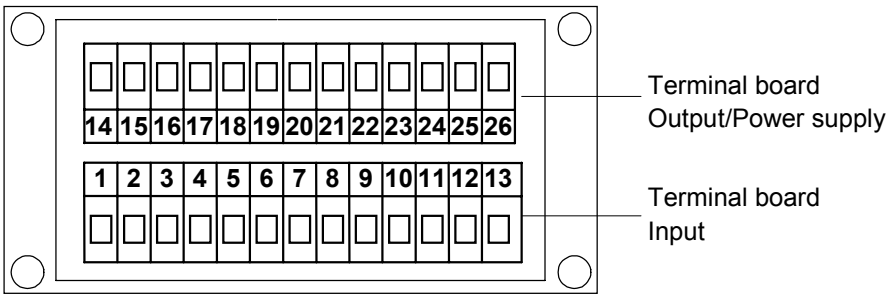
Data storage with the machine switched off is ensured by EEPROM memory.

P2X_T is built into a panel case 48X96 according to DIN 43700.

Front view



Back view



Input description

The positioner is controlled by 4 opto-isolated inputs, that are:

START: active from NA to NC, it causes the positioning start and brings different effects according to the working mode (see working mode at page 4).

EMERGENCY: it must be normally closed, if open it blocks or interrupts the positioning

PIECECOUNTER: at the end of each positioning the instrument expects a changing over of the piece counter input from NC to NA to proceed to the next positioning. NB: if not used connect it in parallel with the START input.

PRESET: the changing over from NA to NC causes the reset or the preset loading according to the zero reset procedure constant (see zero reset procedure page 6).

For switches see the connections scheme at page 10.

Output descriptions

The positioner is able to manage 3 relays outputs:

START/STOP:	normally open switch that closes to allow positioning
FORWARD/BACKWARD:	change-over switch that controls the direction of motion of the positioned axis
END POSITIONING:	normally open switch that closes at positioning end
ANALOG OUTPUT	voltage selectable 0÷10V or –10÷10V, and current 4-20mA

For switches see the connections scheme at page 10

PROGRAMMING

The following keys are used to programme:

PGM	to start and to leave the programming mode of the instrument
▲	to change from one constant to another or to increase the digit value during modification
◀	or to change from one digit to the next one
RESET/ENTER	to confirm inserted values

To enter programming mode is necessary to press the **PGM** key ; on the display you will see the write POS. INN (immediate positioning); by the key ▲ you can run through the menus QUOTE (quote), C ICL I (cycles), COST. (costanti), MANUAL (manual), TEST (test) whose functions are the following:

POS. INN	to insert an immediate positioning dimension (see next paragraph)
QUOTE	to insert dimensions and positioning programs, number of pieces and cycles (see next paragraph)
C ICL I	per impostare il numero di cicli del programma di posizionamento da eseguire (vedi “Impostazione del numero di cicli” a pagina 4)
COST.	to enter the machinery constants of the positioner (see Setting up of Machinery Constants at page 4)
MANUAL	to change to manual operating mode of positioner (see Manual Operating mode at page 7)
TEST	to test inputs and outputs (see Test function at page 7)

IMMEDIATE POSITIONING

Immediate positioning mode allows you to set a positioning dimension to perform as soon as the START input is activated.

Press **PGM** to enter programming mode: on the display the writing POS. INN will appear.

Press **RESET/ENTER** the display shows the current dimension value, on the auxiliary display il display the writing "P 1." will appear.

Press **RESET/ENTER** the display will be zeroset (or shows the last set dimension) il display si azzera (o mostra l'ultima quota impostata), being the first digit on the right flashing

By means of the keys ▲ (increment of flashing digit value) and ◀ (selection of flashing digit) set up the required positioning dimension.

Press **RESET/ENTER** and the current dimension will be visualized again: now, when you close the START input, the positioner starts the positioning to the required dimension and ,once the dimension has been reached, it activates the positioning end output.

To proceed to another immediate positioning press **RESET/ENTER** and repeat the previouses operations.

Press **PGM** to exit the immediate positioning mode.

SETTING UP OF POSITIONING DIMENSIONS, OF NUMBER OF PIECES

The positioner can store until 99 dimensions, that can be grouped together in many positioning programs. There isn't a limit to the number of dimensions in each program, but the amount of dimensions of all programs together can not be more than 99. For each dimension it is possible to set the number of pieces to manufacture in sequence (max. 9999).

Press **PGM** to enter the programming mode: the writing POS. INN appears on the display

Press ▲ to select the menu 9uDtE

Press **RESET/ENTER** the display show 000 with the first digit flashing: this is the password request. With the key ▲ (increase of the flashing digit) and ◀ (selection of the flashing digit) set the value **273** and confirm by **RESET/ENTER**.

N.B.: In the machinery constant exist one constant for remove the dimensions from password protection.

When you have entered into set of the dimensions, the display show the value of the dimension 1 and on the auxiliary display appear *01* (dimension index) and afterwards 9t.

Press ▲ and ◀ to select the dimension you want to set between all the 99 dimensions, the auxiliary display shows the current dimension.

Press **RESET/ENTER** to enter dimension setting: the first digit from the right will be flashing.

By means of the keys ▲ (increment of flashing digit value) and ◀ (selection of flashing digit) set the required positioning dimension.

Press **RESET/ENTER** the **number of pieces** to be manufactured, relating to the set dimension, will be visualised; on the auxiliary display it appears "P2.", press **RESET/ENTER** and insert the required value and confirm by **RESET/ENTER**
NB The value n.P.=0 do not enable the relay of end positioning.

Now the display will show StEP and on the auxiliary display the dimension index. At this point you decide if the current dimension is the end or not of the positioning program. If you confirm StEP pressing **RESET/ENTER** the program execution will proceed with the other dimensions, pressing instead the key ▲, the display will show End and the current dimension will become the end of the positioning program: then confirm by **RESET/ENTER**.

For set the next positioning dimension repeat the previous operations.

CREATING POSITIONING PROGRAMS

Enter the menu 9uOtE by the keys **PGM** and **RESET/ENTER**. Select the first dimension of the positioning program by pressing the key ▲ and set its value according to the description of the previous paragraph.

To control the inserted program you only have to enter the menu 9uOtE and run ▲ through the sequence of program steps: for the end of program dimensions the display will show the writing "End".

SETTING OF NUMBER OF CYCLES

The number of cycles means the number of times the program will be executed. In the automatic working mode, if the number of cycles is more than 1, once the last dimension of the positioning program has been executed, the positioner restarts from the first dimension of the chosen program when the piececounter input is activated again.

To set the number of cycles enter programming mode and go to C ICL I by the keys **PGM**, ▲, and **RESET/ENTER**. Set up the required value) and confirm it by the key **RESET/ENTER**.

SETTING UP OF MACHINERY CONSTANTS

Enter on programming and move to the menu COSt for machinery constant, press **RESET/ENTER** and the number 000 will be displayed, the first digit from the right will be flashing you are now supposed to insert the password; insert the number **273** and confirm by **RESET/ENTER**. In case of wrong password the instrument leave the programming mode. By pressing the key ▲ you can run trought the constants; which are kept visible for about 2 seconds, after a while their current value appears. To modify it press **RESET/ENTER** and use the keys ▲ and ◄. Once the required value has been inserted, confirm it by **RESET/ENTER**.
ATENTION: in this phase if you not press keys for more of 10 seconds the instrument leave the programming mode.
The machinery constant of the positioner are the followings:

- **Blade Thickness** SP.LAMA

By setting a not zero value all the positioning dimensions were set will be increased with this quantity. These constant is used the aplicatios witch expect a cut with material removal.

- **PreStop** P.StOP

It represents the inertia of positioned axis; the positioner disables the start output when the axis reaches a dimension equal to the difference between the set dimension and the PreStop value. This constant allows to compensate for the positioning inertia in steady inertia systems. It is suggested to set the PreStop value after setting all the other machine constants. In order to obtain the correct PreStop value it is necessary to carry out a positioning and find out the difference between the set dimension and the actually obtained dimension.

- **Dimension of slow motion** 9.LEntO

The positioner starts the slow output when the axis reaches a dimension equal to the difference between the set dimension and Slow Motion. By setting up 0 value the slow output is always disabled (the motion is always fast).

- **Absolute/Line working procedure** ASS.L In

In Absolute working mode all the set dimensions refer to absolute zero, whereas in Line working procedure the set dimensions refer to the last executed positioning, which means that the instrument resets the current dimension before starting each positioning.

- **Automatic/Semiautomatic Working mode** Aut.SEM

In the **Automatic** procedure, (setting **A**), the positioning starts when the START input changes over from **open** to **closed**; following positionings carry on automatically as long as the START input remains in the **closed** condition. Automatic execution stops as soon as the START input changes over from **closed** to **open**.
In the **Semiautomatic** procedure, (setting **S**), positioning starts when the START input changes over from **open** to **closed** : once the arrival dimension has been reached execution stops and starts again only if the START input changes over from **open** to **closed**.

- **Duration of Positioning End Impulse (Cutting Time)** t.tAG

Al At the end of the positioning, the positioning end output remains active for a period from 1 to 9999 milliseconds, according to the setting; the Setting 0 value at the end of the positioning output is always on.

- **Clearance Compensation Dimension** 9.rEC.G.

By setting a not zero value you enable the clearance compensation in forward positioning: which means that the axis goes beyond the positioning dimension by a value equal to the Clearance Compensation Dimension and it waits as long as the time of motion reversal before moving back to the arrival dimension.

- **Time of Motion Reversal** t. InU.no.

In order to avoid excessive stresses in the handling system, it is possible to set a wait time between 0 and 9999 milliseconds for every motion reversal manoeuvre.

- **Shifting Dimension** 9.SCOSt.

At the positioning end the instrument waits for the changing over of the piece-counter input from **open** to **closed** before shifting forward as much as the Shifting Dimension; then , after a period equal to the Wait Before Shifting Back, it goes back to the previous dimension (positioning dimension).
Shifting can be disabled by setting up a Shifting Dimension equal to zero.

- **Wait Before Shifting Back** t.Att.S.

After this period there is a return from the shifting dimension (enabled only if Shifting Dimension is set up not zero value); it can be set up from 0 to 9999 milliseconds.

- **Displayed value for an encoder turn** U ISUAL

The instrument can correct counted pulses by multiplying them by a coefficient amounting to the ratio between the U ISUAL and INPULS constants; if the two constants are opportunely set it is possible to display the wished value for a given number of pulses counted on inputs. The value to be set in this parameter represents the value to be displayed connected to an encoder turn, that is the multiplier factor of input pulses.
The range of admissible values is 1 ÷ 999999.

- **Number of pulses for encoder turn** INPULS

The value to be set in this parameter represents the number of pulses for a turn of the encoder that is the divisor factor of input pulses.
The range of admitted values is 1 ÷ 999999.
Example:
Let us consider a 100 pulses/turn encoder and for every turn an axis shifting of 123,4567. In order to display the value of 123,45: set U ISUAL=12345 and INPULS=100; in order to position the decimal point in the 2nd position set N.DEC=2.
NOTE: to reduce the error made by truncating the digits after the radix point in the value to be displayed, it is advisable to multiply U ISUAL and INPULS by 10 or 100 or 1000 in order to consider the maximum number of significant digits; with the above mentioned values by multiplying everything by 10 it is possible to obtain U ISUAL=123456 and INPULS=1000 by thus obtaining 6 significant digits (instead of 5) for U ISUAL.

- **Number of decimals** n.dEC.

It arranges the numbers of decimals digit to be visualised, from 0 to 4.

- **Preset Dimension** PrESEt

The instrument enables you to set the value that will be visualised when the **RESET/ENTER** key is pressed or the **PRESET** input is activated, according to the zeroset mode you have chosen (see next paragraph).

- **Zeroset Modes** ModA22.

By setting the Zeroset Mode you can determine the effect you will obtain by pressing the **RESET/ENTER** key for about 3 seconds or the effect of the **PRESET** input.
Chose the required Zeroset mode from the following table.

Zero set mode	effect of PRESET input	Effect by pressing RESET/ENTER key for 3 seconds
0	RESET	KEY DISABLED
1	PRESET	KEY DISABLED
2	RESET	RESET
3	RESET	PRESET
4	PRESET	RESET
5	PRESET	PRESET
6	INPUT DISABLED	RESET
7	INPUT DISABLED	PRESET
8	INPUT DISABLED	KEY DISABLED

- **Dimensions protected by password** PASS.9

To prevent accidental or undesired alteration of positioning dimensions, the instrument offers you the possibility to protect access to dimensions by mean of passwords. Therefore options are **S** for protected dimensions and **N** for unprotected dimensions.

- **Time constant for acceleration ramp** t.r.ACC

Starting the positioning axis, before reaching the maximum speed, the positioner produces an acceleration ramp with a time constant that may be set-up between 50 to 9999 milliseconds.

- **Time constant for deceleration ramp** t.r.dEC

During the positiong, reached the Slow value, by the passing from the speed Fast to the speed Slow, it produces a decelaration ramp with a time constant that may be set-up between 50 and 9999 milliseconds.

- **Value of the analog output for the speed Fast** HIGH

The output value which corresponds to the speed Fast is stated in per cent of the maximum value and that can be set-up from 1% to 100%.

- **Value of the analog output for the speed Slow** LOU

The output value which corresponds to the speed Slow is stated in per cent of the maximum value and that can be set-up from 1% to 100%.

- **Working way for output -10/+10V o 0/10V** InUEr t

Through this constant is possible to select the type of output: setting **0** (driving gear) the output goes from -10V to +10V, positive voltage for the onward gear and negativ for the backward gear, setting **1** (inverter) the output goes from 0 to +10V and the gear wise is discriminated by the relay of Forward/Backward.
By using the current output 4/20 mA set this constant to **1**.

- **Dimensions lower limit** L IM. InF

Due to safety reasons the positioner prevents the entry of dimensions lower than the value set in this constant. Set a value lower then the minimum value of positioning dimensions

- **Dimensions upper limit** L IN.SuP

As for the previous constant, the positioner prevents the entry of dimensions exceeding the value set in this constant. Set a value upper then the maximum value of positioning dimensions

- **Display mode** U IS.d ISP

Setting this function gives the possibility to convert the quota visualized on the display in a quota expressed in inch fraction or degrees. Keeping pressed the key **PGM** for abt. 3 seconds is possible proceed to a type of visualization to an other.

The constant U IS.d ISP defines the type of conversion of the quota, using keys ▲ and ◀ select the visualization needed according to the following table:

U IS.d ISP	**DISPLAY FUNCTION**
d ISAb	Disabled
dEC nP	From tenth of mm to thousandths of an inch
dEC CP	From tenth of mm to hundredths of an inch
nn CP	From mm to hundredths of an inch
nn dP	From mm to tenths of an inch
Cn CP	From cm to hundredths of an inch
dn CP	From dm to inches
Gr Ad I	Sexagesimal degrees with display in degrees and prime numbers
Gr. Pr I	Sexagesimal degrees with display in degrees

- **Baud rate for serial output** bAud

Not used in this version, don't change (or set to) d ,SAb.

MANUAL WORKING MODE

In manual working mode it is possible to displace the positioned axis by using the keyboard: enter programming mode and go to menu MAnUAL, press **RESET/ENTER** and the display will show the current dimension; the auxiliary display will show "MA" which indicates the manual working mode.

The key ▲ causes a fast forward displacement of the positioned axis.

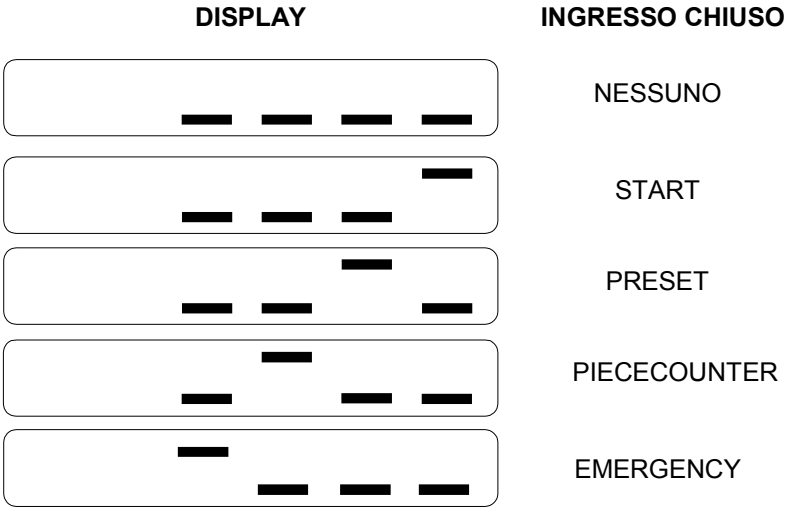
The key ◀ causes a fast backward displacement of the positioned axis.

N.B. emergency input must be closed.

Press **PGM** to exit manual working mode .

TEST FUNCTION

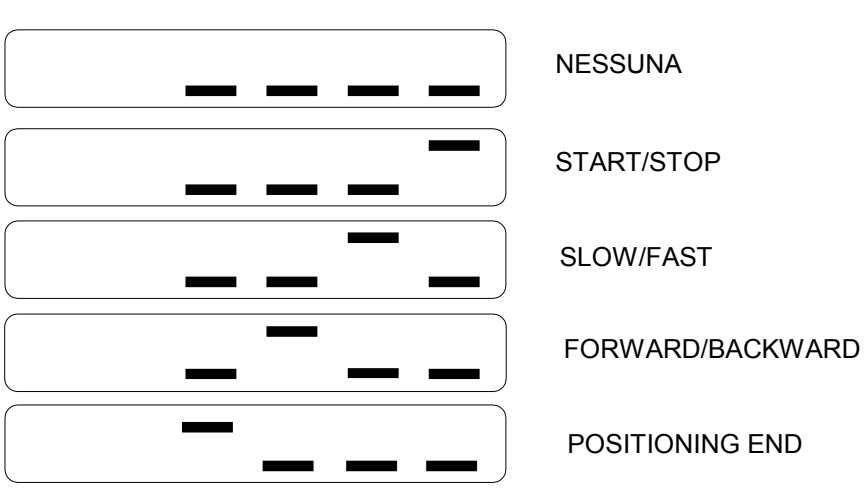
Enter programming mode and go to menu TEST , press **RESET/ENTER**, insert password **273**, confirm by **RESET/ENTER** and on the display will be shown 4 dashes witch correspond to the positioner inputs: the dash in the **lower** (upper) position means an **open** (closed) input.
The Input test consists of closing the input switches and verify the correspondence between what is visualised on the display and the following picture:



To enter **output test** press **RESET/ENTER** on the display 4 dashes are displayed, its last right one flashes. .
Each dash represents an output:.From right to left the dashes are represented as follows: START/STOP, SLOW/FAST, FORWARD/BACKWARD, POSITIONING END (see next picture).
The flashing dash indicates the selected output.
The dash position indicates the output condition: an **upper** (lower) position means an **active**(inactive,idle) output.

Press ◀ to select the required output (the flashing dash will change)

Press ▲ to activate the selected output; the selected dash will move to the upper position (see following picture)



You can change alternatively from input test to output test by pressing **RESET/ENTER** .
To exit the test mode press **PGM**.

POSITIONER OPERATING

Once the instrument has been connected, set the machinery constants and insert dimensions and positioning programs as it is described in the previous paragraphs.

To choose the positioning dimension or the program to be executed, press **RESET/ENTER** and the auxiliary display will appears S.A. and the first dimension index of the posiotioning with the first digit flashing; select the start dimension using the keys ▲ and ◄ and confirm by **RESET/ENTER**.

Being the EMERGENCY input closed, activate the START input (changing over from open to closed); the positioner will move the axis toward the first dimension.

As soon as the set dimension has been reached, the instrument opens the start switch and close the positioning end switch, which is closed as much as the set value of the “Duration of Positioning End Impulse” constant.

Before positioning to the next dimension the instrument waits for the changing over from closed to open of the PIECECOUNTER input and the permission from the START input, according to working mode (procedure) (semiautomatic or automatic).

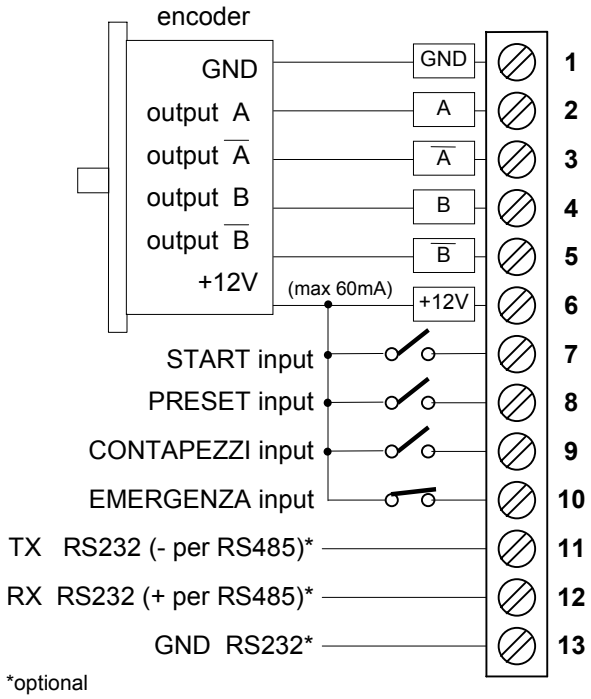
N.B.if the counterpiece input is not used, it is necessary to connect parallelly to the START switch because at the end of each positioning the positioner waits for the changing over of the counterpiece input.

Once the working program has been completely executed, the instrument starts again from the first dimension of the program which has just been executed.

During positioning, if you press **PGM** the number of cycles, that have been so far completed, will appear on the display. If you press ◄ the number of pieces to be manufactured at the current dimension will appear on the display; if the key ▲ is pressed, the number of manufactured pieces will appear on the display.

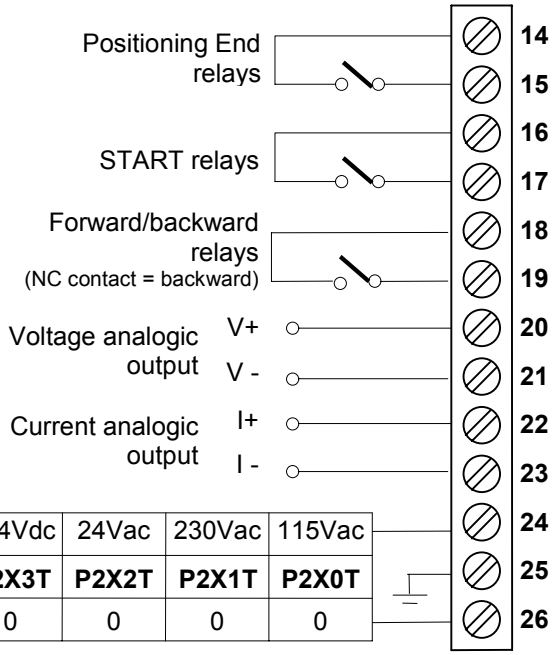
CONNECTION DIAGRAM

INPUT JUNCTION BOX



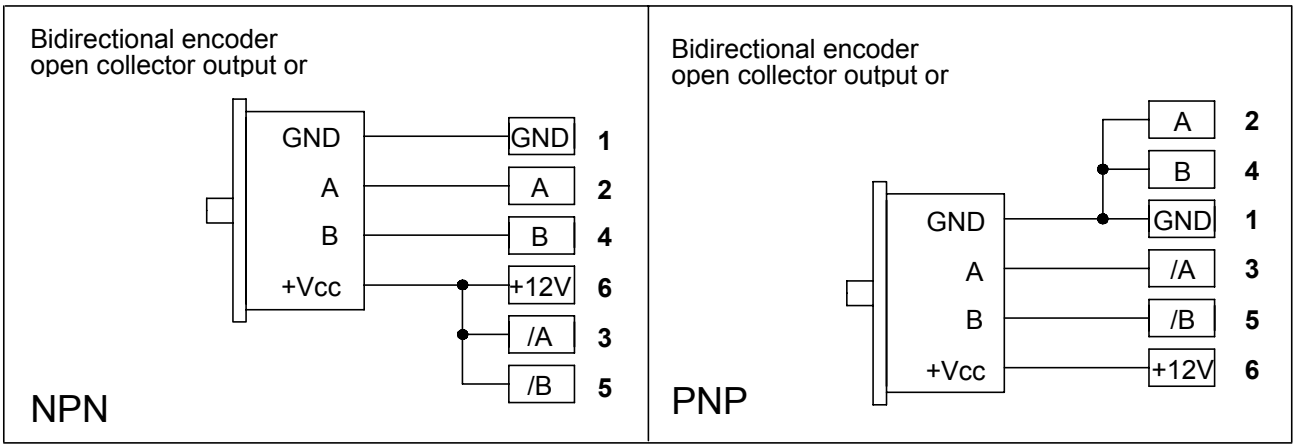
*optional

OUTPUT/POWER SUPPLY JUNCTION BOX



+24Vdc	24Vac	230Vac	115Vac
P2X3T	**P2X2T**	**P2X1T**	**P2X0T**
0	0	0	0

Scheme of transducers connections



TECHNICAL FEATURES

• Power supply	P2X0T 115Vac, P2X1T 230 Vac, P2X2T 24 Vac, P2X3T 24 Vdc
• Line frequency	50/60 Hz
• 7 segments display	6 digit for dimension visualisation 2 digit for guided programming
• DIN 43700 case	black, self-extinguishing, shock resistant
• Measures	48x96x120 mm
• Perforation profile	45x92 mm
• Frontal protection degree	IP54
• Transducer power supply	12 Vdc (60 mA max)
• Counting input	NPN e PNP open collector Push Pull 12V Line driver differential
• Maximum counting frequency	100 KHz
• Operating procedure (mode)	Semiautomatic/Automatic absolute/line manual
• Possibility to create working programmes	Stores 99 steps of program memory with the possibility of specifying the number of pieces and the number of cycle repeats
• Data storage with the machine switched off by EEPROM memory	
• Manual Preset	
• Extractable terminal (junction box)	
• Input/output test	
• 3 relays output 120 Vac 0,5A 24Vdc 1A	start-stop forward-backward positioning end
• 4 inputs ON-OFF optoisolated 12Vdc	Preset Emergency Piececounter Start
• Analog output	current: 4/20 mA voltage: selectable between -10/+10, 0/10V current: 4-20mA
• Resolution	11 bits + sign
• Thermal stability	200 ppm/°C max
• Minimum load voltage output	1 Kohm
• Maximum load output current	500 Ohm
• Accuracy analog output	± 1% FS max
• Serial output	RS232 o RS 485 (optional)
• Directive: Electromagnetic compatibility 2014/30/EU, Low voltage 2014/35/EU, RoHS 2011/65/EU	