

Positioner with analogue output P1XT

P1X0T
 P1X1T
 P1X2T
 P1X3T

The P1X_T is a programmable single-axis positioner with microprocessor and relay outputs that processes signals supplied by incremental transducers such as encoders, magnetic lines, optical lines, etc. The control of the positioning is made through the voltage analogue output, that may be set-up as 10/+10V or 0/10V or in current output 4/20mA. Other features are the relays outputs of Start/Onward/Backward, end of positioning and the inputs of: Start, Emergency, Preset, Pieces-counter, all optoisolated.

The axis dimension is displayed on high brightness six-digit display (reading scale -99999, +999999) and three auxiliary displays show the set dimension, the machine constants, and the processing parameters.

The keyboard with 16 keys and 8 function indicators make the positioner use and setting up easy.

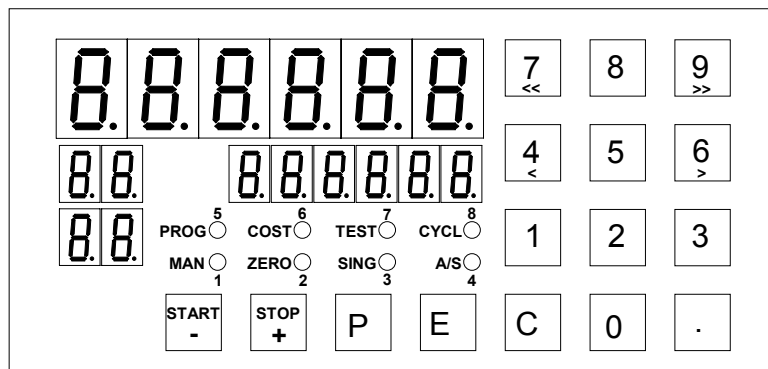
The P1X_T can memorize up to 99 dimensions to create positioning programmes giving the possibility to manage for every dimension the number of parts that are to be processed in sequence as well as the number of cycle repetitions. In order to optimize positioning accuracy there are some parameters that can counterbalance system inertia, clearances, and wear and tear of mechanical couplings.

Find below the other features characterising the instrument: automatic/semiautomatic, manual functioning mode, absolute/line, single positioning, blade thickness compensation, zero research, inputs and outputs test; and serial connection RS232 or RS485 with MODBUS RTU protocol to dialogue with remote units.

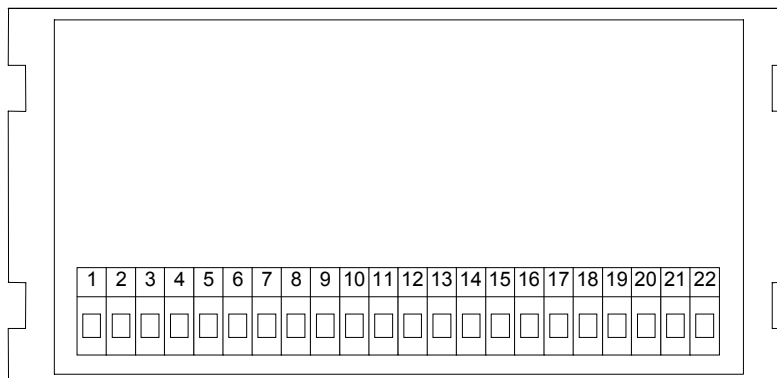
The keeping of data when there is no power supply is guaranteed by a non volatile EEPROM memory.

The instrument is enclosed in a panel box 72x144 conforming to the DIN 43700 standard.

Front view



Back view



Inputs description

The positioner is controlled by 4 optoinsulated inputs that are:

- START: active from open to close; it starts the positioning;
- EMERGENCY: it must usually be closed; if it is open, it stops the positioning;
- WORK COUNTER: work counter input; at the end of every positioning the instrument waits for a switchover from closed to open of the work counter input in order to carry on the subsequent positioning;
- RESET: active from closed to open; it determines the resetting/presetting of the dimension or the zero research.

For the relevant connections see wiring diagram on page 10

Outputs description

The positioner can manage the following outputs:

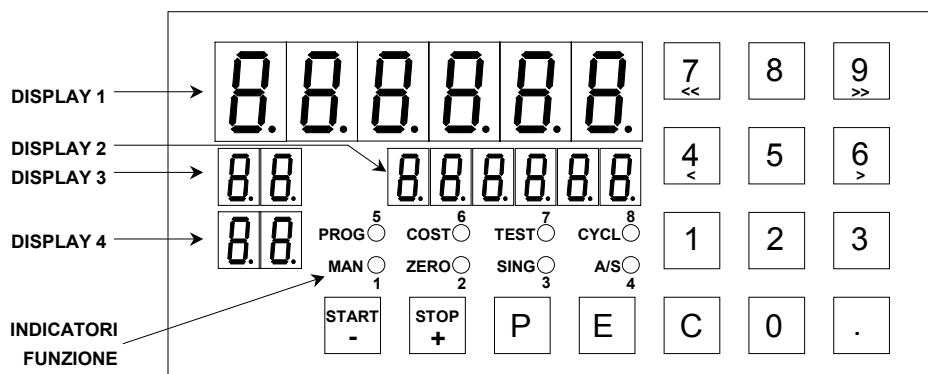
- STOP/ONWARD/BACKWARD: it controls the speed and the motion direction of the positioned axis,
- END OF POSITIONING: contact that closes at the end of positioning,
- AUXILIARY OUTPUT(AUX): programmable auxiliary contact (end of cycle, work number, etc),
- ANALOGUE OUTPUTS in current 4/20mA and in voltage, set-up **between** 0/10V and -10/10V.

For the relevant connections see wiring diagram on page 10

Description of the front panel

The display1 always displays the axis dimension, whereas the other displays show different parameters as a function of the positioner status.

The function indicators show the currently selected function.



PROGRAMMING

The keys used for programming are the following:

- P** Function choice programming
- E** Enter to confirm the entered values
- C** Clear to cancel/enter values
- START -** Increment or start key (only in the automatic/semiautomatic function)
- STOP +** Decrement or stop key (only in the automatic/semiautomatic function)

The programming and the use of the positioner is based on 8 main functions the selection of which is obtained by pressing the **P** key followed by the relevant numerical key. The default function present when the tool is switched on is the automatic/semiautomatic function (A/S); when the **P** key is pressed, the DISPLAY2 will display the **5C.FUN** writing (function choice) followed by the numerical key corresponding to the wished

function according to the following table:

KEY	FUNCTION INDICATOR	ASSOCIATED FUNCTION
1	MAN	Manual axis movement
2	ZERO	Zero setting/presetting or zero research
3	SING	Immediate positioning at a given dimension
4	A/S	Automatic/semiautomatic positioning
5	PROG	Writing of dimensions and positioning programmes
6	COST	Setting of positioner machine parameters
7	TEST	Inputs/outputs tests
8	CYCL	Setting of the number of cycles to be carried out

NOTA BENE: in order to ease the association between the wished function and the corresponding number, on the front panel next to every function indicator it is reported the number corresponding to the associated function.

1. MANUAL AXIS MOVEMENT (MAN)

The manual function enables to move the axis forward/backward in slow/fast mode by pressing the numerical keys according to the following table:

KEY	AXIS MOVEMENT
7 <<	backward fast
9 >>	forward fast
4 <	backward slow
6 >	forward slow

NB: in order to move the axis the EMERGENCY input must be closed.

2. ZERO SETTING/PRESETTING OR ZERO RESEARCH (ZERO)

Through this function it is possible to zero set or set at a wished value (preset) the dimension of the axis or to carry out an automatic zero research (with encoder zero notch or zero micro) to zero set or preset the dimension.

Manual zero setting or presetting

By pressing the **E** key or by enabling the PRESET input in the terminal box it is possible to zero set or to carry out a presetting of the dimension as a function of what was set in the constant *POD.R22* on page 7

Automatic zero setting or presetting (zero research)

By enabling the START input in the terminal box (if the constant *POD.R22* is set to the proper value see page 7) the zero research is started; it occurs with the backward shifting of the axis at slow speed. When the axis meets the zero notch the dimension is set to zero and the movement is interrupted.

In order to use this function it is necessary that the zero microswitch (or the proximity switch) is connected to the PRESET input of the positioner.

3. IMMEDIATE POSITIONING AT A SINGLE DIMENSION (SING)

This mode was created to immediately position the axis at a given dimension without intervening on the positioning programmes. Press the **C** key, enter the dimension through the numerical keypad, confirm by pressing **E** and close the START input to start the movement of the axis or hold down the START- key for about 2 seconds. If the EMERGENCY input is closed, the positioner controls the motion to reach the set dimension. Once the axis reached the set position, it is possible to enable the END OF POSITIONING and AUX outputs according to what is set in the *OUT.P. I.* constant (see page 6)

4. AUTOMATIC/SEMI-AUTOMATIC POSITIONING (A/S)

The automatic/semiautomatic function carries out the selected programme. The programme selection can be obtained in 2 ways:

- Press the **C** key and insert in display 3 the index of the dimension corresponding to the first step of the programme to be carried out then confirm with **E** or,
- Press the **C** key and select through the + and – keys the first dimension of the programme and confirm with **E**.

Once selected the programme, display 3 will show the index of the dimension while on display 2 the corresponding dimension will be displayed.

To start the positioning close the **START** input in the terminal box or hold down the **START-** key for about 2 seconds. The axis will shift towards the first dimension of the programme and when reached it the axis will be stopped and the end of positioning output will be enabled for a time equal to that set in the *Lt.FG* constant (see page 6). Before going on with the subsequent dimensions the positioner waits for the enabling of the **WORK COUNTER** and **START** inputs according to what was set in the machine *PLt.SEN* constants (see page 55).

By pressing the **STOP+** key it is possible to interrupt the positioning; to resume it press **START-** for 2 seconds or close the **START** input or open the emergency input to quit the positioning programme. As to the writing of the dimension programmes see the following paragraph.

5. WRITING OF DIMENSIONS AND POSITIONING PROGRAMMES (PROG)

By programme we mean a series of dimensions to be executed in sequence where, for every dimension, it is possible to set the number of parts to be processed and the enabling of the auxiliary output **AUX**.

The positioner can memorize 99 dimensions that may be organised into positioning programmes. The length of the single programmes is limited only by the total number of memorised dimensions, which must not exceed 99 (for instance it is possible to create as ultimate limits either 99 programmes made by a single dimension or one single programme made by 99 dimensions).

The modification of the dimensions is protected by a password; the password is requested through the display of letter **P** on display3 and of three zeroes (the first one of them is blinking) on display2. Enter the number **273** and confirm with **E**. In case of wrong password entry the instrument leaves the programming phase. The request of the password in order to have access to the programme dimensions may be excluded by opportunely setting the *PP55.9* constant (see on page 7).

Dimension setting

Display3 shows the programme index (or programme step) of the current dimension (from 1 to 99), the display2 shows the value of the wished dimension and the display4 the *9t* writing.

To select the dimension which is to be modified there are two modes: with the **START-** and **STOP+** keys it is possible to scroll all the dimensions in sequence and to select the dimension to be modified or to press the **C** key for about 2 seconds until the dimension index on display3 starts blinking; then introduce the value of the dimension index that is to be modified and confirm with the **E** key.

After selecting the dimension to be modified, press the **C** key, enter the wished numerical value and confirm with **E**.

Setting of the number of pieces

Then the programme will make the request of the number of parts to be processed in sequence; display4 will display the *nP* writing, press the **C** key, enter the wished number of pieces and confirm with **E**.

NB: If a number of pieces=0 is set, the positioner does not wait for the enabling of the **PIECES COUNTER** input to carry on with the positioning at the subsequent dimension.

Setting of the kind of dimension, of the end of programme and of the enabling of the auxiliary output

After the number of parts it is necessary to programme the dimension mode constants; display4 will display the *FD* writing while display2 will show the following:

A	S	-		
---	---	---	--	--

AUX output enabling

- output not enabled (default),

9 the output is enabled when the set dimension is reached,

n the output is enabled when the set number of parts is reached.

For every programme step it is possible to decide whether enabling the AUX output when the set dimension is reached, or when the set number of parts is reached, or not. In case the decision to enable the AUX output is made, the output remains enabled for all the time set in the *t.F.U.H.* constant (see page 6).

End of programme

S the dimension corresponds to one step of the programme (default),

L the dimension corresponds to the end of the programme.

This constant enables to attribute to the current dimension the end of the programme.

Absolute/relative dimension

A the set dimension is absolute (default),

r the set dimension is relative.

The set value for the dimension to be processed can be expressed either in an absolute way, that is it may be referred to the axis zero point, or in a relative way, that is it may be referred to the current position of the axis.

In order to change the previous constant values use the **START-** key to switch from one value to the other and the **STOP+** key to switch to the following constant. After setting all the wished values, confirm through the **E** key.

6. SETTING OF POSITIONER MACHINE PARAMETERS (COST)

Through this function all the machine constants that adjust the positioner functioning may be entered. In order to modify the constants the password **273** is always needed. Then all the constants are described.

1) Blade thickness *SPLANA*

If a value other than zero is set all the set positioning dimensions will be increased by that value. This constant is used for the applications that need cutting with material removal.

2) PreStop *P.STOP*

The positioner stops the axis movement when it reaches the dimension amounting to the difference between the set dimension and the PreStop value. This parameter enables to counterbalance the positioning inertia in systems with constant inertia. It is advisable to enter the PreStop parameter after setting all the other machine constants. In order to obtain the correct PreStop value it is necessary to carry out a positioning and to calculate the difference between the set dimension and the dimension being actually reached by the axis.

3) Slow dimension *9.LENTO*

The positioner enables the slow output when the axis reaches a dimension amounting to the difference between the set dimension and the Slow dimension. By setting the zero value, the Slow output is always disabled (the movement is always in the fast mode).

4) Absolute/Line functioning mode *ASSL In*

In the Absolute functioning mode (setting A) all the set dimensions are referred to the absolute zero, while in the Line mode (setting L) the set dimensions are related to the last carried out positioning; that is the instrument zero sets the current dimension before carrying out any positioning.

5) Automatic/Semiautomatic functioning mode *Aut.SEN*

In the Automatic functioning mode (setting A) the beginning of the positioning is determined by the switchover of the **START** input from open to closed; the following positioning operations are automatically carried out for all the time during which the **START** input remains closed. The automatic process is stopped when the **START** input is opened.

In the Semiautomatic functioning (setting S) the positioning starts with the switchover of the **START** input from open to closed: after reaching the target dimension the process is stopped and only restarts if the **START** input switches from open to closed.

6) Duration of the End of Positioning output enabling (Cutting time) *E.E.AG*

At the end of positioning, the END OF POSITIONING output is enabled for a time that can be set from 100 to 9999 milliseconds; by setting 0 the End of Positioning output remains enabled until the next start command is given.

7) Duration of the Auxiliary output enabling *E.AUH*

It determines the enabling time of the AUX output that can be set from 100 to 9999 milliseconds (see "Aux output enabling" on page 5).

8) Setting of outputs for immediate positioning *OUTP. I.*

With this constant it is possible to set the enabling of the END OF POSITIONING and AUX outputs in the "Immediate positioning at a single dimension" function (see page 3). Through the following table it is possible to select the various options:

<i>OUTP. I.</i>	END OF POSITIONING OUTPUT	AUX OUTPUT
0	Disabled	Disabled
1	Enabled for the <i>E.E.AG</i> time.	Disabled
2	Disabled	Enabled for the <i>E.AUH</i> time
3	Enabled by pressing the key 5	Disabled
4	Disabled	Enabled by pressing the key 8

9) Clearances recovery dimension *Q.RECC.*

By setting a value other than zero the enabling to the clearances recovery in the onward positioning is obtained: that is the same axis exceeds the positioning dimension of one value amounting to the set Clearances Recovery Dimension and then waits for a time equal to the Motion Reversing Time to go back to the target dimension.

10) Motion Reversing time *E.INUPO.*

In order to avoid excessive strain on the handling system, it is possible to set a waiting time, ranging between 0 and 9999 milliseconds, for all the motion reversing manoeuvres.

11) Deviation dimension *Q.SCOSL.*

By setting this constant to a value differing from zero, at the end of the positioning the instrument waits for the switchover from open to closed of the WORK COUNTER input to carry out an onward shifting of a dimension equal to the Deviation Dimension; after that, when a time equal to the Deviation Return Waiting Time has elapsed, the instrument returns to the set dimension.

If a Deviation Dimension equal to zero is set this function is disabled.

12) Deviation Dimension Waiting Time *E.ALESL.*

Time interval after which the return from the deviation dimension is obtained (active only if a Deviation Dimension other from zero is set); it can be set between 0 and 9999 milliseconds.

13) 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 0 ÷ 999999.

14) 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 0 ÷ 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 *OUTPUT* and *INPUTS* 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 100 it is possible to obtain *OUTPUT*=123456 and *INPUTS*=10000 by thus obtaining 6 significant digits (instead of 4) for *OUTPUT*.

15) Number of decimals *ndEC*

It sets the number of decimals of the display that can be set between 0 to 5.

16) Preset dimension *PRESET*

Value of the dimension that will be displayed by using the zero setting function or by enabling the PRESET input in the terminal box according to what was set in the following constant.

17) Zero setting mode *ModAZZ*

The setting of the zero setting mode enables to select the effect of the **E** key or of the PRESET input according to the following table:

<i>ModAZZ</i>	KEY E	RESET INPUT
0	DISABLED	RESET
1	DISABLED	PRESET
2	RESET	RESET
3	PRESET	RESET
4	RESET	PRESET
5	PRESET	PRESET
6	RESET	DISABLED
7	PRESET	DISABLED
8	DISABLED	DISABLED
9	DISABLED	PRESET in zero automatic research mode 1
10	DISABLED	PRESET in zero automatic research mode 2

Modes 9 and 10 refer to the zero research automatic cycle (see on page 3) the zero setting/presetting or zero research function).

Zero automatic research mode 1

In the automatic zero setting function when the **START-** key is pressed the slow backward motion of the axis is started searching for the zero input. When the zero point is reached the axis motion continues for 2 seconds more and then stops and carries out the dimension presetting.

Zero automatic research mode 2

In the automatic zero setting function when pressing the **START-** key the slow backward motion of the axis is started searching for the zero input. When the zero point is reached the axis is stopped and the dimension presetting is carried out.

18) Dimensions protected by password *PASS.9*

In order to prevent the accidental or unintentional alteration of the positioning dimensions, the instrument gives the opportunity to protect with a password the access to the dimensions. It is thus possible to select between 0 , dimensions protected by password, and 1 ,dimensions unprotected by password.

19) Time constant for acceleration ramp *ErACC*

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.

20) Time constant for deceleration ramp *ErDEC*

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

21) Value of the analogue 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.

22) Value of the analogue output for the speed Slow *LOW*

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.

23) Working way for output *-10/+10V o 0/10V Invert*

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**.

24) Dimensions lower limit *L INF*

Due to safety reasons the positioner prevents the entry of dimensions lower than the value set in this constant and interrupts the axis motion if during the positioning the dimension becomes lower than this limit. Don't set values that are upper then the Upper Limit for the values (next constant) or the positioner will not accept the start drives

25) Dimensions upper limit *L SUP*

As for the previous constant, the positioner prevents the entry of dimensions exceeding the value set in this constant and interrupts the axis motion if during the positioning the dimension exceeds this limit. Don't set the values that are lower then the Lower Limit for the values (previous constant) or the positioner will not accept the start drives.

26) Display mode *U d P*

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 **P** for abt. 3 seconds is possible proceed to a type of visualization to an other.

The constant *U d P* defines the type of conversion of the quota: using keys **START-** and **START+** select the visualization needed according to the following table






<i>U d P</i>	DISPLAY FUNCTION
<i>d 15Ab</i>	disabled
<i>dEC nP</i>	From tenth of mm to thousandths of an inch
<i>dEC cP</i>	From tenth of mm to hundredths of an inch
<i>nn cP</i>	From mm to hundredths of an inch
<i>nn dP</i>	From mm to tenths of an inch
<i>cn cP</i>	From cm to hundredths of an inch
<i>dn cP</i>	From dm to inches
<i>GrAd 1</i>	Sexagesimal degrees with display in degrees and prime numbers
<i>Gr. Pr 1</i>	Sexagesimal degrees with display in degrees

7. INPUTS/OUTPUTS TEST (TEST)

In order to have access to the test function it is necessary to enter the password **273**.







In the inputs test function display3 will display the **⏏ I** (Test Input) message and display2 will display 4 hyphens. Every hyphen indicates one input: the input in the **low** position (high) indicates that the input is **open** (closed).

The inputs test consists in closing the input switches and check that the display corresponds to the figure below:

DISPLAY2	INPUT CLOSED
	NONE
	START
	PRESET
	PIECESCOUNTER
	EMERGENCY

Then go to the outputs test by pressing the **E** key; the display3 will display **⏏ O** (Test Output).

In order to enable/disable the outputs press the numerical keys indicated in the following figure: the position of the hyphen indicates the output status; to the hyphen in the **high** position (low) corresponds an **enabled** output (not enabled).

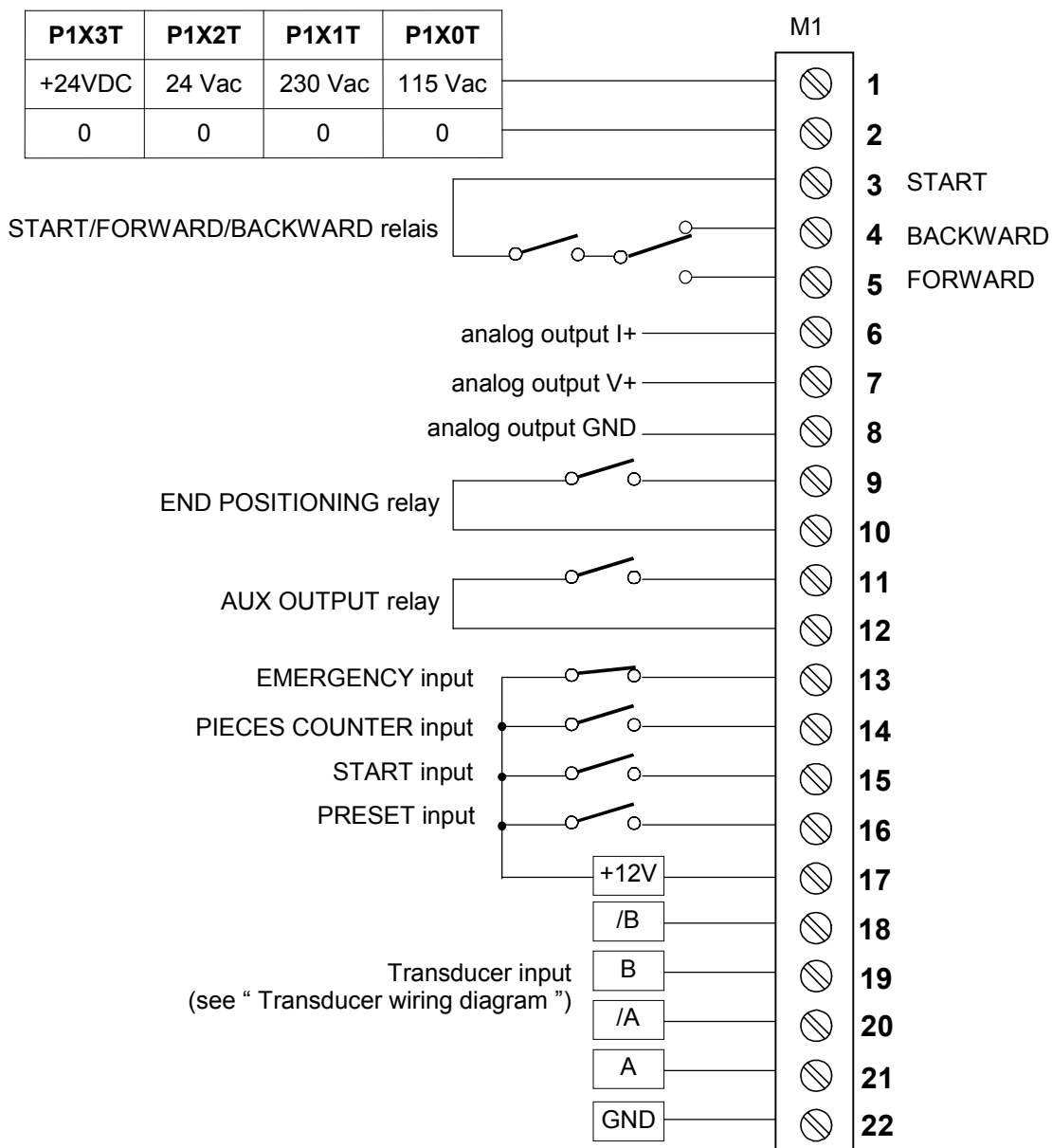
DISPLAY2	START OUTPUT	KEY TO BE PUSHED
	NONE	NONE
	START	1
	FORWARD/BACKWARD	2
	SLOW/FAST	3
	END POSITIONING	4
	AUX OUTPUT	5

By pressing the **E** key it is possible to go back to the inputs test; in order to leave the test function, press **P**.

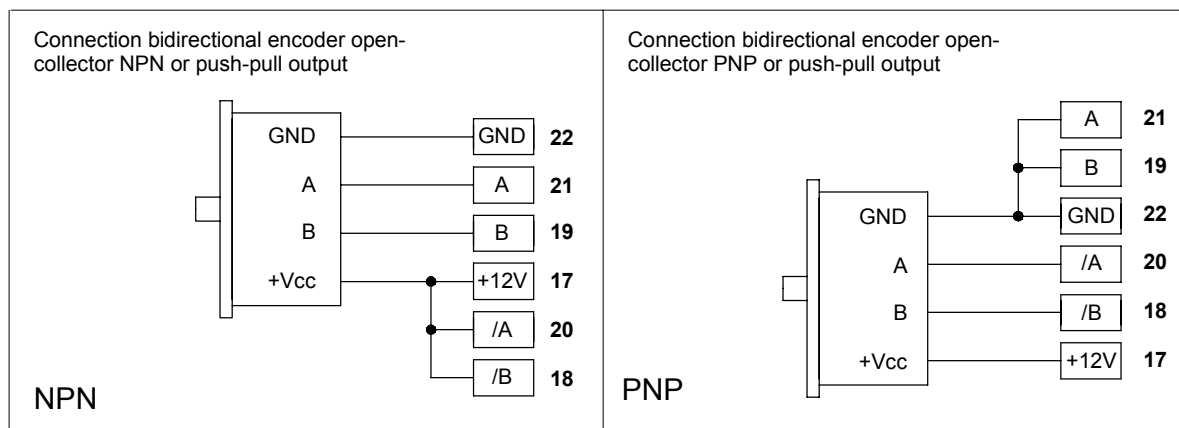
8. SETTING OF THE NUMBER OF CYCLES TO BE CARRIED OUT (CYCL)

By number of cycles we mean the number of repetitions of the positioning programme. The automatic functioning mode involves the possibility to repeat the selected programme. By setting a number of cycles greater than 1, once the last dimension of the positioning programme has been carried out, at the next command by the work counter input the positioner restarts from the first dimension of the selected programme.

WIRING DIAGRAM



Transducer wiring diagram



TECHNICAL FEATURES

- Power supply P2X0 115Vac, $\pm 10\%$
P2X1 230 Vac, $\pm 10\%$
P2X2 24 Vac, $\pm 10\%$
P2X3 24 Vdc $\pm 20\%$
 - Power 7VA
 - 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
 - Dimensions 72x144x160 mm
 - Perforation profile 70x142 mm
 - Frontal protection degree IP54
 - Transducer power supply 12 Vdc (100mA max.)
 - Counting input NPN e PNP open collector
Push Pull
Line driver differential 12V
 - Maximum counting frequency 100 KHz
 - Operating procedure (mode) Semiautomatic/Automatic
Absolute/line
Manual
Single positioning
Test
 - Possibility to create working programmes 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
- Extractable terminal (junction box)
 - Input/output test
 - Relays output 250Vac 250Vac/10A (resistive load) Start/forward/backward
Positioning end
Aux outputs
preset
emergency
piececounter
start
 - Inputs ON-OFF optoisolated 12Vdc voltage: selectable between -10/+10, 0/10V
current: 4/20 mA
 - Analogue output 11 bits + sign
 - Resolution 200 ppm/ $^{\circ}$ C max
 - Thermal stability 1 Kohm
 - Minimum load voltage output 500 Ohm
 - Maximum load output current $\pm 1\%$ FS max
 - Accuracy analogic output
 - Directive: Electromagnetic compatibility 2014/30/EU, Low voltage 2014/35/EU, RoHS 2011/65/EU