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USER'S MANUAL AND MAINTENANCE

POSITIONER SINGLE AXIS WITH RELAY OUTPUTS AND INPUT FROM POTENTIOMETRIC TRANSDUCER "P3X_"

Manual purpose
This manual has been designed by the Manufacturer to provide the necessary information regarding the instrument to those who are authorized to carry out safely its installation, maintenance, dismantling and disposal. All the necessary information for the buyers and planners can be found in the Sales catalogue. Other than adopting good technical construction methods, the information should be read carefullyand strictly applied. Inobservance of this information could cause risks for the health and safety of people and economical damage. This information, provided by the Manufacturer in the original language(Italian) is also available in other languages to satisfy legislative and/or commercial needs.
This manual must be kept in a good condition by a responsible person in an ideal place so that it is always available for consultation. In case this manual is lost or deteriorates, a replacement should be requested directly from the manufacturer quoting the manual's code. This manual reflects the state of skill of the instrument at the time of input on the market: however the manufacturer reserves the right to make changes, add or improve the manual without giving any reason to hold the present manual inadequate.

Identification of the equipment
The identification plate represented is applied to the instrument.
To find the identification code of the instrument, consult the sales catalogue.

Environmental conditions
Temperature setting: min. 0°C, max. + 50°C.
It is forbidden to use the instrument other than its specific use and in potentially explosive conditions or where anti- explosive elements are used.

Storage
Here below are some references to be followed for the storage of the instrument.
Avoid environments with excessive humidity and those exposed to bad weather (avoid open areas). Avoid putting the instrument directly on the ground. Store the instrument in its original packing.

Conformity declaration and CEE marking
The instrument answers to the following Communitarian Directives:
2014/30/EU Electromagnetic compatibility, 2014/35/EU Low voltage, 2011/65/EU RoHS.

Maintenance
Turn off the power before touching the internal parts.
Clean the external plastic parts using a soft, damp cloth with ethylic alcohol or water. Do not use hydrocarbon solvents (petrols, diluants, etc.): using these products could affect the proper mechanical functioning of the instrument.
Reparations should be done only and exclusively at the FIAMA technical assistance centre.

Calibrations and tests
It is advisable to calibrate the instrument periodically, once every working year.
To do the calibration, follow the calibration procedure indicated in the present manual .

Assistance request procedure
For any kind of technical assistance request, contact the sales department of the Manufacturer directly indicating the information given on the identification plate, the number of hours used and the type of defect.

Manufacturer's responsibility
The manufacturer declines any responsibility in case of :
• Using the instrument contrary to the national safety and accident-prevention laws.
• Wrong installation, inobservance or wrong procedures of the instructions provided in the present manual.
• Defective electrical power supply.
• Modifications or tamperings.
• Operations carried out by untrained or unqualified staff.
The safety of the instrument also depends on the strict observance of the procedures indicated in the manual: always operate the instument in its functioning capacity and carry out a careful routine maintenance.
• All phases of inspection and maintenance should be done by qualified staff.
• The configurations provided in the manual are the only ones permitted.
• Do not try to use them anyway contrary to the indications provided.
• The instructions in this manual do not substitute but accomplish the obligations of the current legislation regarding the safety laws.

Description

The **P3X** instrument is a microprocessor programming single-axis positioner with relay outputs that processes signals supplied by incremental transducers such as rotative and linear potentiometric.
Positioning is controlled by the start/stop, forwards/backwards , slow/fast and positioning end outputs. All the positioner inputs, that are start, emergency, preset, piececounter and counting-input, are optoisolated.
The current dimension is displayed with six digits and high brightness (reading scale -9999, +99999) an auxiliary two digit display allows an assisted programming and moreover it visualises certain parameters during working.
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; To optimize the accuracy of the positioning, **P3X** requires entering a few parameters in order to compensate the inertia of the system, the clearances and the wear of the mechanical couplings.
Data storage with the machine switched off is ensured by EEPROM memory.
The **P3X** is built into a panel case 96X96 according to DIN 43700.

Installation

Before installing the instrument, read the following warnings:
a) Connect the instrument strictly following the instructions of the manual.
b) Carry out the connections using the correct wires within the limits of the tension and power supply as indicated in the technical data.
c) The instrument does not have an ON/OFF switch, hence it comes on when connected to the power supply. For safety reasons, the equipment connected permanently to the power supply requires a bi-phasal selector switch which should be within easy reach of the operator.
d) If the instrument is connected to any apparatus not isolated electrically, carry out an earth connection to avoid it being connected directly through the structure of the machine.
d) It is the responsibility of the user to check, before using , the correct settings of the parameters of the instrument to avoid damage to persons or things.
e) The instrument cannot function in a dangerous environment (inflammable or explosive). It can be connected to elements that operate in the same atmosphere only through appropriate interfaces, according to the current safety
regulations.
g) Avoid dust, humidity, corrosive gases, heat sources.

Power supply

a) Before connecting the instrument, check that the the power supply tension is within the permitted limits and that it corresponds to the one indicated on the tag.
b) Carry out the electrical connections with the instrument disconnected.
c) For the power line to instruments and sensors, a power supply line separate from that of the power is required : it is necessary to use an isolating transformer.
d) The power line should provide a device that separates the set fuses of the instruments and should not be used to regulate relays, contactors, etc.
e) If the network tension is very disordered (eg. from the change-over of the power units, motors, inverters, welders, etc.), use the appropriate filters of the network.
f) If an earth connection is needed, ensure that the plant has a good earth system: tension between neutral and earth <1V and the resistance <6 Ohm.

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.

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.

For switches see the connections scheme.

Output descriptions

The positioner is able to manage 4 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

SLOW/FAST: change-over switch that controls positioned axis speed

POSITIONING END: normally open switch that closes at positioning end

For switches see the connections scheme.

PROGRAMMING

The keys used for programming are the following:

P **F**unction choice programming

E **E**nter to confirm the entered values

C **C**lear 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 SC.Fun2 writing (function choice) followed by the numerical key corresponding to the wished function according to the following table:

KEYS	FUNCTION INDICATOR	ASSOCIATED FUNCTION
1	MAN	Manual axis movement
2	SING	Immediate positioning at a given dimension
3	A/S	Automatic/semiautomatic positioning
4	COST	Setting of positioner machine parameters
5	PROG	Writing of dimensions and positioning programmes
6	CYCL	Setting of the number of cycles to be carried out

N.B.: 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. 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.1 constant

3. AUTOMATIC/SEMIAUTOMATIC 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 T.TAG constant. 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 AUT.SEM constants.
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.

4. 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 SLENTO

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) Automatic/Semiautomatic functioning mode AUt.SEM

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.

5) Duration of the End of Positioning output enabling (Cutting time) t.tAG

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.

6) Duration of the Auxiliary output enabling t.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 8).

7) 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 . Through the following table it is possible to select the various options:

OUt.P. I.	End of positioning output	AUX output
0	Disabled	Disabled
1	Enabled for the t.tAG time.	Disabled
2	Disabled	Enabled for the t.AuH time
3	Enabled by pressing the key 5	Disabled
4	Disabled	Enabled by pressing the key 8

8) Clearances recovery dimension 9.rECU.

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.

9) Motion Reversing time t. InU.nO.

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.

10) Deviation dimension 9.SCOSt.

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.

11) Deviation Dimension Waiting Time t.AtE.SC.

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.

12) Number of decimals n.dEC

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

13) Zero setting mode ModA22

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:

ModA22	**key E**
0	DISABLED
1	DIRECT
2	DELAYED RESET (2s)

The modalities 1 and 2 make a relative reset of the quote. The absolute quote is restored at the next activaction of **E** key.

14) 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.

15) Analog/digital converter resolution r.AdC

Set to zero this value.

21) Dimensions lower limit L IN. 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

22) 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 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.

23) 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 **P** 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: select the visualization needed according to the following table

U IS.d ISP	**DISPLAY FUNCTION**
d ISAb	disabled
dEC MP	From tenth of mm to thousandths of an inch
dEC CP	From tenth of mm to hundredths of an inch
MM CP	From mm to hundredths of an inch
MM dP	From mm to tenths of an inch
CM CP	From cm to hundredths of an inch
dM CP	From dm to inches
GrAd 1	Sexagesimal degrees with display in degrees and prime numbers
Gr. Pr 1	Sexagesimal degrees with display in degrees

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).
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 PASS.9 constant.

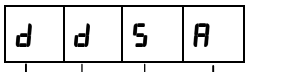
Dimension setting

Aux display shows 9t (quote) the display shows the dimension value.
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 the aux display 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; aux display will display the P2 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; aux display will display the M0 writing while display will show the following:



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

End of programme/Step

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

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

AUX output enabling at end of positioning

d output not enabled (default)

F the output is enabled at the end of positioning

AUX output enabling when number of pieces is reached

d uscita disabilitata (default)

P output is enabled when the set number of pieces is reached

In case the decision to enable the AUX output is made, the output remains enabled for all the time set in the t.AuH. constant.
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.

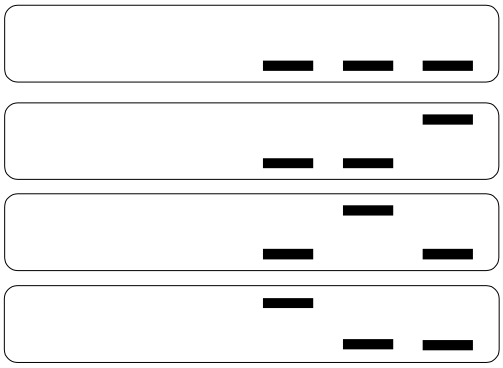
6. SETTING OF THE NUMBER OF CYCLES TO BE CARRIED OUT (CYCL)

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.

7. INPUTS/OUTPUTS TEST (TEST)

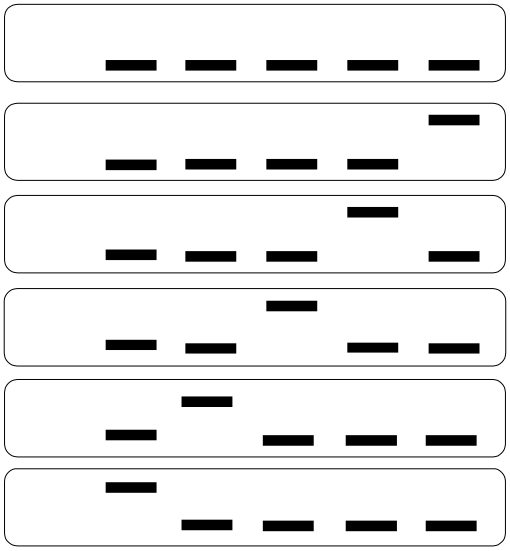
From automatic/semiautomatic mode, press for 5 seconds the **C** key.
In order to have access to the test function it is necessary to enter the password **273**.

In the inputs test function aux display will display the **t I** (Test Input) message. 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:



DISPLAY	CLOSED INPUT
	NONE
	START
	EMERGENCY
	COUNT PIECES

Then go to the outputs test by pressing the **E** key; the aux display will display **t0** (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).



DISPLAY	ACTIVEOUT	KEY TO PRESS
	NONE	NONE
	FAST/SLOW	1
	FORWARD/BACKWARD	2
	START/STOP	3
	END POSITIONING	4
	AUX OUTPUT	5

POTENTIOMETRIC TRANSDUCER CALIBRATION

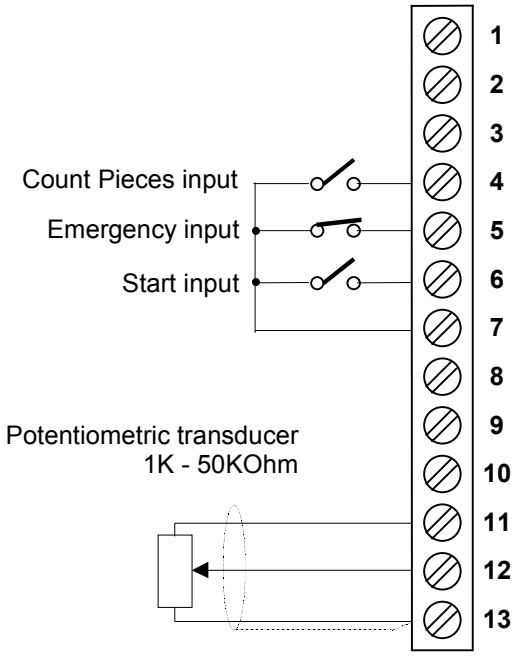
This function allows you to input two numerical values in two different positions of the transducers (for example: at the beginning, and at the end of the stroke). The setting procedure takes place in the following way: in manual mode, with emergency input close, press **C** key for 5 seconds. The password request (000) will appear, then insert **327** and confirm with **E** , on the display will appear CAL 1, move the slider of the potentiometer on the first benchmark position (for example: at the beginning of the scale) and then press **C** key and programme the dimension you would like to visualize for this transducer position, and confirm with **E**.

Now will appear CAL 2 move the slider of the potentiometer on the second benchmark position (for example: at the end of the scale) and then press **C** key and programme the dimension you would like to visualize for this transducer position, and confirm with **E**.

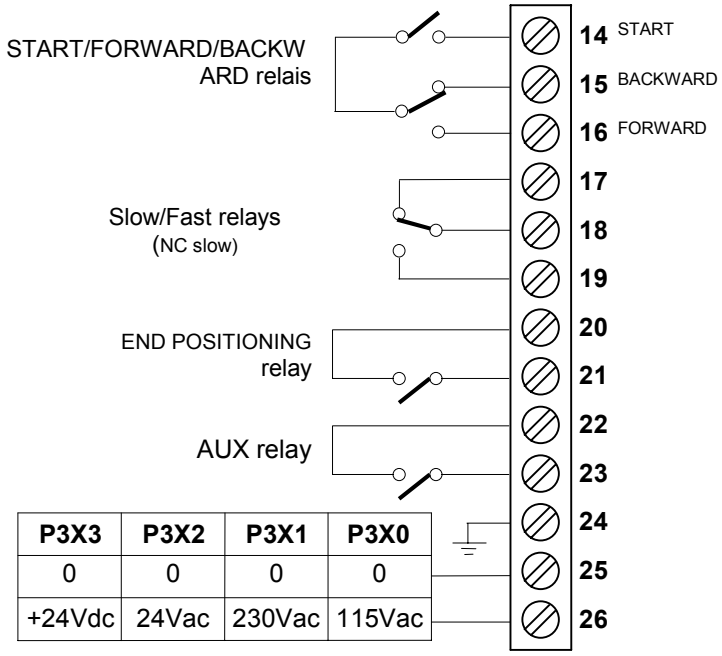
Now the positioner is calibrated with the potentiometer transducer, check the value on the intermediate position of the stroke.

WIRING DIAGRAM

TEMINAL BLOCK INPUT



TERMINAL BLOCK OUTPUT AND POWER SUPPLY



P3X3	P3X2	P3X1	P3X0
0	0	0	0
+24Vdc	24Vac	230Vac	115Vac

TECHNICAL FEATURES

Power supply	115Vac, 230 Vac, 24 Vac, 50/60 Hz, 24Vdc
Power	7 VA
Display	5 digits –9999,99999
Potentiometric transducer input value	1 – 50 KOhm
Resolution potentiometric input	16000 punti
Functioning mode	Automatic/Semiautomatic, Manual, Single positioning, Reset, Cycle
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
Relays output 250Vac 250Vac/10A (resistive load)	Start/forward/backward Slow/fast Positioning end Aux outputs
3 inputs ON-OFF optoisolated 5Vdc	Preset Emergency Start
Dimensions	96x96x120mm DIN 43700
Perforation profile	92x92 mm
Frontal protection degree	IP54
Working temperature	0 ÷ 50 °C
Electromagnetic compatibility	2014/30/EU
Low voltage	2014/35/EU
RoHS	2011/65/EU

Manufacturer
All communications to the manufacturer should be addressed to:
FIAMA s.r.l., Via G. Di Vittorio, 5/A - 43016 San Pancrazio (Parma) - Italy
Tel. (+39) 0521.672.341 - Fax. (+39) 0521.672.537 – e-mail: info@fiama.it - www.fiama.it