

Sommario

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The following is a list of operations to carry out to calibrate the space control of the axes (PI + FF).
 The space feedback permits to correct the axis position according to the follow error rilevato.
 In this page the data in yellow are those that allow to program the axis calibration parameters.
 The data in green is service data that loses significance when this page is exited.

Parameter name	Unit measure	Default	Range	Description
VOLTAGE OUT	V	0.0	-10.0 - 10.0	The output voltage value, expressed in tenths of a volt, sent directly to the device.
OFFSET	V	0.0000	-99.9999 - 99.9999	Voltage value that is added to the analog output to compensate the plant voltage offset.
SPEED	mm/'	-	-	The instant speed value of the axis.
MAX SPEED	mm/'	5000	0 - 9999999	Axis speed corresponding to 10V given by the analog output.
POSITION	mm	-	-	The instant position of the axis.
DELTA	mm	0.0	-	Delta of movement between one positioning and another.
SET SPEED	mm/'	0	-	Movement speed during positioning.
ACC. TIME	s	0.00	-	Acceleration time during positioning.
DEC. TIME	s	0.00	-	Deceleration time during positioning.
FEEDFORWARD	%	100.0	0.0 - 200.0	The percentage coefficient that, multiplied by the speed, generates the feed-forward part of the regulation output.
PROP. GAIN	-	0.000	0.000 - 9.999	The coefficient that, multiplied by the follow error, generates the proportional part of the regulation output.
T INTEGRAL	s	0.000	0.000 - 9.999	The time that produces the integration coefficient of the follow error. The integration of this error multiplied by this coefficient generates the integral part of the regulation output.
MAX FOLLOW ERR.	mm	99.9	0.0 - 99999.9	Defines the maximum acceptable drift between the theoretic position and real position of the axis.
FOLLOW ERR.	mm	-	-	The instant reading of the follow error.

The following operations must be carried out when the following parameters have been set in the axis parameter screens:

- RESOLUTION: set the correct resolution.
- MAX POSITION: enter a very large positive setting (Es.: 9999 mm)
- MIN POSITION: enter a very large negative setting (Es.: - 9999 mm)

To carry out one of the calibrations described above, there must be the following conditions:



Make sure that the emergency stop shuts off the power to the motors so that a safety condition can be entered in the event of uncontrolled machine movement.



Restore any emergency conditions on the machine by resetting the alarms.

Setup of the parameter **OFFSET**

1



Press to activate the calibration.

2

Enter 0 (zero) in the parameter **OUT VOLTAGE**.

3












Adjust the parameter **OFFSET** (by direct entry, using the buttons  , or by the automatic procedure from the button

) so that the axis **POSITION** is not variable (or varies very slowly).

4



Press to disactivate the calibration.

Check count and direction of rotation:	
control that an output voltage greater than 0 (zero) corresponds to an increasing variation in the axis position.	
1	 <p>Press  per attivare la calibrazione.</p>
2	Enter a positive value in parameter VOUT .
3	Check that the POSITION parameter increases.
4	 <p>Press  to deactivate the calibration: the output voltage VOUT goes to zero without a ramp.</p>
5	 <p>If the motor does not rotate in the correct direction change the cabling by inverting the PHA and PHB signals.</p>
Maximum speed:	
determine the axis movement speed that corresponds to a 10V output voltage.	
1	 <p>Press  to activate the calibration.</p>
2	Enter a positive value in the parameter VOUT (If possible enter a value close to 10V).
3	Read the value shown in parameter SPEED .
4	<p>Determine the value of parameter MAX SPEED with the formula:</p> $\text{MAX VELOCITA} = \frac{10 \cdot \text{VELOCITA}}{\text{VOUT}}$
5	 <p>Press  to deactivate the calibration: the VOUT output voltage will go to zero without ramp.</p>
6	Enter the value calculated in MAX SPEED .

Parameters for the space feedback:

the parameters involved are **FEEDFORWARD**, **PROP. GAIN** and **T INTEGRAL**. When the previous steps have been completed correctly, continue as follows:

1	Enter 100.0% in the parameter FEEDFORWARD .													
2	Enter the minimum setting (0.001) in the parameter PROP. GAIN .													
3	If the FOLLOW ERR reading is different to 0 (zero), an axis movement that tends to reduce this reading should be noted.													
4	Now enter a space setting in the parameter DELTA and a speed setting in the parameter SET SPEED (lower than MAX SPEED).													
5	<div><div>POSIZIONATORE</div><div>STOP</div></div> Press <div><div>POSIZIONATORE</div><div>STOP</div></div> to start the sequence of axis movements.													
6	The axis being calibrated starts a forward movement equal to the space in DELTA at the speed in SET SPEED .													
7	At the end of the first positioning, the axis returns to the initial position to then restart the movement.													
8	<p>During these movements, control the FOLLOW ERR reading and adjust the parameters FEEDFORWARD and PROP. GAIN to try and keep its value as low as possible.</p> <p>Follow these criteria:</p> <ul style="list-style-type: none">• Gradually increase the PROP. GAIN setting until the axis does not vibrate excessively in the stop stage. Then slightly reduce the value to obtain an acceptable behaviour.• The FEEDFORWARD setting must be varied according to the following rule: <table><tr><th colspan="2" rowspan="2"></th><th colspan="2">FOLLOW ERR.</th></tr><tr><th>>0</th><th><0</th></tr><tr><td rowspan="2">Direction of movement</td><td>Forward</td><td>Increase FEEDFORWARD</td><td>Reduce FEEDFORWARD</td></tr><tr><td>Backward</td><td>Reduce FEEDFORWARD</td><td>Increase FEEDFORWARD</td></tr></table>			FOLLOW ERR.		>0	<0	Direction of movement	Forward	Increase FEEDFORWARD	Reduce FEEDFORWARD	Backward	Reduce FEEDFORWARD	Increase FEEDFORWARD
				FOLLOW ERR.										
		>0	<0											
Direction of movement	Forward	Increase FEEDFORWARD	Reduce FEEDFORWARD											
	Backward	Reduce FEEDFORWARD	Increase FEEDFORWARD											
9	<div><div>!</div></div> <p>During these movements overshooting the threshold for the follow error does not create a machine alarm, but is simply signaled by the symbol <div><div>✗</div></div>. So great care must be taken during this stage to the modifications of the PID parameters.</p>													
10	<div><div>POSIZIONATORE</div><div>RUN</div></div> Press <div><div>POSIZIONATORE</div><div>RUN</div></div> to conclude the positionings.													

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