

mico

RESEARCH EDITION

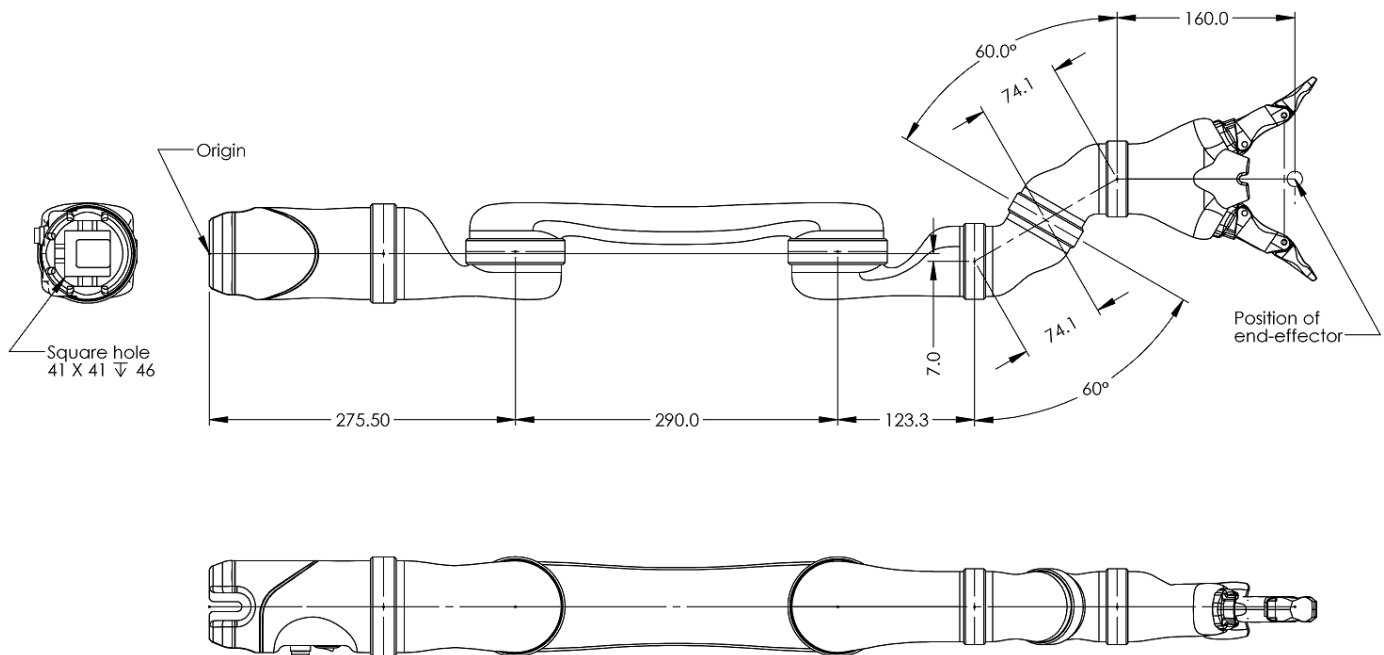


SPECIFICATIONS



MECHANICAL

TOTAL WEIGHT	5.0 Kg
MAXIMUM PAYLOAD	1.25Kg mid-range 750g full extension
MAXIMUM REACH	70 cm
GEAR SYSTEM	
Type	Harmonic Drive [™]
Gear ratio	1:136 (large actuator) 1:110 (small actuator)
Back drivability	When shutdown
MAXIMUM LINEAR ARM SPEED	20 cm/s
AMBIANT TEMPERATURE	-10 °C to 40 °C expected
WATER RESISTANCE	IPX2 expected



ELECTRONIC

UTILIZATION VOLTAGE	18 VDC to 29 VDC
AVERAGE POWER	25 W
PEAK POWER	80 W
CONTROL SYSTEM FREQUENCY	500 Hz (Possibility of 1 KHz in open-RS485)
CPU	360 MHz
USB 2.0	12 Mbps
RS485 Internal	11.25 Mbps
CANBUS External	1 Mbps
SLIP RING Location	1 in every actuator
EXPANSION CARDS	
Connectors	2 expansion cards connectors
Protocol	SPI
2 internal / external expansion wires	

CONTROLLER FEATURES

EACH ACTUATOR CONTROLLED INDEPENDENTLY
REDUNDANT SECURITY ON EACH ACTUATOR / FINGER
REDUNDANT ERROR CHECK IN ACTUATORS AND CONTROL SYSTEM
POSITION AND ERROR CALCULATION EVERY 0.01 SECOND
SINGULARITY AVOIDANCE SYSTEM
CARTESIAN AND ANGULAR TRAJECTORY CONTROL
FORCE AND TORQUE CONTROL

LARGE ACTUATORS - Specifications

QUANTITY IN ARM	3
MOTOR TYPE	Brushless DC motor
GEAR TYPE	Harmonic Drive [™] ratio 1:136

DIMENSIONS

Diameter	74.5 (-0.010 / -0.056) mm
Height	70 mm
Input fixation type	8X M4 screws (10 mm deep)
Output fixation type	8X M4 screws (10 mm deep)

TOTAL WEIGHT	0.6 Kg +/- 3%
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NUMBER OF TURNS	+/- 27.7 turns
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MOTOR TEMPERATURE	Maximum	80°C
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VELOCITY	Maximum	9 RPM
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COMMAND/SEC	Maximum	54 ° / sec
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UTILIZATION VOLTAGE	18 VDC to 29 VDC
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CURRENT

Continuous	0.75 A
Peak	1.5 A

TORQUE

Continuous	9.5 Nm
Peak / Momentary peak	18 Nm / 29 Nm

ABSOLUTE POSITION SENSOR

At Start-up	+/- 1.5°
Once indexed	+/- 0.040°

(After 7 degrees movement max in any direction)

RELATIVE HALL EFFECT POSITION SENSOR	+/- 0.055°
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(Motor side sensor, equivalent output precision)

RELATIVE ENCODER POSITION SENSOR	+/- 0.020°
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(After reducer output encoder)

TORQUE SENSOR

Cross-Axis Sensitivity	0 - 8%
Precision	+/- 0.4 Nm (At room temp)
Temperature error	+/- 0.3 Nm (Over temperature range)

OTHER SENSORS

Accelerometer	+/- 3g in X, Y, Z. 50Hz Bandwidth
Actuator current	+/- 5 A Range.
Temperature	+/- 2°C Max. Accuracy

Note: Torque, current and velocity values are based on 24V alimentation

SMALL ACTUATORS - Specifications

QUANTITY IN ARM	3
MOTOR TYPE	Brushless DC motor
GEAR TYPE	Harmonic Drive [™] ratio 1:110
DIMENSIONS	
Diameter	58 (-0.010 / -0.056) mm
Height	65 mm
Input fixation type	6X M3 screws (4.5 mm deep)
Output fixation type	6X M3 screws (4.5 mm deep)
TOTAL WEIGHT	0.36 Kg +/- 3%
NUMBER OF TURNS	+/- 27.7 turns
TEMPERATURE Maximum	80°C
VELOCITY Maximum	18 RPM
COMMAND/SEC Maximum	108 ° / sec
UTILIZATION VOLTAGE	18 VDC to 29 VDC
CURRENT	
Continuous	0.8 A
Peak	1.6 A
TORQUE	
Continuous	3.8 Nm
Peak / Momentary peak	9.8 Nm / 15.7 Nm
ABSOLUTE POSITION SENSOR	
At Start-up	+/- 1.5°
Once indexed	+/- 0.040°
<i>(After 7 degrees movement max in any direction)</i>	
RELATIVE HALL EFFECT POSITION SENSOR	+/- 0.068°
<i>(Motor side sensor, equivalent output precision)</i>	
RELATIVE ENCODER POSITION SENSOR	+/- 0.020°
<i>(After reducer output encoder)</i>	
TORQUE SENSOR	
Cross-Axis Sensitivity	0 - 8%
Precision	+/- 0.4 Nm (At room temp)
Temperature error	+/- 0.3 Nm (Over temperature range)
OTHER SENSORS	
Accelerometer	+/- 3g in X, Y, Z. 50Hz Bandwidth
Actuator current	+/- 5 A Range.
Temperature	+/- 2°C Max. Accuracy

Note: Torque, current and velocity values are based on 24V alimentation

FINGER ACTUATORS - Specifications

QUANTITY IN ARM	2
MOTOR TYPE	Brushless DC motor
GEAR TYPE	Lead screw – 1 mm pitch
TOTAL WEIGHT	0.13 Kg +/- 3%
MOTOR TEMPERATURE	Maximum 80 °C
VELOCITY	Linear max. 30 mm / sec
TRAVEL	21 mm
UTILIZATION VOLTAGE	18 VDC to 29 VDC
CURRENT	
Continuous	0.4 A
Peak	1.4 A
FORCE	
Continuous	60 N
Peak	120 N
RELATIVE POSITION SENSOR	+/- 0.017 mm
OTHER SENSORS	
Current	+/- 2 A Range.
Temperature	+/- 2 °C Max. Accuracy

Note: Torque, current and velocity values are based on 24V alimentation

GRIPPER

FINGERS	
Quantity	2
Actuation system	Under actuated
Actuators	One per finger
Sensors	1 current sensor / actuator 1 temperature sensor / actuator 1 optical encoder position sensor / actuator

API AND SOFTWARE

API	
Compatibility	Windows, Linux Ubuntu & ROS
Port	USB 2.0
Programming languages	C# & C++