MicroTorque

Precision Electric Rotary Actuator

- ***High Resolution with ±0.1° Accuracy***
- ***100% Duty Cycle***
- ***Easy 3-button setup***
- ***Adaptive control continuously adjusts to changes in load and operating conditions***
- ***Electric Braking reduces overshoot***
- ***Stall and Thermal Overload Protection***
- ***Tamper-proof internal manual override***
- ***Polarity Detection allows direct or reverse acting operation without re-wiring***

The MicroTorque electric rotary actuator is designed to provide high resolution, high-accuracy positioning for valves and dampers. It continuously monitors and compensates for actuator backlash, motor coast, and load changes to eliminate positioner deadband. The 0.2 degree resolution stabilizes the process by preventing oscillation resulting in cooler motor operation, reduced wear on valve seals and stem packing, and lower maintenance costs.

The patented control circuitry allows the MicroTorque actuator to bridge the gap between the larger,high priced actuators and the less accurate economy models. The pulsed modulation control prevents thermal overload while providing excellent torque and response time.

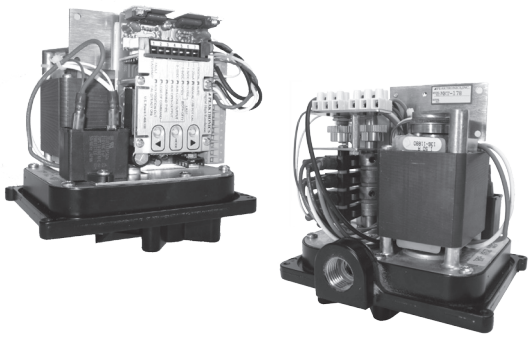
MicroTorque has twice the resolution of commonly used pneumatic smart positioners, and as much as ten times the resolution of conventional electrical positioners, with a positioning accuracy of 0.1 degree. The standard Feedback Potentiometer provides 6000 points of resolution for extremely accurate positioning.

A standard electric brake feature stops the motor before changing actuator direction, reducing valve wear due to cycling.

The multiple standard inputs and variety of plug-in modules allow for many options. This paired with the easy-to-use pushbutton LED interface make commissioning quick and simple.

Built-in stall detection often eliminates the need for commonly used torque switches, and thermal tripping of the actuator motor is avoided if the motor is stalled.

MicroTorque's Duty Cycle Protection allows safe modulation with continuous duty cycle. This feature activates prior to tripping of the thermal overload protector, which prevents long-term shutdown periods. It eliminates damage to actuator internal motor components caused from continuously tripping the thermal overload, and prevents damage to the actuator due to poorly tuned PID control loops.



The MicroTorque actuator can be configured to accept 4-20mA, 1-5V, 0-5V, 0-10V, or a digital input signal. Two standard limit switches are preconfigured at the factory for 90° rotation. The stroke is field-adjustable from 30° to 270°. The **Polarity Detection feature** automatically determines which motor winding to control based on where the open and closed positions are set; this feature also eliminates the need to rewire the unit for direct or reverse acting applications.

When using 1-5V, 4-20mA or a digital signal, The MicroTorque includes a **failsafe position feature** for 1-5V, 4-20mA or digital input that detects when the input is lost or out of range. The Fault indicator will flash and the actuator will be moved to one of three preset positions: the open position, the closed position, or the position last attained prior to losing the input signal.

Two **auxiliary functions** are provided as standard and are associated with the open and closed positions. The MicroTorque activates these functions when the position falls between the defined open/closed position and the Auxiliary Open/Closed position. The Feedback Transmitter/Relay Output option is required to use these outputs, which can be used to drive alarms or act as auxiliary limit switches.

The **simple three button control** allows the user to perform a complete set-up from the MicroTorque itself without the need for any instrumentation. The adaptive control feature eliminates the need for any calibration steps. In the simplest application, only the closed and open positions need to be set and the unit automatically and continuously sets all other parameters when placed in the AUTO mode.

The **Electronic Brake** feature of the MicroTorque provides highly reliable and accurate braking of the motor, and it is a key element in achieving high resolution. The combination of the electronic brake and **Adaptive Control Algorithm** automatically adapts to changes in the load. Adaptive control regulates power to the motor windings, allowing the actuator to make small adjustments to position and compensate for actuator backlash and motor coast, resulting in very small deadband.

The **Automatic Duty Cycle Control** feature allows continuous operation of the motor until it detects an excess heat build up in the motor (usually well below the limit of the thermal switch). At that time, duty cycle operation is automatically enabled and continues until the motor cools enough to resume continuous operation. This operation does not impact the MicroTorque's resolution performance, and it prevents disruption of a process due to a thermal switch shutdown.

The standard **Stall Detect** feature will reset if the command signal reverses direction and movement is possible in reverse direction. If the actuator is also stalled in the reverse direction then a double stall occurs, which requires a power down or manual override to reset. The Stall Detect can also be useful for detecting if any of the motor wires become disconnected.

One size fits most. The MicroTorque features a standard ISO-5211 mounting configuration that accommodates F03, F05 and F07 mounting patterns, simplifying selection and spares inventory.

OPTIONS

MicroTorque offers field-interchangeable plug-in option boards and modules that easily allow you to change the functionality of the actuator.. These are mounted inside the actuator housing for maximum environmental protection. MicroTorque provides one option board slot and one option module space so you can mix and match to suit your requirements.

Feedback Transmitter option board- provides an output signal that can be scaled to any range from 0 to 20mA (for the current output) or from 0 to 10V (for the voltage output).

Feedback Transmitter / Relay output option board- provides an output signal that can be scaled to any range from 0 to 20mA (for the current output) or from 0 to 10V (for the voltage output), plus three relay contact outputs that can be used to drive alarm devices or provide process limit switches.

Isolated 2-Wire Feedback Transmitter option board - provides an isolated 4-20mA output signal that can be scaled to any range from 4 to 20mA. The electrically isolated 4-20mA output is loop-powered and requires only 2 wires. An on-board LED indicates when loop power is present.

Feedback Transmitter option module - provides a 4-20mA signal proportional to the potentiometer value

4-20mA Slide Wire Transmitter option module - converts a slide wire input (with total resistance of 100 ohms to 10K ohms) to a 2-wire 4-20mA current loop.

RS-485 Modbus® option module - provides an isolated RS-485 bus connection using the Modbus protocol. On-board dip switches allow configuration of bus settings: mode, baud rate, parity, node address, and line terminating resistor.

Heater - for installations to -20° C. Must be ordered with actuator; not available as field retrofit.

SPECIFICATIONS

GENERAL

Output Torque: 400 lb-in (N M)

Stroke: Factory set 90º, field adjustable 30-270º

Stroke time: 16 seconds/90°

Resolution: 450 positions through 90°

Accuracy: ±0.1º

Repeatability: 0.18º (0.2% of span)

Duty Cycle: Continuous (100%)

Starts/hour: 1800

Input Signals:
4-20mA, 0-5 VDC, 0-10VDC, 1-5VDC

Input Impedance:
20K ohms (1-5 VDC, 0-5 VDC, 0-10 VDC Input)
251 ohms ±1% (4-20 mA Input)

Feedback Potentiometer 1K ohm, 6000 pts resolution

Zero and Span Adjust: pushbutton configuration

Loss-of-Signal Threshhold:
< 0.75V or > 5.5V (1-5 VDC input)
< 3mA or > 22mA (4-20mA input)

Failsafe Operation: Open, Closed or Last Position

Communications: Modbus RTU, RS-485 (option)

ELECTRICAL

Power supply:

117VAC ±10%, 50/60 Hz

234VAC ±10%, 50/60 Hz

24VAC ±10%, 50/60 Hz

Power consumption: 70 VA (normal), 250VA (max)

Motor Off-state Leakage Current: < 15mA

Maximum Load Current: 5A @ 60ºC

ENVIRONMENTAL

Enclosure rating: UL Type 4 (NEMA 4), IP66

Operating Temperature: 0ºC to +60ºC (32ºF to 140ºF)

With heating option: -20ºC to +60ºC (-4ºF to 140ºF)

Storage Temperature: -40°C to +85 °C (-40°F to +185 °F)

Relative Humidity: 0 to 90 % (noncondensing)

PHYSICAL

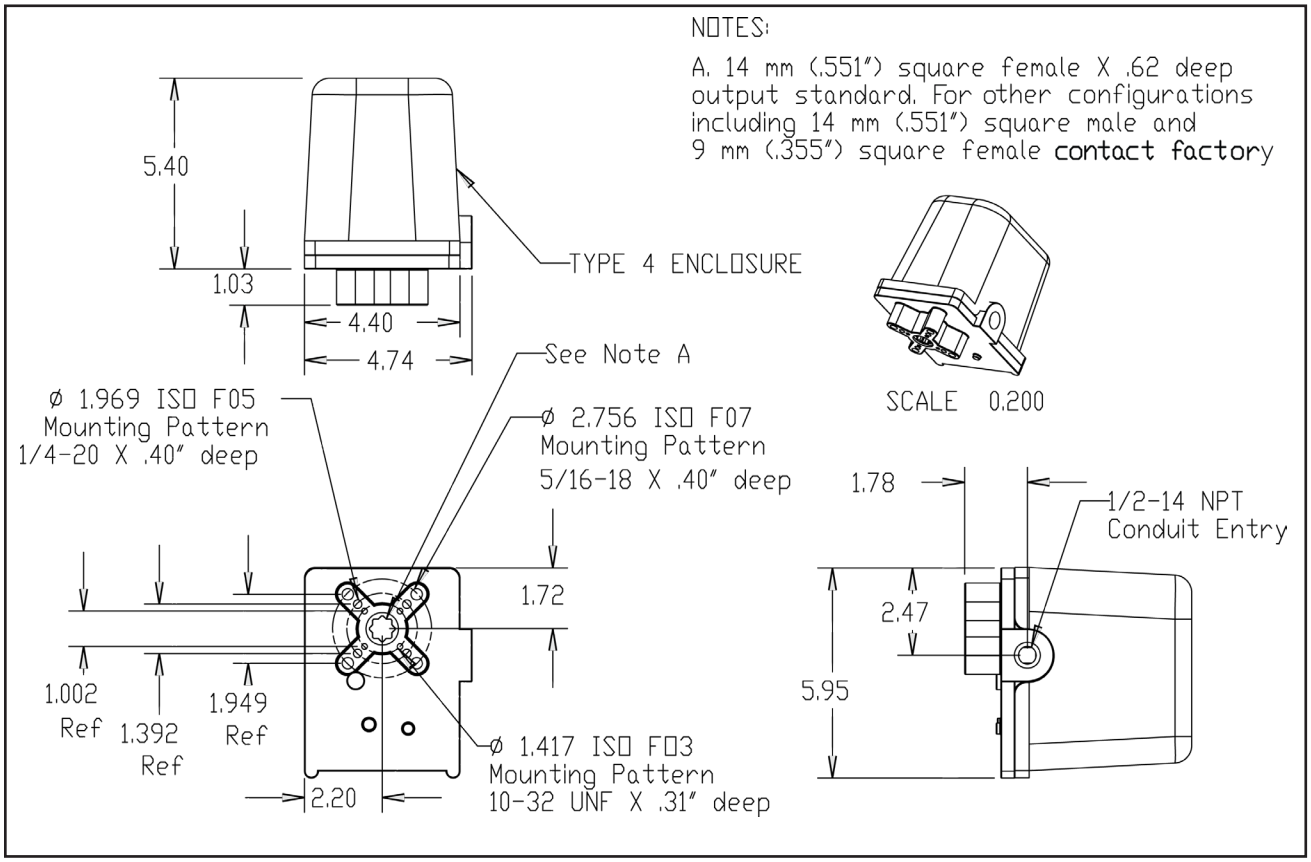
Lubrication: Lubrico LM203

Cover material: PVC composite

Base material: Diecast Zinc alloy

Gear train material: 1018 low carbon steel

DIMENSIONS



Note: Minimum height clearance for mounting: 7.43 in (18.87 cm)

	MT	400	__	__	__		A
	01 - 02	03-05	06	07	08	09	10
BASE INSTRUMENT MicroTorque Quarter-Turn Electric Actuator	MT						
TORQUE 400 in/lb		400					
POWER REQUIREMENTS 115V AC 50/60 Hz			1				
OPTION BOARDS *(see note 1)* None Feedback transmitter output 4-20mA Isolated 2-wire feedback output 4-20mA Feedback transmitter output 4-20mA with relay output (3) RS-485 Modbus RTU Communications				0 1 2 3			
OPTION MODULES *(see note 1)* None Feedback Transmitter output 4-20mA Slide Wire Input, 4-20mA loop powered (for use with 100 ohm to 10K ohm slide wires)					0 1 2		
HEATING None Heater and thermostat for anti-condensation and operation to -40° C						0 H	
DESIGN LEVEL Design Level							A

Note 1: MicroTorque will accommodate one option board and one option module simultaneiously

Accessories:

Valve Mounting Bracket Kit - specify valve manufacturer and model number on order	MT-VMK

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