

## Final Control Elements

7: 18 sec. / 10 mm, 700 N

### MINI-TOP ELECTRONIC ACTUATOR

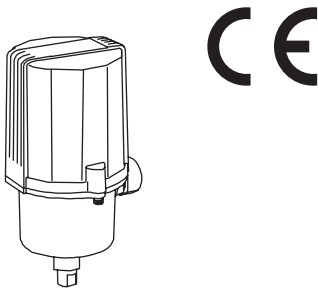
(linear type)

#### Functions & Features

- Small-size control valve actuator
- Electrical positioner incorporated
- 1/1000 high resolution
- Seal-spring incorporated for both directions; usable with three-way valves
- Easy adjustment: electronic limiter at the valve open & closed positions
- Overload protection
- Various power inputs
- Manual operation function option available
- CE marking for 24 V DC power

#### Typical Applications

- Actuator for automatic control valve in pilotplants
- Air-conditioning in buildings or plants
- Micro-flow control for pharmaceutical injection
- For small-size control valves



**MODEL: MSP5-[1][2][3][4][5]-[6][7][8][9]**

#### ORDERING INFORMATION

- Code number: MSP5-[1][2][3][4][5]-[6][7][8][9]
- Specify a code from below for each [1] through [9]. (e.g. MSP5-371LT-ACR/S/Q)
- Special input range (for codes Z and 0)
- Specify the specification for option code /Q (e.g. /SET)

#### [1] STROKE

- 1: 5 to 10 mm (.20" to .39")
- 3: 10 to 20 mm (.39" to .79")

#### [2] OPERATION TIME, THRUST

- 3: 5 sec. / 10 mm, 150 N
- 4: 9 sec. / 10 mm, 300 N

#### [3] OUTPUT STEM TYPE

- 6: M6 female thread, 0.75 pitch
- 8: M8 female thread, 1.0 pitch
- 1: M10 female thread, 1.25 pitch
- D: M6 female thread, 1.0 pitch
- E: M8 female thread, 1.25 pitch
- F: M10 female thread, 1.5 pitch

#### [4] SEQUENTIAL CONTROL SIGNALS

- L: Full-open/-closed signal
- F: Forced open/close signal
- B: Full-open/-closed and forced open/close signals (Select 'With Terminal Box.')
- 0: Without

#### [5] TERMINAL BOX

- T: With
- 0: Without

#### [6] INPUT

##### Current

- A: 4 - 20 mA DC (Input resistance 250 Ω)
- Z: Specify current (See INPUT SPECIFICATIONS)

##### Voltage

- 6: 1 - 5 V DC (Input resistance approx. 1 MΩ)
- 0: Specify voltage (See INPUT SPECIFICATIONS)

#### [7] CE MARKING

- C: With
- 0: Without

#### [8] POWER INPUT

##### AC Power

- K3: 100 - 120 V AC  
(Operational voltage range 90 - 132 V, 47 - 66 Hz)  
(Not selectable for CE)
- L3: 200 - 240 V AC  
(Operational voltage range 180 - 264 V, 47 - 66 Hz)  
(Not selectable for CE)

##### DC Power

- R: 24 V DC  
(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)

#### [9] OPTIONS (multiple selections)

##### Manual Operation Function

- blank: Without
- /S: With (Not available when DC power is selected.)



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## Other Options

blank: none

/Q: Option other than the above (specify the specification)

## SPECIFICATIONS OF OPTION: Q

### EX-FACTORY SETTING

/SET: Preset according to the Ordering Information Sheet  
(No. ESU-4854)

## GENERAL SPECIFICATIONS

**Degree of protection:** IP55

**Action:** Direct or reverse; field selectable with DIP switches  
(factory set to "reverse")

(In "reverse" action with upright mount, the output stem goes up with an input signal increase.)

**Operation at abnormally low input:** go up, go down or stop; moving direction when upright mount, field selectable with DIP switches (factory set to "go down")

**Detectable input drop level:**  $-16 \pm 2.5 \%$

### Electrical connection

#### •Without terminal box

**Wiring conduit:** G 1/2 female; cable connector with 1 meter wire ( $0.5 \text{ mm}^2$ ) provided

#### •Terminal box

**Wiring conduit:** G 1/2 female (two)

**Terminal screws:** M3 pillar terminal  
(Sequential control signal suffix code B)  
M3 chromated steel  
(other terminal box types)  
(torque 0.5 N·m)

**Housing material:** Diecast aluminum

**Drive:** Stepping motor

**Position detection:** Potentiometer

**Deadband:** 0.1 – 4.5 % adjustable (factory set to 1.5 %)

**Restarting timer:** 0 – 10 sec. adjustable  
(factory set to 1.5 sec.)

**Isolation:** AC power to signal

**Zero adjustment:** 0 – 25 %

**Span adjustment:** 50 - 100 %

**Protective functions:** Overload protection

**Power indicator:** Green LED turns on with power supplied.

**Input indicator:** Green LED turns on with normal input

**Status indicator LED:** Red light blinks in 2 sec. intervals in normal operations; blinks in 0.5 sec. intervals when a foreign object is detected mechanically caught inside.

**Manual operation:** Optional

•MSP5-x3: 27 turns/mm

•MSP5-x4: 54 turns/mm

•MSP5-x7: 112 turns/mm

## INPUT SPECIFICATIONS

■ **DC Current:** Input resistor incorporated (250  $\Omega$ )

■ **DC Voltage:** 1 – 5 V DC or specific range within 0 – 5 V DC, minimum span 1 V

(For a current input, convert the current to a voltage with 250  $\Omega$ )

**Input resistance:** Approx. 1 M $\Omega$

■ **Forced open/close signal:** Dry contact inputs to command to go up and go down

**Rating:** 5 V DC @ 2.5 mA

(go up and go down when upright mount)

## OUTPUT SPECIFICATIONS

■ **Operation Time & Torque** (at rated power voltage)

(Model: Operation Time: Thrust)

MSP5-x3: 5 sec. / 10 mm: 150 N (33.5 lbf)

MSP5-x4: 9 sec. / 10 mm: 300 N (67 lbf)

MSP5-x7: 18 sec. / 10 mm: 700 N (157 lbf)

■ **DC Voltage:** 1 – 5 V DC (not isolated)

With "direct" action, 5 – 1 V DC position output is provided proportionally to 4 – 20 mA DC (1 – 5 V DC) input.

**Load resistance:**  $\geq 5 \text{ k}\Omega$

■ **Full-open / -closed signals:** Limit switch contact

**Rating:** 125 V AC @ 0.75 A ( $\cos \phi = 1$ )

30 V DC @ 0.6 A (resistive load)

**Mechanical life:**  $3 \times 10^7$  cycles

**Maximum operation frequency:** 60 cycles/min.

## INSTALLATION

### Power consumption

•AC: Approx. 25 VA

•DC: Approx. 0.6 A

**Operating temperature:** -5 to +55°C (23 to 131°F)

**Operating humidity:** 30 to 85 %RH (non-condensing)

**Vibration:** 0.5 G (4.9 m/s<sup>2</sup>) max.

**Mounting position:** All directions

Do not mount the actuator with its output stem or cable connector on the upside if the actuator is to be exposed to dripping water.

### Weight

•DC powered: 1.2 kg (2.65 lb)

•AC powered: 1.4 kg (3.09 lb)

Add 0.7 kg (1.54 lb) for the terminal box.

## PERFORMANCE

**Resolution:** 1/1000 or 0.015 mm, whichever is greater, with 0.1 % deadband setting

### Insulation resistance

•AC powered:  $\geq 100 \text{ M}\Omega$  with 500 V DC

(signal or metallic housing to power)

$\geq 100 \text{ M}\Omega$  with 100 V DC



(signal to metallic housing)

• **DC powered:**  $\geq 100 \text{ M}\Omega$  with 100 V DC

(signal or power to metallic housing)

#### Dielectric strength

• **AC powered:** 1500 V AC @ 1 minute

(signal or metallic housing to power)

100 V AC @ 1 minute

(signal to metallic housing)

• **DC powered:** 100 V AC @ 1 minute

(signal or power to metallic housing)

standard spring has 0.5 – 1 mm (.02" – .04") flexibility to facilitate the full-closed adjustment.

## STANDARDS & APPROVALS

#### CE conformity:

EMC Directive (2004/108/EC)

EMI EN 61000-6-4: 2007/A1: 2011

EMS EN 61000-6-2: 2005

Low Voltage Directive (2006/95/EC)

EN 61010-1: 2010

Measurement Category II

Pollution degree 2

Full-open/-closed signal to other, power or metallic housing: Reinforced insulation (125 V)

## TERMINOLOGY

#### • Overload (Lock) Protection

The Mini-Top Series is equipped with a protection circuit against overload caused by for example the valve catching an alien substance.

When an overload is detected, the Mini-Top stops supplying power to the motor and the status LED blinks in 0.5 sec. intervals.

The protection is reset automatically with applying opposite-direction input signal or turning the power off and restarting.

#### • Restarting Timer

The Mini-Top Series is equipped with a timer circuit which gives an interval period (0 – 10 seconds) between stop-restart actions to prevent the motor and other internal components from overheating.

It is recommended to set a long restarting time when the ambient temperature and/or the temperature of flow material is high.

#### • Electronic Limiter

This model is equipped with electronic limiters in order to prevent mechanical locks when the input goes below 0 % or above 100 %.

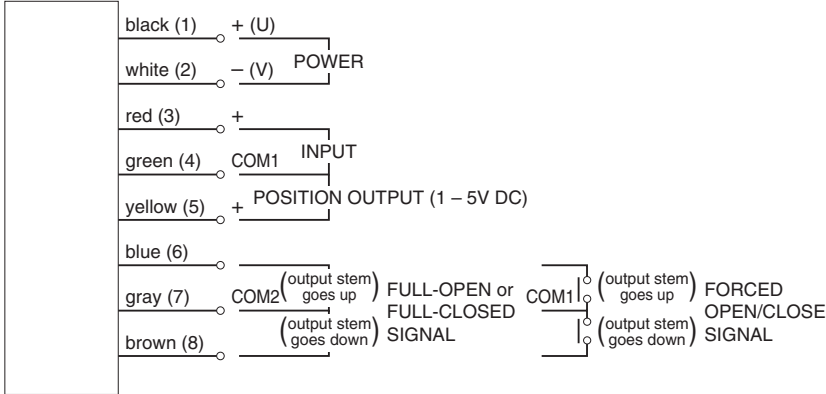
Limiters are set at approx. -1.5 % for the full-closed side, approx. 101.5 % for the full-open side.

#### • Seal-Spring

The Mini-top Series incorporates a seal-spring to maintain the sealing pressure when the valve is fully closed. The

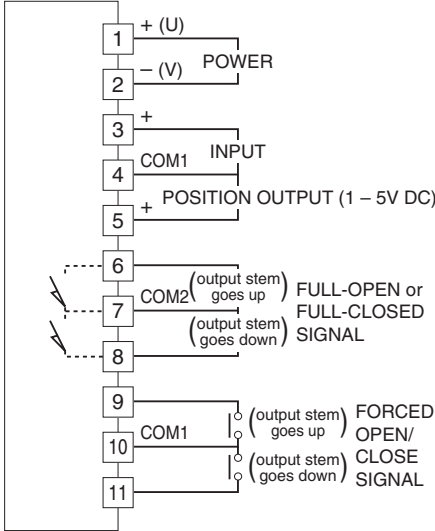


## TERMINAL CONNECTIONS

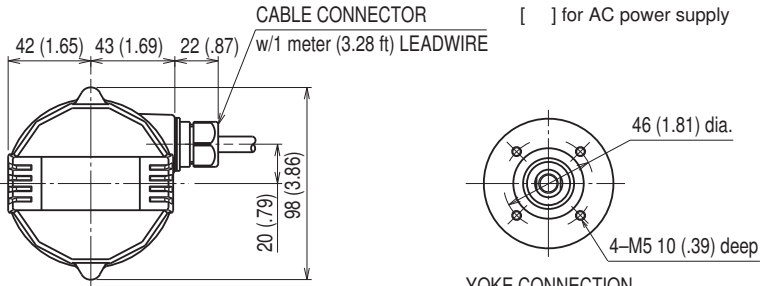


(1) to (8): Terminal No. of terminal box.  
Full-open/-closed signals and forced open/close signals are optional.

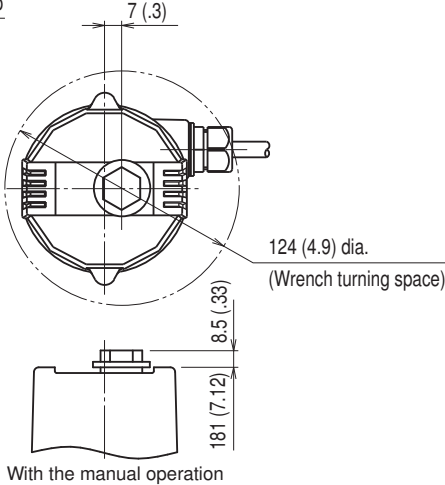
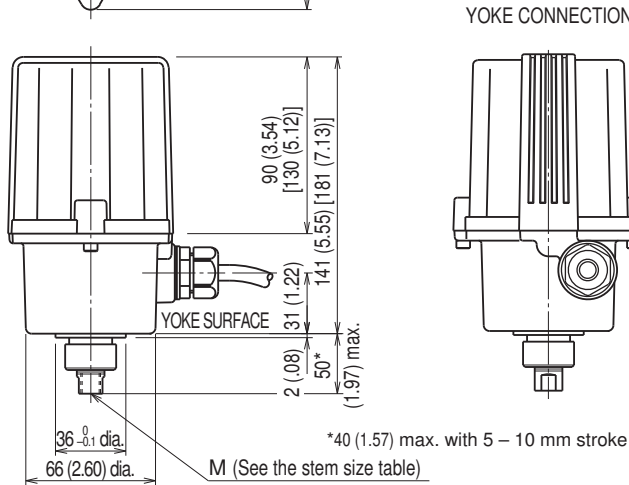
• With Both Full-open/closed Signal and Forced Open/Close Signal



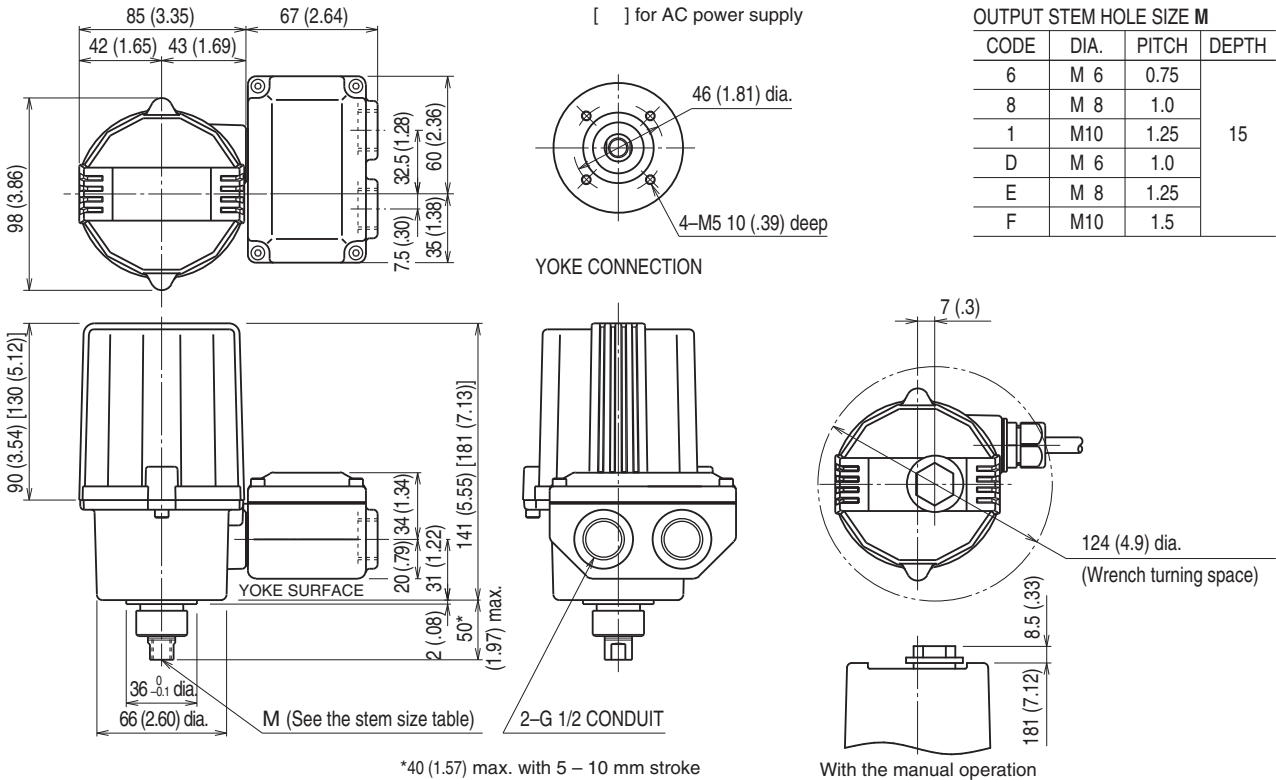
## DIMENSIONS unit: mm (inch)



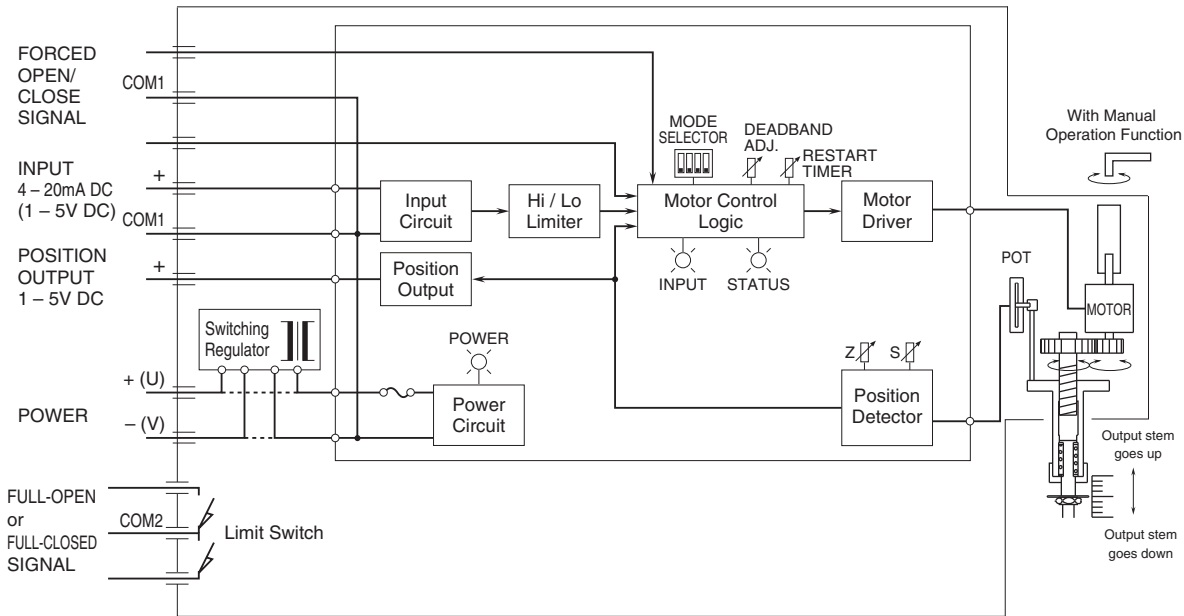
OUTPUT STEM HOLE SIZE M			
CODE	DIA.	PITCH	DEPTH
6	M 6	0.75	15
8	M 8	1.0	
1	M10	1.25	
D	M 6	1.0	
E	M 8	1.25	
F	M10	1.5	



## ■ TERMINAL BOX TYPE



## SCHEMATIC CIRCUITRY



Full-open/-closed signals and forced open/close signals are optional.  
Disregard the switching regulator circuit for DC power input.



Specifications are subject to change without notice.



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