

## Final Control Elements

### MINI-TOP ELECTRONIC ACTUATOR

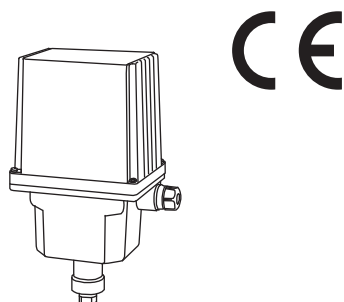
(linear type)

#### 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

#### 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: MSP6-[1][2][3][4]-[5][6][7][8]**

### ORDERING INFORMATION

- Code number: MSP6-[1][2][3][4]-[5][6][7][8]  
Specify a code from below for each [1] through [8].  
(e.g. MSP6-361T-ACR/L/Q)
- Special input range (for codes Z and 0)
- Specify the specification for option code /Q  
(e.g. /SET)

#### [1] STROKE

- 3: 10 to 20 mm (.39" to .79")  
4: 20 to 40 mm (.79" to 1.57")

#### [2] OPERATION TIME, THRUST

- 3: 5 sec. / 10 mm, 600 N  
4: 8 sec. / 10 mm, 1200 N  
6: 15 sec. / 10 mm, 2500 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] TERMINAL BOX

- T: With  
0: Without

#### [5] 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)

#### [6] CE MARKING

- C: With  
0: Without

#### [7] 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.)

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

##### Control Signals

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

##### 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 mm<sup>2</sup>) 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 operating handle:** Not available

## INPUT SPECIFICATIONS

■ **DC Current:** Input resistor incorporated (250 Ω)

■ **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 Ω)

**Input resistance:** Approx. 1 MΩ

■ **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)

MSP6-x3: 5 sec. /10 mm 600 N (135 lbf)

MSP6-x4: 8 sec. /10 mm 1200 N (270 lbf)

MSP6-x6: 15 sec. /10 mm 2500 N (562 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

(Current is approx. 1.5 times as high as the above figure during the motor startup)

**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:** 2.7 kg (5.96 lb)

**AC powered:** 2.8 kg (6.17 lb)

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

## PERFORMANCE

**Resolution:** 1/1000 or 0.02 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)

## STANDARDS & APPROVALS

### EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

Low Voltage Directive

EN 61010-1

Measurement Category II

Pollution Degree 2

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

RoHS Directive

EN 50581

## 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

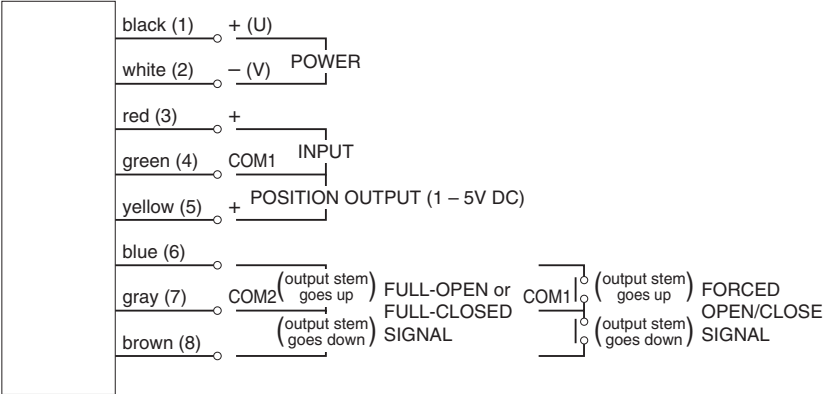
This model is equipped with electronic limiters in order to prevent mechanical locks when the input goes below 0 % or above 100 %.

Limiters are set at approx. -0.5 % for the full-closed side, approx. 100.5 % for the full-open side.

### • Seal-Spring

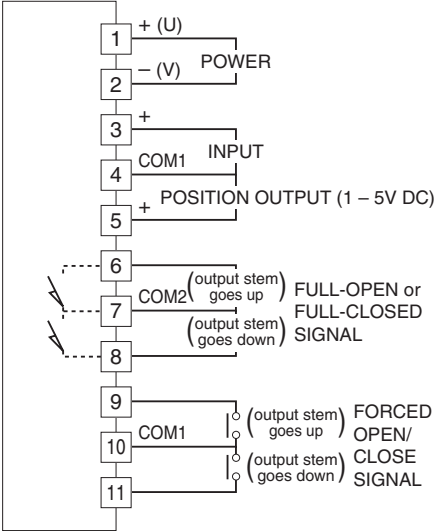
The Mini-top Series incorporates a seal-spring to maintain the sealing pressure when the valve is fully closed. The standard spring has 0.5 – 1 mm (.02" – .04") flexibility to facilitate the full-closed adjustment.

TERMINAL CONNECTIONS

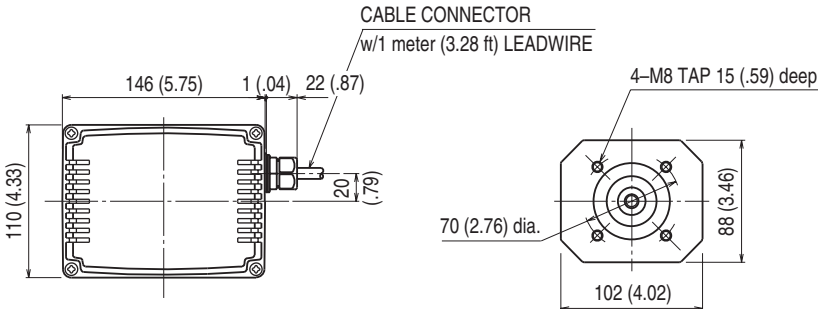


(1) to (8): Terminal No. of terminal box.  
Full-open/-closed signals and forced open/close signals are optional.

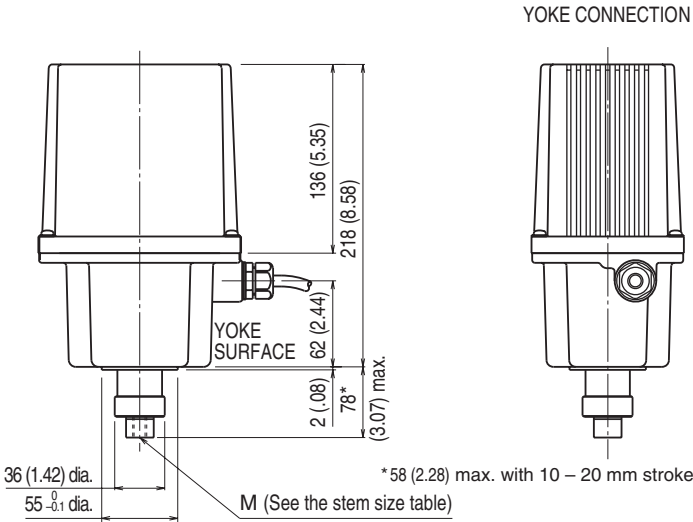
• With Both Full-open/closed Signal and Forced Open/Close Signal



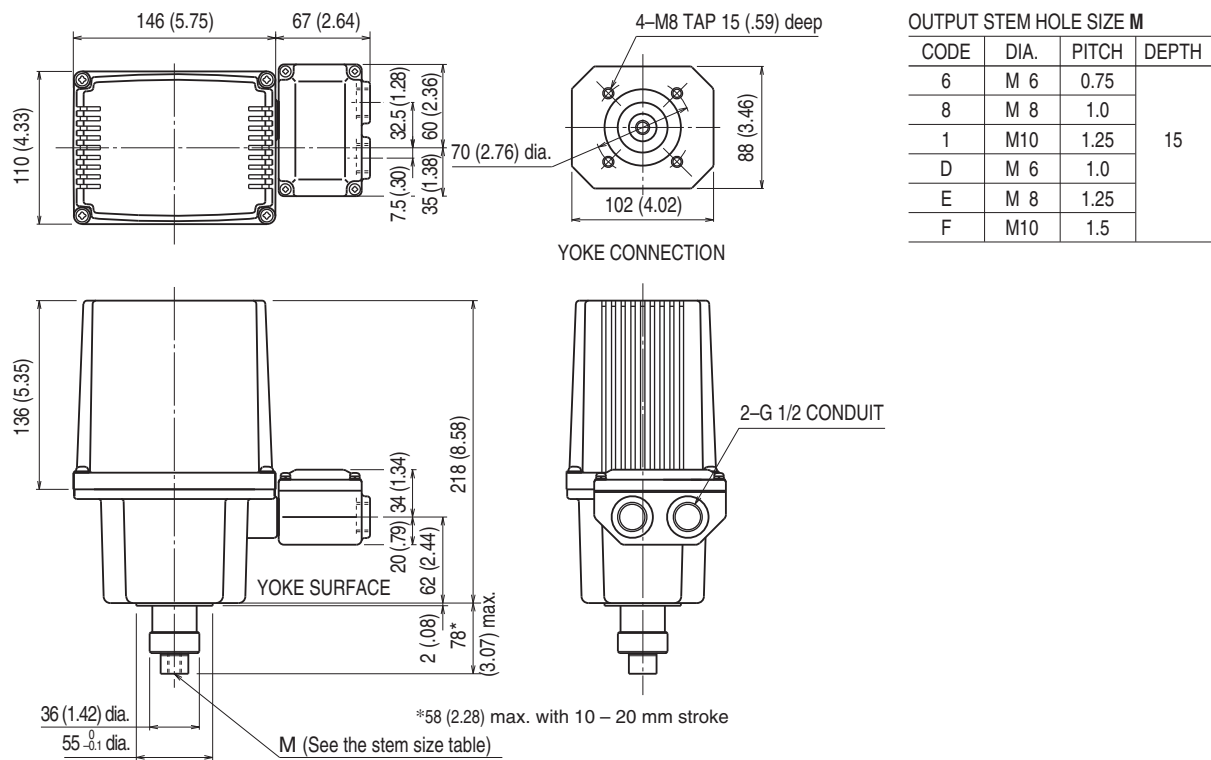
DIMENSIONS unit: mm (inch)



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	

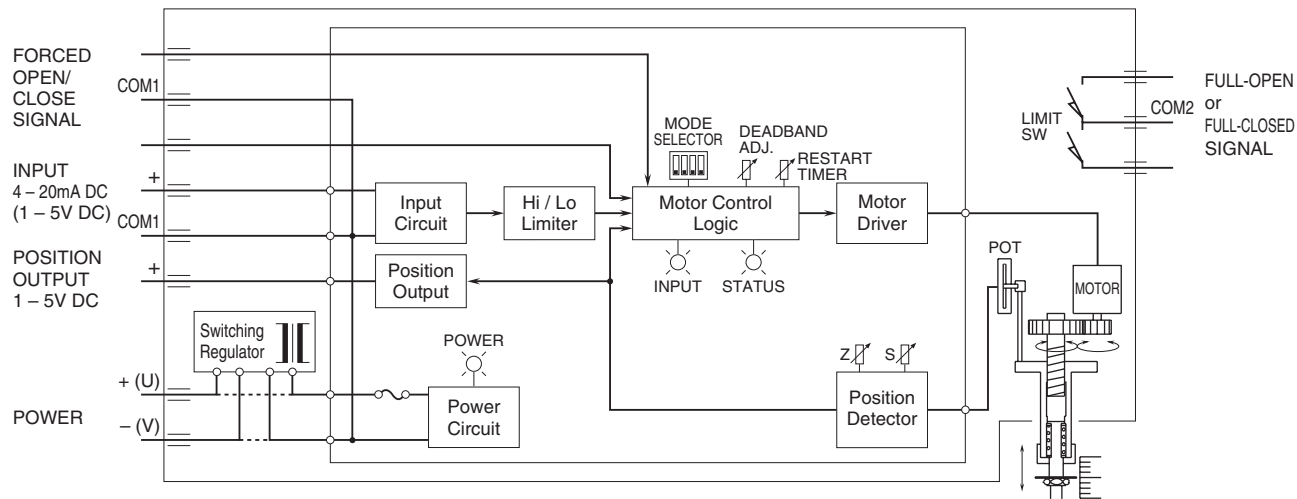


■ TERMINAL BOX TYPE



Cable connector or leadwires not provided with terminal box.

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.