

Final Control Elements

MINI-TOP ELECTRONIC ACTUATOR

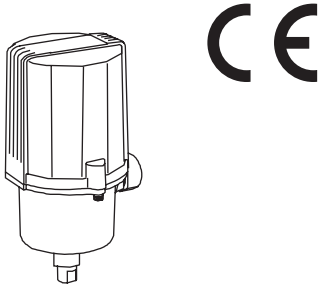
(linear type)

Functions & Features

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

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: MSP4-[1][2][3][4][5]-[6][7][8][9]

ORDERING INFORMATION

- Code number: MSP4-[1][2][3][4][5]-[6][7][8][9]
Specify a code from below for each [1] through [9].
(e.g. MSP4-271LT-ACRS)
- Special input range (for codes Z and 0)

[1] STROKE

- 1: 5 to 10 mm (.20" to .39")
- 2: 8 to 15 mm (.31" to .59")

[2] OPERATION TIME, THRUST

- 3: 5 sec. / 10 mm, 150 N
- 4: 9 sec. / 10 mm, 300 N
- 7: 18 sec. / 10 mm, 700 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
(1. 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

Manual Operation Function

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

GENERAL SPECIFICATIONS

Degree of protection: IP55

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

(In "reverse" action, the output stem is retracted with an input signal increase.)

Operation at abnormally low input: Extend, retract or stop; field selectable with DIP switches (factory set to "extend")

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

Electrical connection

• **No terminal box**

Wiring conduit: G 1/2 female; cable connector with 1 meter wire (0.5 mm²) 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 aluminium

Drive: Stepping motor

Position detection: Potentiometer

Deadband: 0.1 – 4.5 % adjustable (default 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 to 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

• MSP4-x3: 27 turns/mm

• MSP4-x4: 54 turns/mm

• MSP4-x7: 112 turns/mm

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 voltage 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 retract and extend

Rating: 5 V DC @ 2.5 mA

OUTPUT SPECIFICATIONS

• **Operation Time & Thrust** (at rated power voltage)

(Model: Operation Time: Thrust)

MSP4-x3: 5 sec. / 10 mm: 150 N (33.5 lbs)

MSP4-x4: 9 sec. / 10 mm: 300 N (67 lbs)

MSP4-x7: 18 sec. / 10 mm: 700 N (157 lbs)

• **Position Output:** 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: 5 kΩ min.

Full-open/closed signals: Limit switch contact

Rating: 125 V AC @ 0.75 A (cos φ = 1)

30 V DC @ 0.6 A (resistive load)

Mechanical life: 3×10^7 cycles

Maximum operation frequency: 60 cycles/min.

INSTALLATION

Power Consumption

• **AC power input:** Approx. 25 VA

• **DC Power input:** 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 max.

Mounting position: All directions

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

Weight

• **DC powered:** 1.2 kg (2.65 lbs)

• **AC powered:** 1.4 kg (3.09 lbs)

Add 0.7 kg (1.54 lbs) 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)

STANDARDS & APPROVALS

CE conformity:

EMC Directive (2004/108/EC)

EMI EN 61000-6-4: 2007

EMS EN 61000-6-2: 2005

Low Voltage Directive (2006/95/EC)

EN 61010-1

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 MSP 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 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

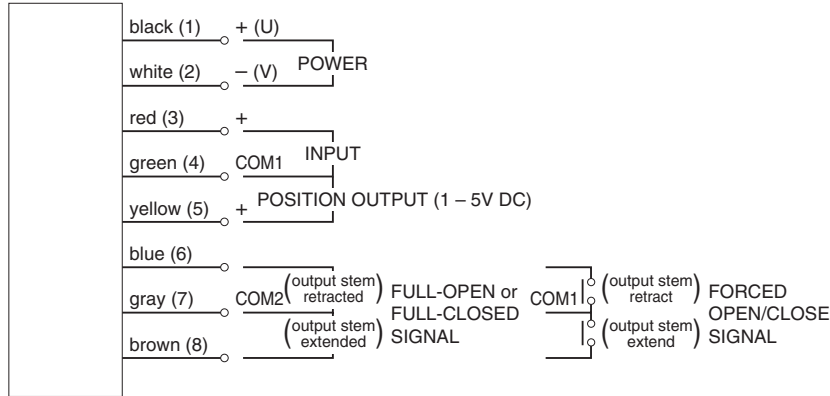
The Mini-Top Series is equipped with electronic limiters in order to prevent mechanical locks when the input goes below 0 % or above 100 %.

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

• Seal-Spring

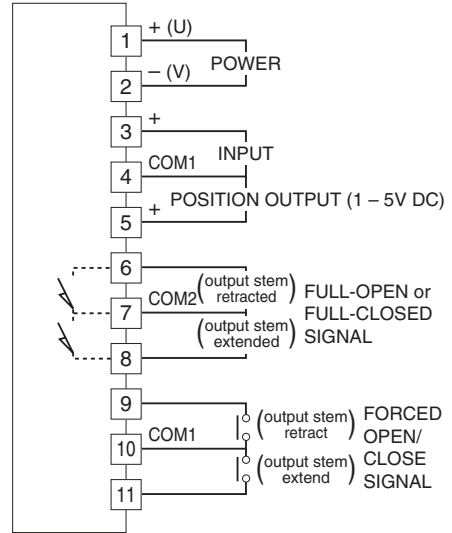
The Mini-Top Series incorporates a seal-spring to maintain the sealing pressure when the valve is fully closed. The standard spring has 0.5 - 1 mm (.02" - .04") flexibility to facilitate the full-closed adjustment.

TERMINAL CONNECTIONS

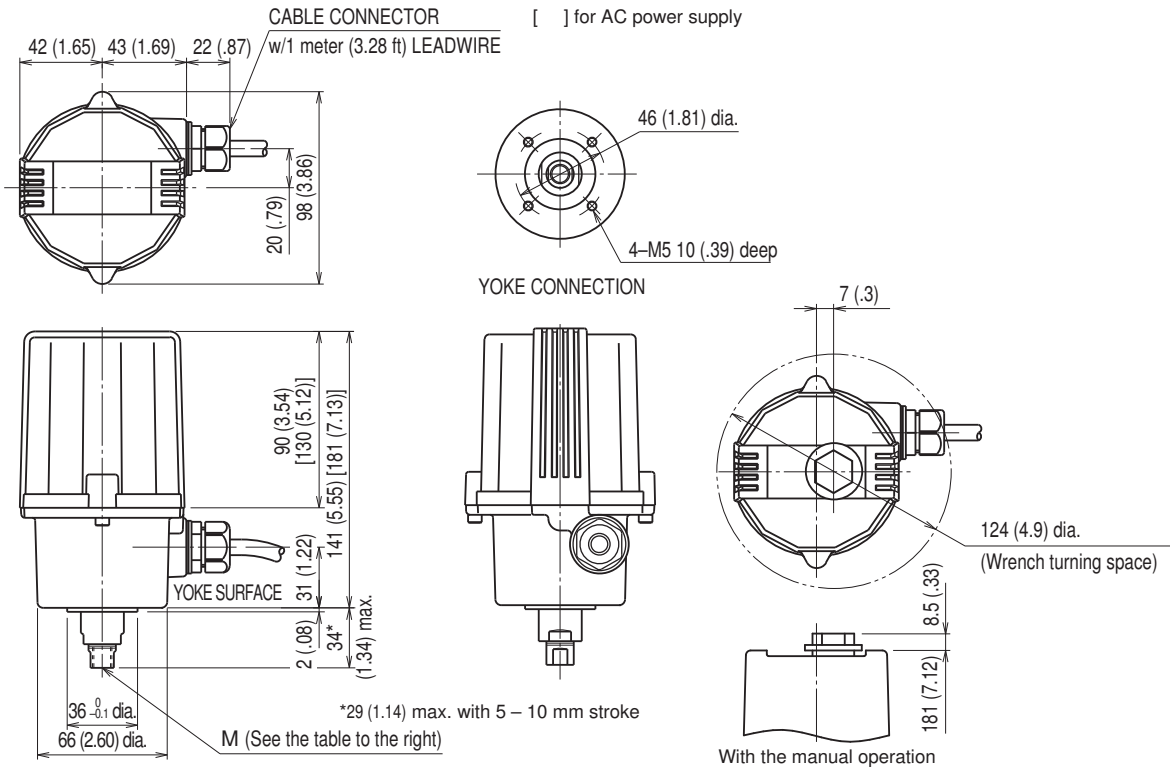


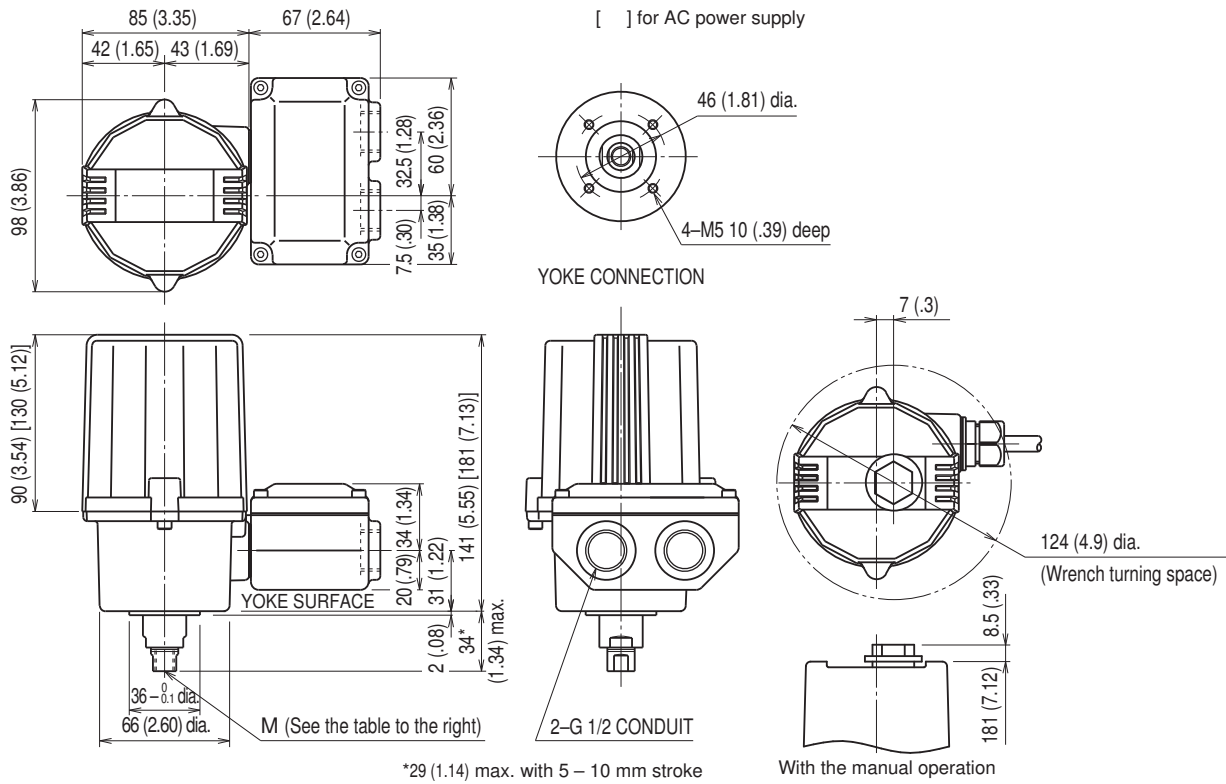
(1) to (8): Terminal No. of terminal box.
Full-open/-closed signals and forced open/close signals are optional.

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



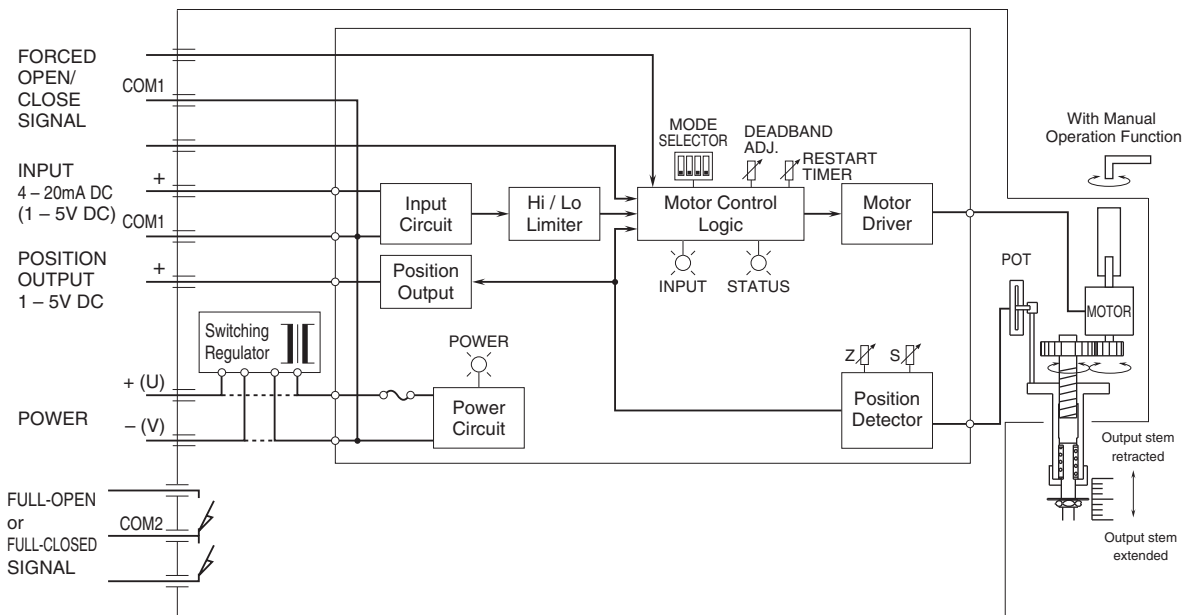
DIMENSIONS unit: mm (inch)





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.