

## Final Control Elements

### MINI-TOP ELECTRONIC ACTUATOR

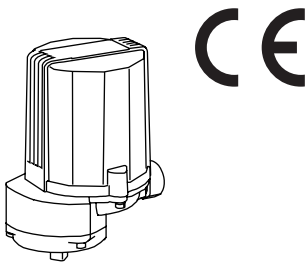
(rotary type)

#### Functions & Features

- Small-size control valve actuator
- Electrical positioner incorporated
- 1/1000 high resolution
- Easy adjustment: electronic limiter at the valve open & closed positions
- Overload protection
- Various power inputs
- 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: MRP4-[1][2][3][4]-[5][6][7]

#### ORDERING INFORMATION

- Code number: MRP4-[1][2][3][4]-[5][6][7]
- Specify a code from below for each [1] through [7]. (e.g. MRP4-14LT-A0R)
- Special input range (for codes Z and 0)

#### [1] SPAN

- 1: 45 to 90 degrees
- 2: 90 to 180 degrees

#### [2] OPERATION TIME, TORQUE

- 4: 7 seconds / 90°, 5 N·m
- 5: 13 seconds / 90°, 5 N·m

#### [3] 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.')

- E: Full-closed/overload signal (Not selectable for CE)
- 0: Without

#### [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.)

#### GENERAL SPECIFICATIONS

**Degree of protection:** IP66

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

(In "reverse" action, the output stem seen from the cover turns counterclockwise with an input signal increase.)

**Operation at abnormally low input:** Counterclockwise turn, clockwise turn or stop; field selectable with DIP switches (factory set to "clockwise")

Note: Counterclockwise or clockwise if seen from the cover.

**Detectable input drop level:** -16 ±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 clockwise and counterclockwise turns

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

## OUTPUT SPECIFICATIONS

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

MRP4-x4: 7 sec. / 90°; torque 5 N·m (3.69 ft·lbf)

MRP4-x5: 13 sec. / 90°; torque 5 N·m (3.69 ft·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:** ≥ 5 kΩ

■ **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<sup>7</sup> cycles

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

■ **Full-Closed/Overload Signal:** Relay contact

Full-closed signal trips at approx. 2 % of span.

**Rating:** 250 V AC @ 1 A (cos φ = 1)

30 V DC @ 1 A (resistive load)

## 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:** 1.1 kg (2.43 lb)

**AC powered:** 1.3 kg (2.87 lb)

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

## PERFORMANCE

**Resolution:** 1/1000 or 0.09°, whichever is greater, with 0.1 % deadband setting

**Insulation resistance**

• **AC powered:** ≥ 100 MΩ with 500 V DC (signal or metallic housing to power)

≥ 100 MΩ with 100 V DC

(signal to metallic housing)

• **DC powered:** ≥ 100 MΩ 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.

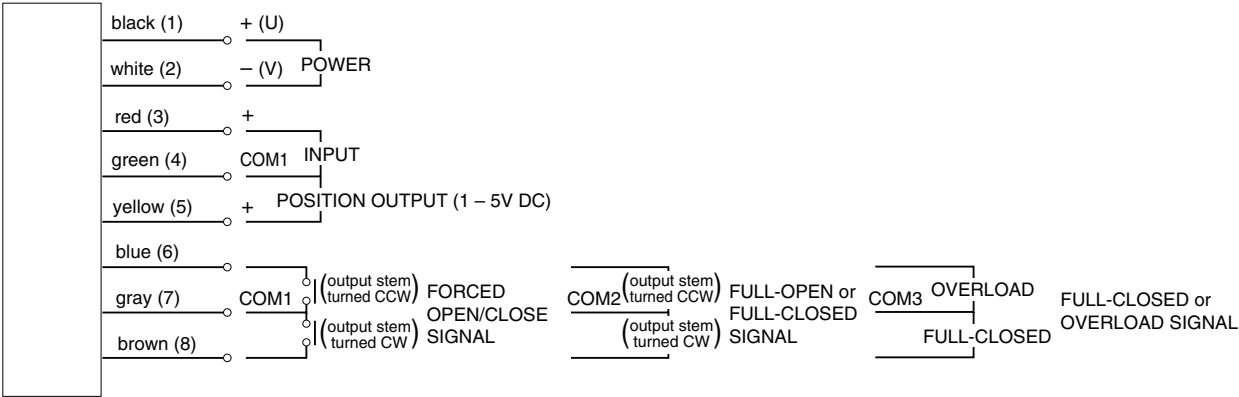
- **Full-open/-closed signal (limit switch contact)**

The Mini-Top series is optionally equipped with full-open/-closed signal that makes at full-open or -closed position. These positions are NOT proportional to the span and/or zero adjustments.

- **Full-closed/overload signal (relay contact)**

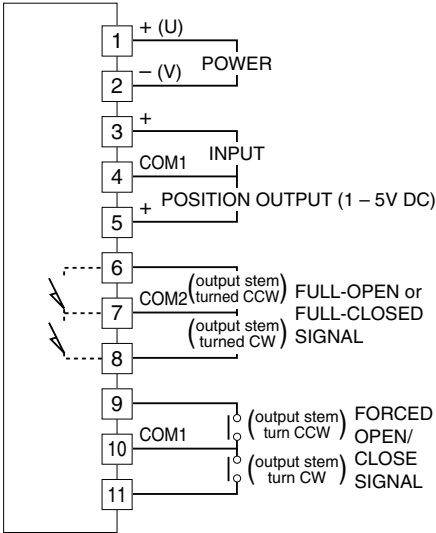
The Mini-Top series is optionally equipped with full-closed/overload signal that makes at full-closed position and/or detecting overload (see "Overload Protection"). This full-closed position is proportional to the span and/or zero adjustments.

**TERMINAL CONNECTIONS**

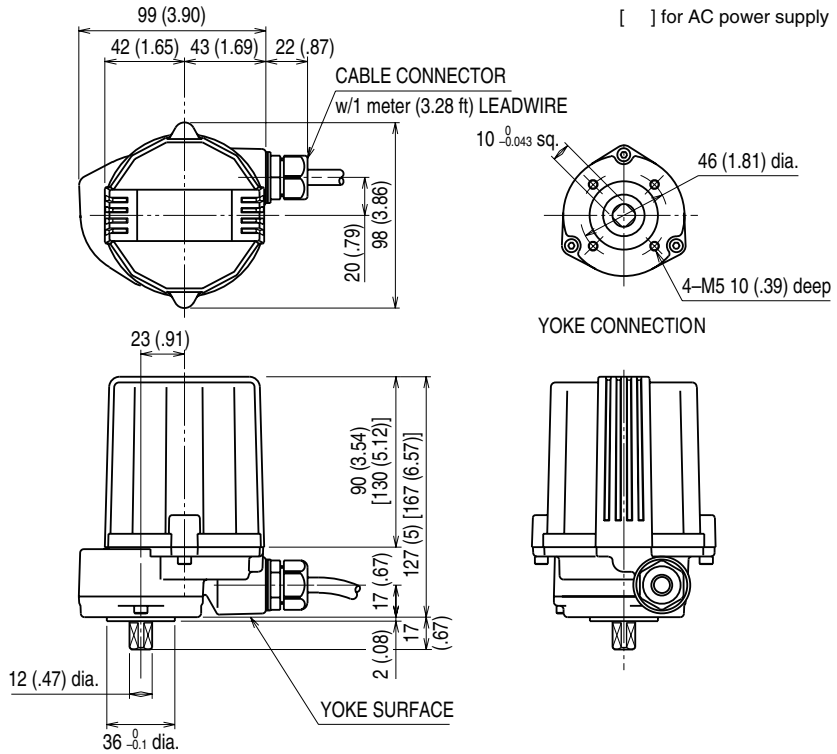


(1) to (8): Terminal No. of terminal box.  
 Full-open/-closed signals, forced open/close signals and full-closed/overload signals are optional.

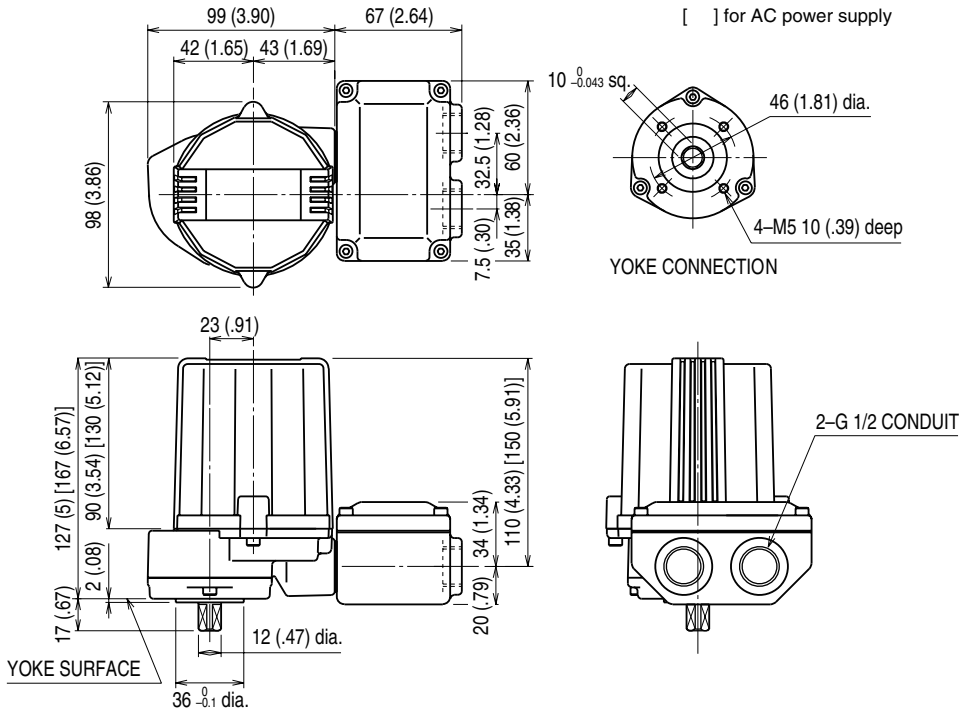
- With Both Full-open/closed Signal and Forced Open/Close Signal



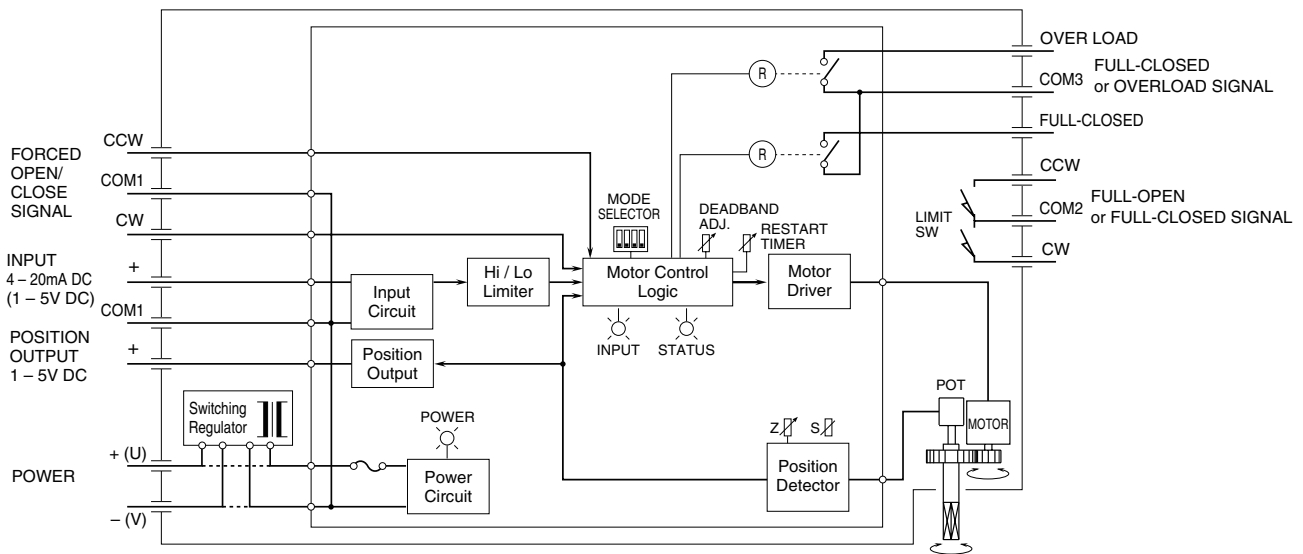
**DIMENSIONS unit: mm (inch)**



■ TERMINAL BOX TYPE



## SCHEMATIC CIRCUITRY



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



Specifications are subject to change without notice.