

## Final Control Elements

### MINI-TOP ELECTRONIC ACTUATOR

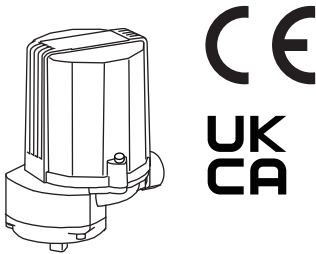
(rotary type)

#### Functions & Features

- Small-size control valve actuator
- 1/1000 high resolution
- Easy adjustment: electronic limiter at the valve open & closed positions
- Overload protection
- Various power inputs

#### Typical Applications

- Actuator for automatic control valve in pilot plants
- 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 of [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 or UKCA)

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 & UKCA MARKING

C: With CE and UKCA

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 and UKCA)

L3: 200 - 240 V AC

(Operational voltage range 180 - 264 V, 47 - 66 Hz)

(Not selectable for CE and UKCA)

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:** cable connector with 1 meter wire (0.5 mm<sup>2</sup>)

•With terminal box (Sequential control signal suffix code: B)

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

**Terminal screws:** M3 pillar terminal

•With terminal box (Sequential control signal suffix code: other than B)

**Wiring conduit:** G 1/2 female (two)  
**Terminal screws:** M3 chromated steel (torque 0.5 N·m)  
**Housing material:** Diecast aluminum  
**Drive:** Stepping motor  
**Insulation class:** E  
**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  $\Omega$ )  
**■ 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 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:**  $\geq$  5 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.  
**■ Full-Closed/Overload Signal:** Relay contact  
Full-closed signal trips at approx. 2 % of span.  
**Rating:** 250 V AC @ 1 A ( $\cos \phi = 1$ )  
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 0.5 kg (1.1 lb) for the terminal box.

## PERFORMANCE

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

### Insulation resistance

•AC powered:  $\geq$  100 M $\Omega$  with 500 V DC (signal or metallic housing to power)

$\geq$  100 M $\Omega$  with 100 V DC

(signal to metallic housing)

•DC powered:  $\geq$  100 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 (CE marking)

#### •EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

#### •Low Voltage Directive

EN 61010-1

Measurement Category II (125 V)

Reinforced insulation:

Full-open/-closed signal to other signals or power

Full-open/-closed signal to metal housing

Pollution Degree 2

#### •RoHS Directive

EN IEC 63000

### ■ UK conformity (UKCA marking)

The UK legislations and designated standards equivalent to the applicable EU directives.

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## 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.

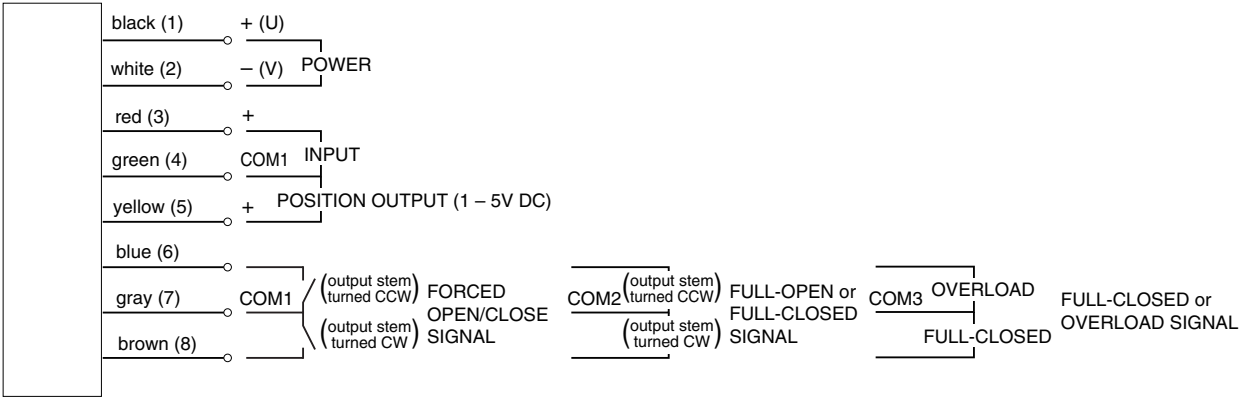
### • **Full-open/-closed signal (limit switch contact)**

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)**

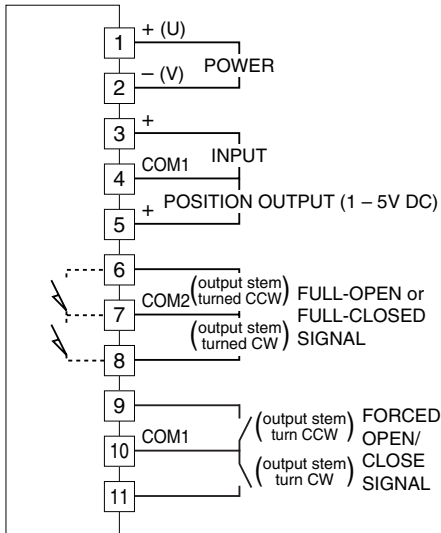
The Mini-Top series is optionally equipped with full-closed/overload signal that makes at full-closed position and/or detecting overload (see "Overload Protection"). This full-closed position is proportional to the span and/or zero adjustments.

**TERMINAL CONNECTIONS**

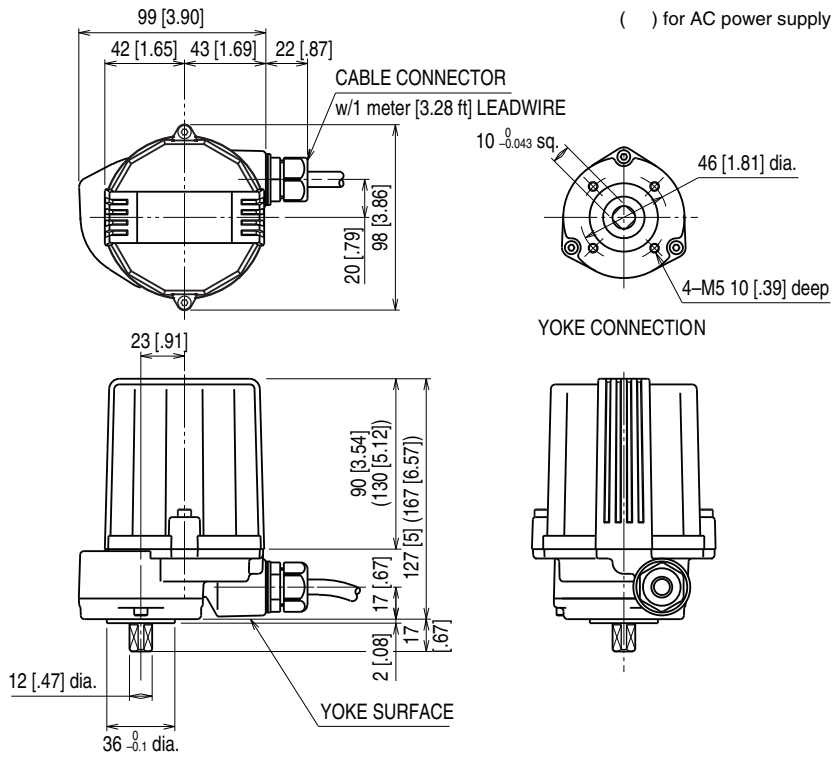


(1) to (8): Terminal No. of terminal box.  
 Full-open/-closed signals, forced open/close signals and full-closed/overload signals are optional.

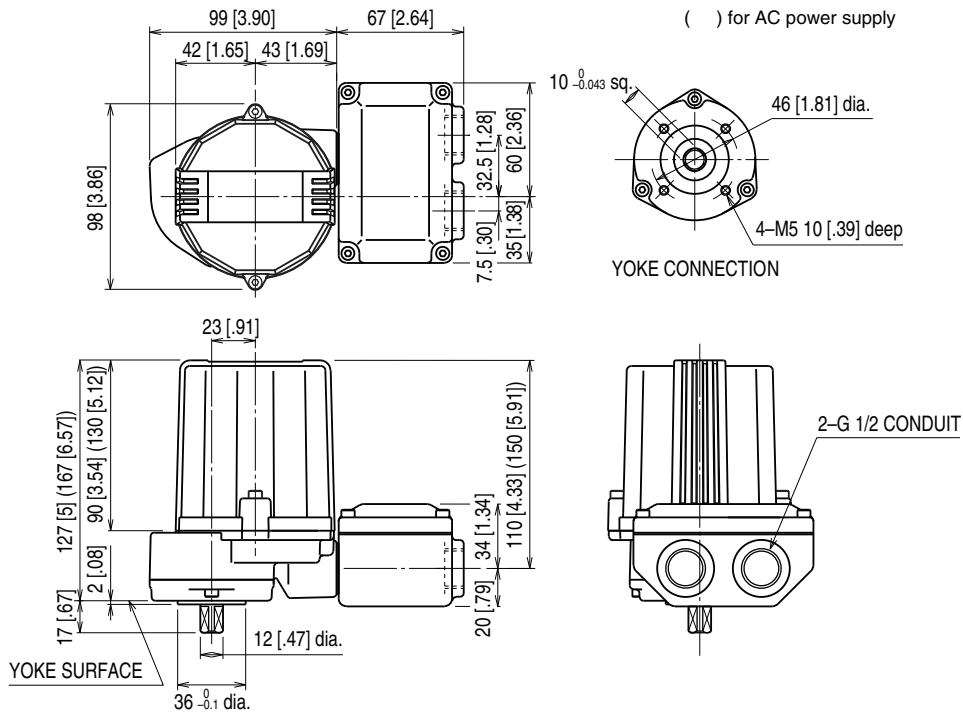
- With Both Full-open/closed Signal and Forced Open/Close Signal



**EXTERNAL DIMENSIONS unit: mm [inch]**

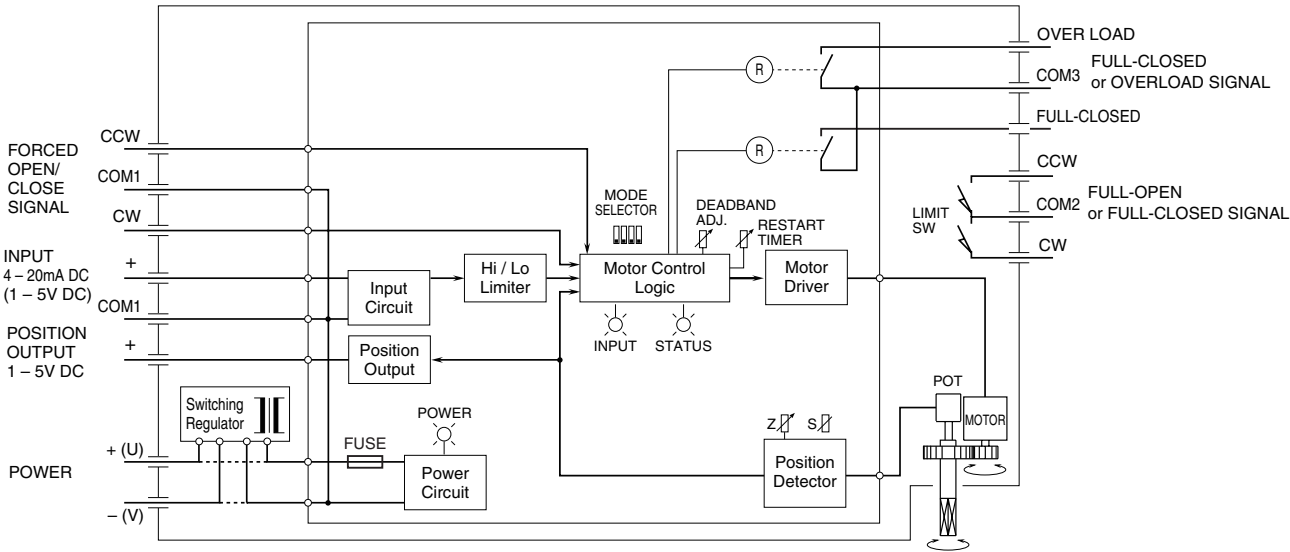


■ TERMINAL BOX TYPE



Cable connector or leadwires not provided with terminal box.

**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.