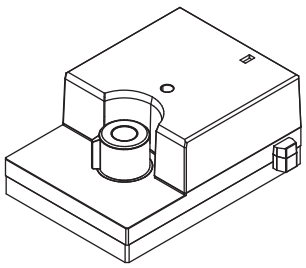
Final Control Elements

MINI-TOP ELECTRONIC ACTUATOR

(rotary type; for damper)

Functions & Features

- Equipped DC brushless motor for drive motor to achieve long life
- Equipped discrete control circuit for high reliability
- Equipped potentiometer for detecting position to improve reliability
- High controllability (1/400 high resolution)
- Easy to set (manual function is available)
- Easy to switch action between reverse and direct
- Housing material is flame-resistant to improve endurance



CE

MODEL: DM05R–[1][2][3][4]-C[5][6][7][8]

ORDERING INFORMATION

- Code number: DM05R-[1][2][3][4]-C[5][6][7][8]

Specify a code from below for each of [1] through [8].
(e.g. DM05R-1AAA-CAD141/Q)

- Specify the specification for option code /Q
(e.g. /C03/SET)

■ **FACTORY DEFAULT SETTINGS**

ITEM	SETTING
Action	Reverse
Input signal	4 - 20 mA DC
Output signal	4 - 20 mA DC
20mA DC input	Stem rotates left and stops at full-close position (Counterclockwise)
4mA DC input	Stem rotates right and stops at full-open position (Clockwise)
Operation at abnormally low input	Stop
Full-open stop position	O display（90° position）
Full-close stop position	S display（0° position）

Note: Viewing from the indicator display direction (S-45°-O).

[1] OUTPUT STEM OPERATIONAL ANGLE

1: 90 degrees

[2] OPERATION TORQUE, OPERATION TIME (90 DEGREES), TORQUE AT LOCK (MAX. VALUE)

CODE	OPERATION TORQUE	OPERATION TIME (90 DEGREES)	TORQUE AT LOCK (APPROX.)
A	6N·m	34 sec.	7 – 8 N·m

[3] INPUT

Current

A: 4 – 20 mA DC (Input resistance 250 Ω)

Voltage

6: 1 – 5 V DC (Input resistance 100 kΩ min.)

[4] OUTPUT

Current

A: 4 – 20 mA DC (Load resistance 300 Ω max.)

Voltage

6: 1 – 5 V DC (Load resistance 5 kΩ min.)

CE MARKING

C: With

[5] POWER SUPPLY VOLTAGE

DC Power

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

Universal

AD1: 24 V DC
(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)
24 V AC
(Operational voltage range 21.6 - 28.8 V AC, 47 - 66 Hz)

[6] POSITION OF SCREW FOR FIXING STEM

2: 25 degrees (Refer to "Type I" in the external dimensions.)
4: 45 degrees (Refer to "Type II" in the external dimensions.)

[7] BRACKET

0: Without
1: With bracket

[8] OPTIONS

blank: none
/Q: With options (specify the specification)

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SPECIFICATIONS OF OPTION: Q (multiple selections)

COATING (For the detail, refer to our web site.)

/C03: Rubber coating

EX-FACTORY SETTING

/SET: Preset according to the Ordering Information Sheet (No. ESU-4790)

GENERAL SPECIFICATIONS

Environment: Indoor use

Action: "Reverse" action (switchable with DIP switch to "direct" action.)

Operation at low input (shown by the position of the indicator):

· Stop at full-open position
· Stop at full-close position
· Hold position (ex-factory setting)

Low input signal level

· Current input: ≤ 1.48 (±0.2) mA DC
· Voltage input: ≤ 0.37 (±0.05) V DC

Cable type (VCTF)

· Size: 0.75 mm^2 (AWG19) / 5 core / with 1 meter wire
· Flame-resistance: VW-1 (-30 to +105 ℃ (-22 to +221 °F))
· Standards: UL758

Housing material: PBT resin

· Flame-resistance: V-0
· Color: black
· Manual button: blue

Drive: DC brushless motor

Insulation class: E (120°C, 248°F)

Position detection: Conductive potentiometer

Deadband adjustment (resolution):

0.25 to 0.5 % (1/400 to 1/200)

Restart limiting timer adjustment: 0.2 – 2 sec.

Isolation: Power voltage or I/O signal to housing

Protective function

· Automatically stops when torque at lock
(The motor is in a non-powered state and does not operate.)

User-configurable item:

· Switching action between direct and reverse
(The switch is on the top side of the housing.)

Configurable with the Ordering Information Sheet

· Output stem operation mode at low input
· Deadband
· Restart limiting timer

■ **SWITCHING RANGE OF REVERSE AND DIRECT ACTION (TABLE BELOW)**

• REVERSE (Viewing from the indicator seal)

INPUT SIGNAL (CURRENT/VOLTAGE)	OUTPUT STEM POSITION	OUTPUT SIGNAL (CURRENT/VOLTAGE)
4 mA DC / 1 V DC	Full-open (CW.)	4 mA DC / 1 V DC
20 mA DC / 5 V DC	Full-close (CCW.)	20 mA DC / 5 V DC

• DIRECT (Viewing from the indicator seal)

INPUT SIGNAL (CURRENT/VOLTAGE)	OUTPUT STEM POSITION	OUTPUT SIGNAL (CURRENT/VOLTAGE)
20 mA DC / 5 V DC	Full-open (CW.)	20 mA DC / 5 V DC
4 mA DC / 1 V DC	Full-close (CCW.)	4 mA DC / 1 V DC

Note • The input signal and output signal have the same current or voltage. (If the input signal is 4 mA DC, the output signal is also 4 mA DC.)
• The input signal and output signal have the same value. (If the input signal is 1 V DC, the output signal is also 1 V DC.)

OUTPUT SPECIFICATIONS

■ Output signal

• 4-20 mA DC or 20-4 mA DC (non-isolated)
Load resistance: 300 Ω max.
• 1-5 V DC or 5-1 V DC (non-isolated)
Load resistance: 5 kΩ min.

STROKE RATE

Duty cycle = Within 50 %

The unit must operate at an average duty cycle of 50% (ratio of operating time to standby time) or less.

INSTALLATION

Operating temperature: -10 to +55°C (14 to +131°F)

Storage temperature: -15 to +60°C (5 to 140°F)

Operating humidity: 30 to 90 %RH (non-condensing)

Vibration resistance:

• Acceleration: 4.9 m/s^2 (0.5 G)
• Frequency: 10 to 55 Hz
• Test period: 30 min. for each direction (90 min. in total)
• Direction: X, Y, Z

Mounting orientation:

Vertical to horizontal

(DO NOT mount upside-down or with the output stem facing upward)

Weight: 0.7 kg (1.54 lb)

Current value

• Power voltage is 24 V DC:
Standby current: 0.06 A
Current at no load: 0.08 A
Current at load: 0.18 A
• Power voltage is 24 V AC:
Standby current: 0.14 A
Current at no load: 0.16 A
Current at load: 0.35 A

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PERFORMANCE

Resolution: 0.5 % (1/200)
Linear characteristic: 1.4 %
Backlash: 1.1 degrees
Insulation resistance: ≥ 10 MΩ with 250 V DC
(Power voltage or I/O signal to housing)
Dielectric strength: 500 V AC @ 1 second (or 400 V AC @ 1 minute)
(Power voltage or I/O signal to housing)

STANDARDS & APPROVALS

■ **EU conformity (CE marking)**
•EMC Directive
EMI EN 61000-6-4
EMS EN 61000-6-2
RoHS Directive
EN IEC 63000

TERMINOLOGY

• **Deadband**
Linear resolution

• **Restart Limiting Timer**
This function prevents the output stem operates frequently when the input signal is unstable.
To prevent the output stem operates frequently, it does not operate at the moment the input signal changes, but after a set period of time.

• **Protective function**
If the output stem is locked, the control circuit automatically stops.
It provides protection both electrically and mechanically.
To restart, turn off the power voltage and then turn on it to reset the electrical circuit.
Alternatively, you can leave the power voltage as is and input a signal value opposite to the one at the time of stoppage to automatically release it.

• **Resolution**
The ratio that the stem of the unit rotates according to input signal.
E.g. Resolution is 1/200 for the specification that input signal is 4 to 20 mA, output stem 90°, direct or reverse action. As the span of input signal is 16 mA (20 - 4 = 16 mA), when input signal is changed by 0.08 mA step (16 mA / 200 = 0.08 mA), the output stem rotates 0.45° (90° / 200 = 0.45°).
(Even for output stem 45°setting, resolution is 1/200 = 0.45°step)
It is not true that input signal = output signal.
(Not input signal 4.00 mA DC = output signal 4.00 mA DC, there is difference around 0.04 mA DC.)

• **Linear Characteristics**
The output stem reciprocates i.e. opens and closes according to the input signal. In the case of DM05R, the difference between the theoretical value and the actual distance that the output stem actually moved is expressed in percentage.

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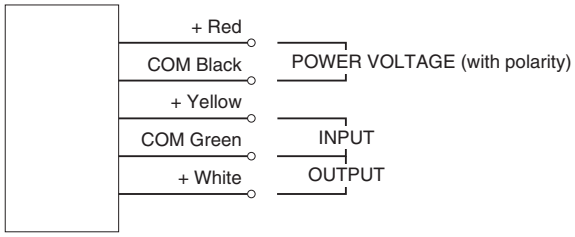
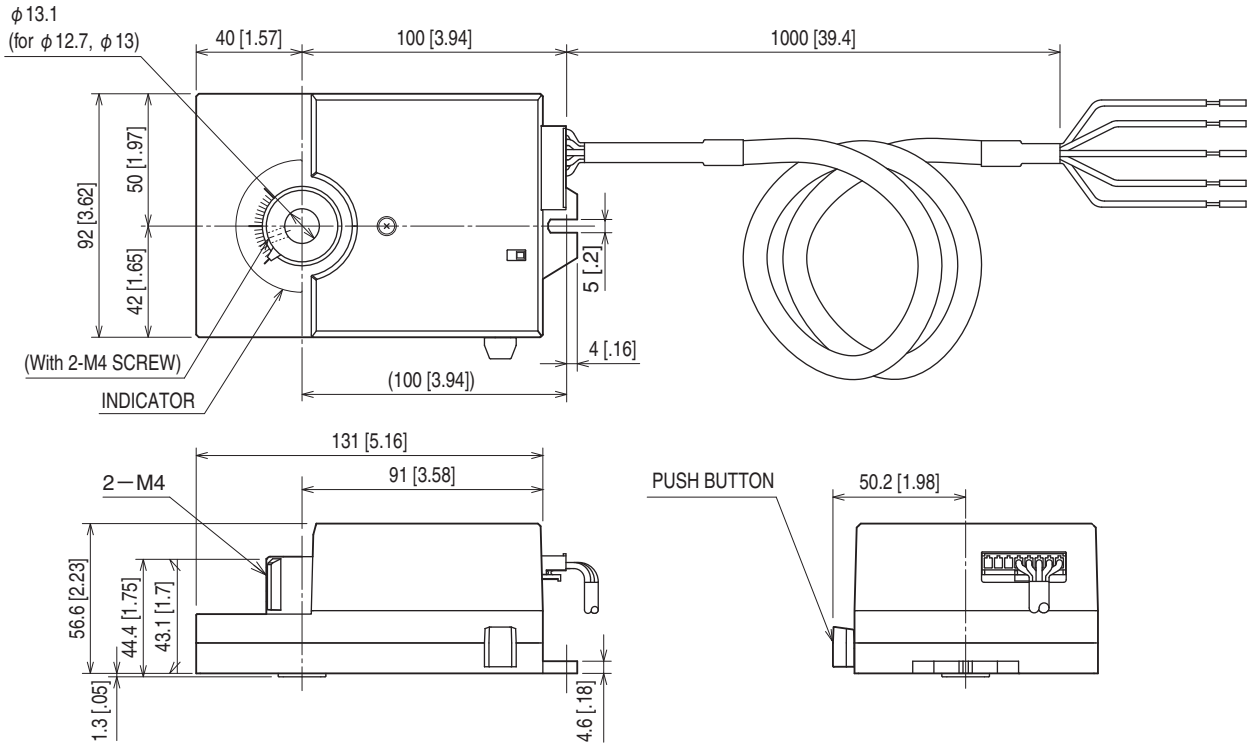
TERMINAL CONNECTIONS / WIRE COLOR



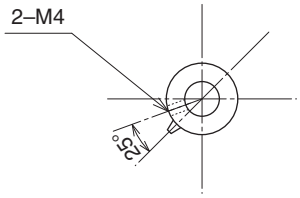
The COM port of the power is connected to the COM port of the input/output.
Ensure proper alignment when connecting AC power.

EXTERNAL DIMENSIONS unit: mm [inch]

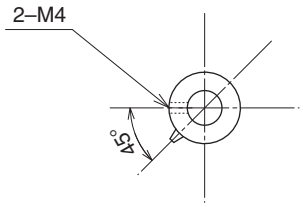


• Position of screw for fixing stem

Type Ⅰ (for 25°)
・DM05R-[1][2][3][4]-C[5]2[7]



Type Ⅱ (for 45°)
・DM05R-[1][2][3][4]-C[5]4[7]



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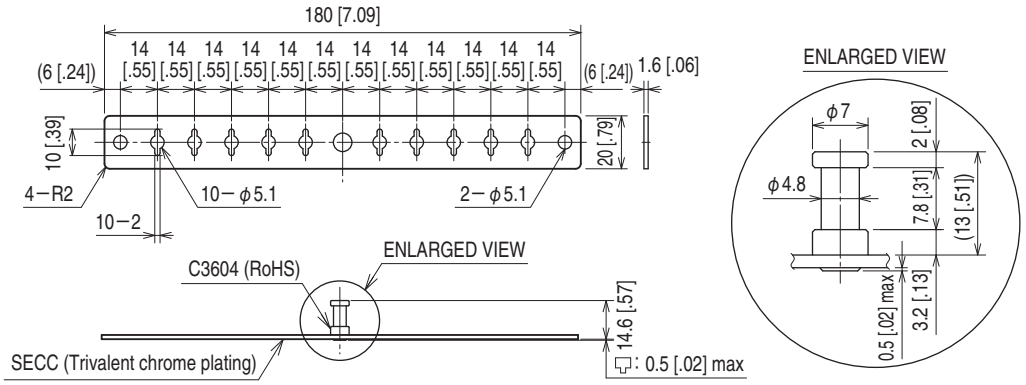
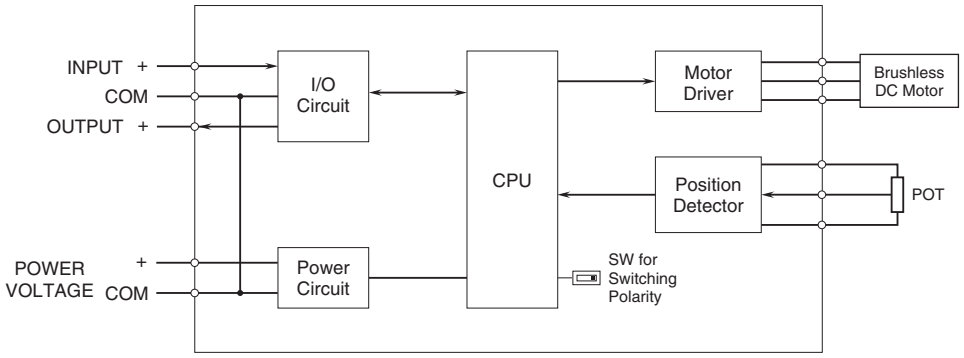
■ **OPTION (not included in the product)**

Bracket



SCHEMATIC CIRCUITRY & TERMINAL CONNECTIONS



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⚠ Specifications are subject to change without notice.

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