

# M3000



## Product Description

The Forta M3000 is an electro-mechanical actuator for the control of two-way and three-way plug valves in:

- commercial hot water and chilled water systems
- large heating systems
- air handling systems

The Forta M3000 is either controlled by an increase/decrease signal or by a modulating control signal.

The electronic circuitry of the actuator ensures that the running time is the same, regardless of the stroke of the valve in question.

Mounting on to 20 mm Venta valves is quick and simple without any linkage kits.

For Satchwell valves a linkage is available (see Accessories on page 7).

The working range of the actuator is adjusted automatically depending on the stroke of the valve. The electronic circuitry of the actuator then takes care of the adjustment of the valve end positions.

The actuator is supplied by 24 VAC. It can provide 16 VDC voltage supply for older TAC controllers.

Available Products

Part Number	Designation	Description
880-0500-000	M3000	Modulating control signal or increase/decrease signal
880-0510-000	M3000-S2	Modulating control signal or increase/decrease signal with end point switches

Specifications

**Supply voltage**

24 VAC +25%/-20%, 50-60 Hz

**Power consumption**

Average 25 VA

**Transformer sizing**

50 VA

**Stroke**

9-52 mm

**Thrust**

3000 N (180 ft-lb)

**Duty cycle**

max. 20%/60 min

Running time

**Modulating**

1.6 sec/mm

**Increase/decrease**

300 sec/60 sec

Analog input

**Control voltage range**

0-10 VDC

**Impedance**

min. 100 kΩ

**Selectable input signals (DC)**

0-10V, 2-10V, 0-5V, 5-10V, 2-6V, 6-10V

4-20mA (using supplied 500Ω resistor on 2-10V setting)

Digital inputs VH-VC

**Voltage across open input**

24 VAC

**Current through closed input**

5 mA

**Pulse time**

min. 20 msec

Output G1

**Voltage**

16 VDC ± 0.3 V

**Load**

25 mA, short circuit proof

Output Y (position feedback)

**Voltage**

2-10 VDC (0-100%)

**Load**

2 mA

Ambient conditions

**Operation temperature**

-10 to +50°C

**Storage temperature**

-10 to +50°C

**Humidity**

max. 90% RH

**Sound power level**

max. 50 dBA

Standards

**Emission**

EN 61326-1:2006

**Immunity**

EN 61326-1:2006

**Heat**

IEC-68-2-2

**Humidity**

IEC-68-2-3

**Cold**

IEC-68-2-1

**Vibration**

IEC-68-2-6

**Enclosure rating**

IP55

Material

**Housing**

Aluminum

**Cover**

ABS plastic

Physical

**Color**

Black/grey

**Weight**

3 kg (6.61 lb)

Dimensions (mm)

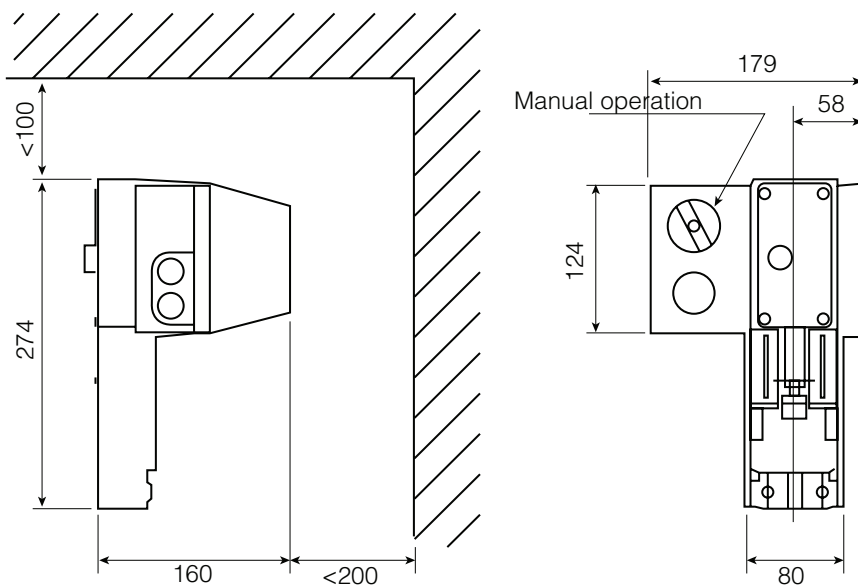


Fig 1

Function

The actuator

The brushless DC-motor of the actuator turns a screw via a gear wheel. The motor receives a control signal from a controller. The screw gets a linear movement that moves the stem of the valve.

Control signal

M3000 can either be controlled by an increase/decrease signal or by a variable direct voltage. If an increase/decrease signal is used, the actuator normally moves inwards on an increase signal and outwards on a decrease signal, see Settings.

Manual operation

Manual operation is possible by using the adjustment knob.

Position feedback

Forta actuators are equipped with a 2–10 VDC position feedback signal, where 2 V always corresponds to the closed position and 10 V to the open position.

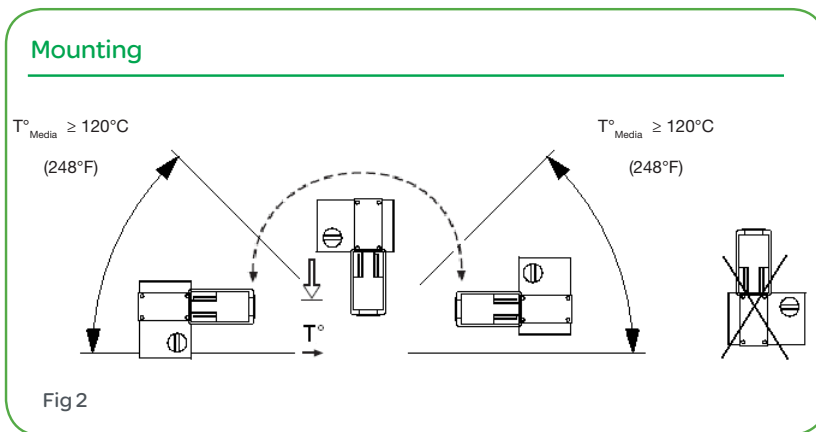
End point switches

When actuators are controlled in sequence, it is possible to use the end point switches that have set positions. They will toggle when the valve is fully open or fully closed, respectively.

### Mounting

The actuator may be mounted horizontally, vertically and in any position in between, but not upside down.

To mount the actuator on a valve, first slide the actuator onto the valve neck and connect the valve spindle to the actuator shaft with the supplied stem extension. Then slide the 'U' bolt brace into the groove on the valve neck and secure the nuts. Ensure the actuator is able to drive the valve through the full stroke range of the valve.

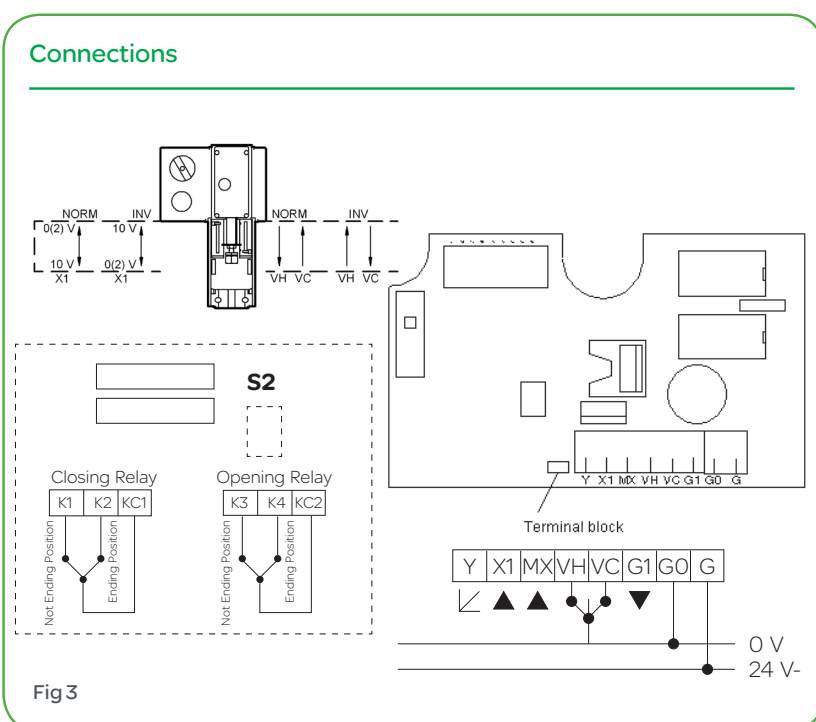


### Electrical Connections

Block	Function	Description
G	24 VAC	Supply voltage
G0	24 VAC rtn	Supply voltage
X1	Input	Control signals Modulating input control
MX	Input, neutral	
VH	Increase	Floating input Control (VH, VC short circuited to G)
VC	Decrease	
G1	16 VDC	Local controller supply
Y	0-100%	2-10V Feedback signal

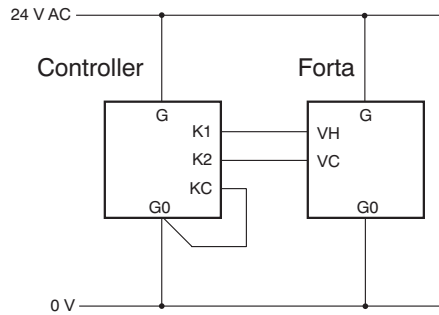
### Cable lengths

For cables to G, G0 and G1 use a maximum of 100 m (328 ft.) with a cross-sectional area of minimum 1.5 mm<sup>2</sup> (AWG 16). For other cables, use a maximum of 200 m (656 ft.) with a cross-sectional area of min. 0.5 mm<sup>2</sup> (AWG 20).



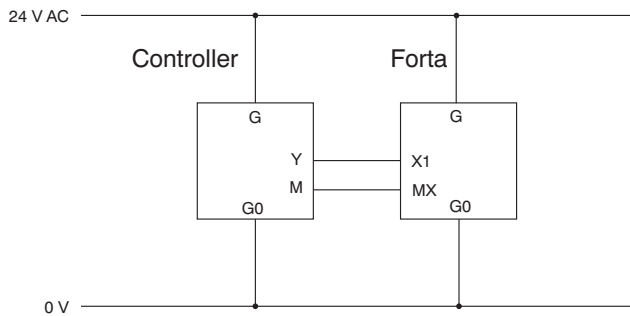
Wiring Examples

Increase/decrease control

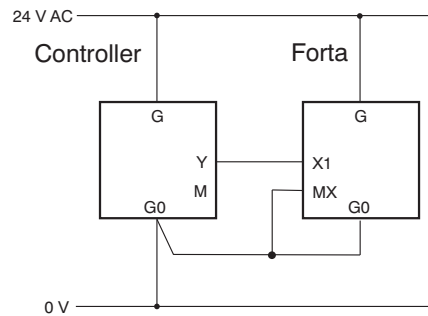


Modulating control

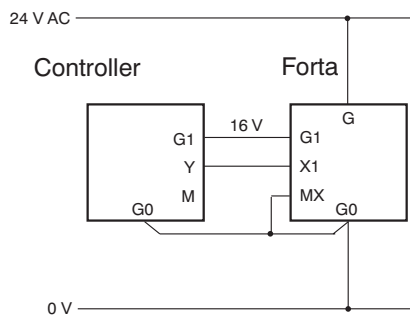
Normal installation (4 wires to the actuator)



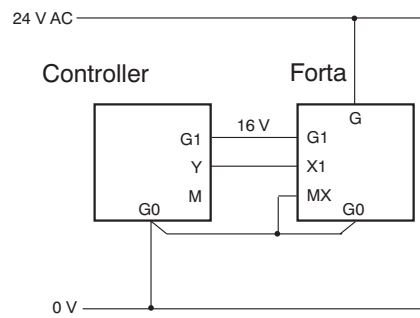
Short cable installation (3 wires to the actuator)



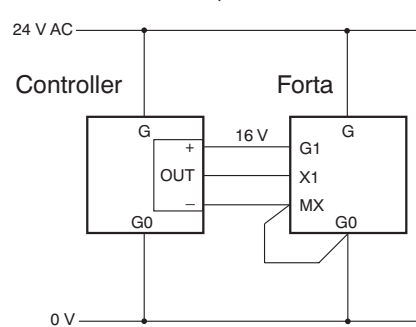
Normal installation (5 wires to the actuator)



Short cable installation (4 wires to the actuator)



Normal installation (5 wires to the actuator)



PU unit installation (4 wires to the actuator)

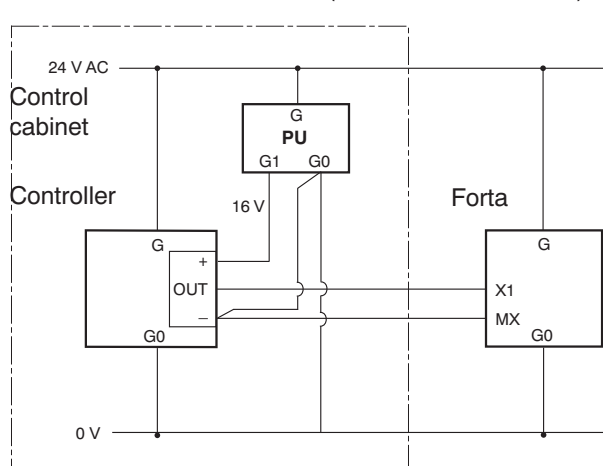


Fig 4

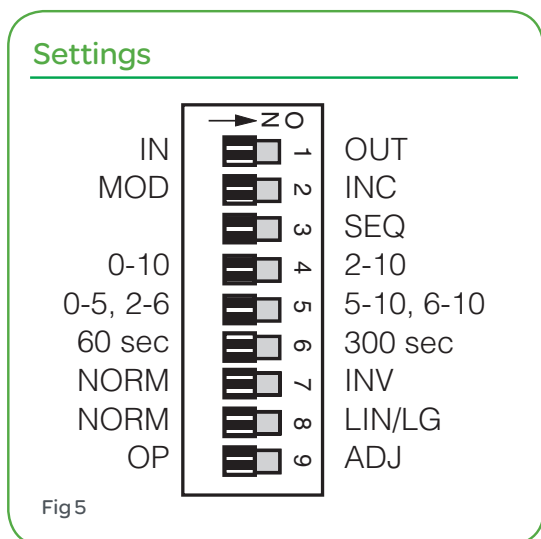


Fig5

	Function in the "OFF" pos.	"ON" position	Description
1	In (retract)	Out (extend)	Valve closing screw direction
2	Modulating	Increase/decrease	Control mode
3	-	Sequence	Sequence control (modulating only)
4	0-10 V	2-10 V	Voltage range
5	0-5 V, 2-6 V	5-10 V, 6-10 V	Sequence voltage (higher range with Sw.4 ON)
6	60 sec	300 sec	Running time (Floating Control only)
7	Normal	Inverted	Direction of movement
8	Normal	Linear/Logarithmic	Flow characteristic (EQ Valve)
9	Operation	End position adjust	Operation/End position adjustment

There are nine DIP switches in a row on the circuit board. On delivery ('Factory'), all switches are in the "OFF" position.

### 1 Valve Closing Screw Direction—IN / OUT

IN direction of movement is used when the screw of the actuator moves inwards to close the valve.

OUT direction of movement is used when the screw of the actuator moves outwards to close the valve (position feedback, Y is 2V for a closed valve).

### 2 Control signal—MOD / INC

M3000 Forta can either be controlled by a variable direct voltage, a modulating signal (MOD), or by an increase/decrease signal (INC).

### 3 Sequence or parallel control— --- / SEQ

With sequence (or parallel) control (SEQ), two actuators/valves can be controlled with a single control signal.

Depending on switch 4 and 5, choose which part of the voltage range to use, the upper range, 5-10 V (6-10 V) or the lower one, 0-5 V (2-6 V).

**Note:** If sequence or parallel control is not used, the switch --- / SEQ must be in the OFF position.

### 4 Voltage range—0-10 / 2-10

Choose the control signal voltage range (either 0-10 V or 2-10 V).

### 5 Part of voltage range—0-5, 2-6 / 5-10. 6-10

Under Sequence, choose which part of a voltage range to use, the lower one 0-5 V (2-6 V) or the upper one 5-10 V (6-10 V). The bracketed range is selected with Switch 4 ON

If switch 7 is in the NORM position, the higher voltage corresponds to 100% flow and the lower one to 0%. The INV position reverses this function.

### 6 Running time—60 s / 300 s

With increase/decrease control, you can choose a running time between 60 sec or 300 sec.

With modulating control, the running time is always 1.6 sec/mm.

### 7 Direction of movement—NORM / INV

When normal direction of movement is used, the screw of the actuator moves inwards as the control voltage decreases or if the actuator gets a decrease signal.

With the switch NORM / INV, the direction of movement can be changed.

### 8 Linearization—NORM / LIN/LG

The motorized valve characteristics can be modified. Use the LIN/LG setting to make the flow characteristics of an equal modified percentage (EQM) valve almost linear.

On the other hand, with LIN/LG a motorized valve equipped with a linear valve operates with "Quick open characteristics." This means that with a small control signal, the valve is almost completely open.

**Note:** For the actuator to register new DIP switch settings, turn off the power supply, adjust the switches, and restore power.

(This does not apply to the switch OP/ADJ).

### 9 End position adjustment—OP / ADJ

This switch is only used to adjust the end positions when the actuator is commissioned.

Momentarily put the switch in the ON position. The actuator automatically finds the end positions of the valve.

At the end of the adjustment all the other DIP switch settings (1 to 8) are read again.

## Actuator Installation

Set the switches on the circuit board before installing the actuator. There are no other switches or potentiometers to set or adjust.

To make an end position adjustment, move the switch »OP/ADJ« into its ADJ position, turn on the supply voltage, and then move the switch back to its OP position.

When an end position adjustment is made, Forta closes the valve and opens it fully. The adjustment is finished by the actuator closing the valve again; the electronic circuitry then adjusts the stroke and the running time to the valve. The set values are stored in the EEPROM of the actuator so that they remain after a loss of voltage.

When the end position adjustment is complete, the actuator starts to control the valve according to the control signal.

### **⚠ WARNING**

Hot media hazard. Before removing the actuator from the valve or before opening the valve, ensure that the valve control medium is isolated and relieve the pressure. Work should only be carried out by qualified personnel.

## Maintenance

The actuator is maintenance-free.

## Accessories

S2-Forta	880-0104-000
Circuit board M3000	1-001-0680-0
Linkage Satchwell valves L7SV	880-0126-000

Accessory for 4-20 mA control signal is factory-supplied (use in series on X1 input and select 2-10V control).