

M1500 is an electro-mechanical actuator for the control of two-way and three-way plug valves in:

- domestic hot water systems
- heating systems
- air handling systems

M1500 is either controlled by an increase/decrease 3-point floating signal or by a modulating 0–10 V control signal. Modulating control makes for a faster positioning of the actuator.

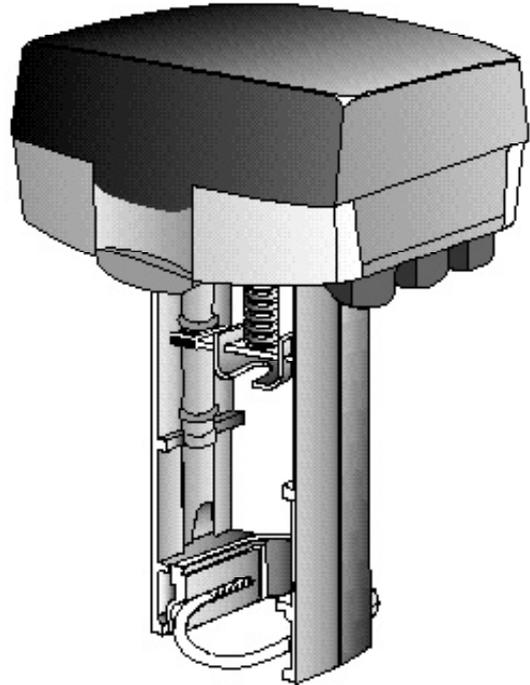
The electronic circuitry of the actuator ensures that the running time is the same, regardless of the stroke of the valve in question.

It is easy to mount and connect the actuator. It can be mounted directly onto TAC's control valves, without any mounting kit.

For Satchwell valves use L2SV linkage (see accessory).

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 V AC. It can provide a position indicator signal 2-10 V and a 16 V DC voltage supply for older TAC controllers.



TECHNICAL DATA, M1500

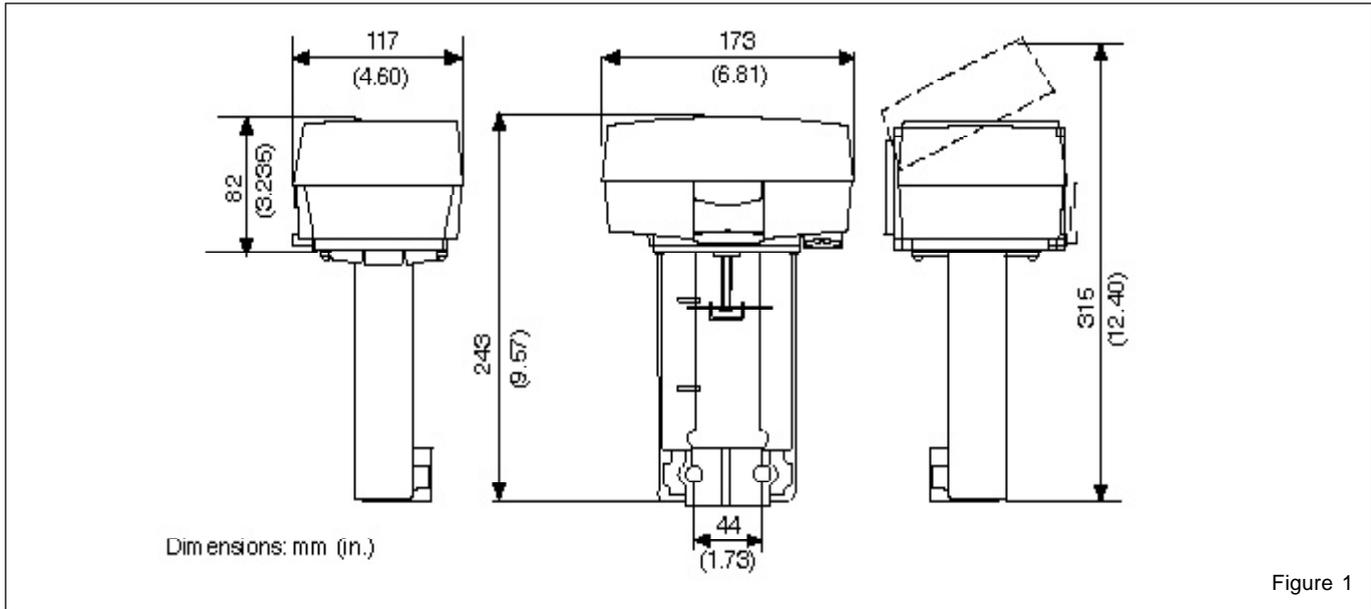
Part numbers	see the table on the next page
Supply voltage	24 V AC +25%/ -20%, 50–60 Hz
Power consumption	average 15 VA
Transformer sizing	50 VA
Running time:	
Modulating 9–25 mm (0.35 - 1 in.)	15 s
Modulating 25–32 mm (1 - 1.26 in.)	20 s
Modulating 32–52 mm (1.26 - 2.05 in.)	30 s
Increase/decrease	300 s/60 s
Stroke	9–52 mm (0.35 - 2 in.)
Factory set stroke	20 mm (0.79 in.)
Thrust	1500 N (337 lbf.)
Duty cycle	max. 20%/60 minutes
Analog input:	
Voltage	0–10 V
Impedance	min 100 kΩ
Digital inputs VH–VC:	
Voltage across open input	24 V AC
Current through closed input	5 mA
Pulse time	min. 20 ms
Output G1:	
Voltage	16 V DC ±0.3 V
Load	25 mA, short-circuit proof

Output Y:	
Voltage	2-10 V (0-100%)
Load	2 mA
Ambient temperature:	
Operation	–10 – +50 °C (14°F - 122°F)
Storage	–10 – +50 °C (14°F - 122°F)
Ambient humidity	max. 90% RH
Enclosure rating	IP 54
Sound power level	max. 40 dBA
Standards:	
Emission	EN 50081-1:1992
Immunity	EN 50082-1:1992
Heat	IEC-68-2-2
Humidity	IEC-68-2-3
Cold	IEC-68-2-1
Vibration	IEC-68-2-6
Material:	
Housing	aluminium
Cover	ABS/PC plastic
Color	aluminium/black
Weight	1.8 kg (3.96 lb.)
Dimensions (mm)	refer to the table on the next page

PART NUMBERS

Designation	Explanation	Part number
M1500	modulating control signal or increase/decrease signal	880-0450-000
M1500-S2	modulating control signal or increase/decrease signal and end point switches	880-0451-000

DIMENSIONS



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 which moves the stem of the valve.

Control signal

M1500 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

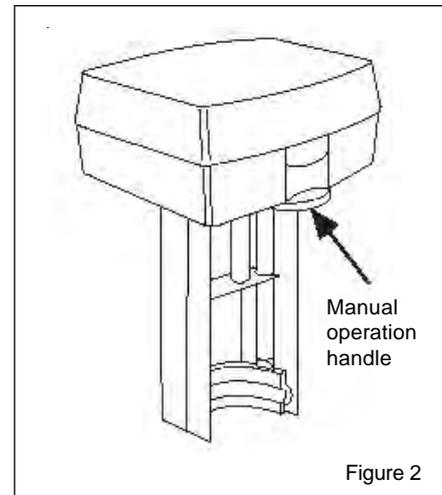
There is a manual operation handle on the actuator, see figure 2. When it is lowered, the motor stops. Then, the actuator can be operated manually if the handle is turned.

Position feedback

Forta actuators are equipped with a 2–10 V DC position feedback signal, where 2 V always corresponds to the closed position and 10 V to the open position (depending of switch nr.1).

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, see figure 3.

N.B.! Do not use the actuator for the DN15 valves V298, V282, V294, V384, V386 and V394.

To mount the actuator on a valve, slide the actuator onto the valve neck, thus making the square nut on the valve spindle fit into the groove on the cross bar. Then slide the brace into the groove on the valve neck and secure the nuts.



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

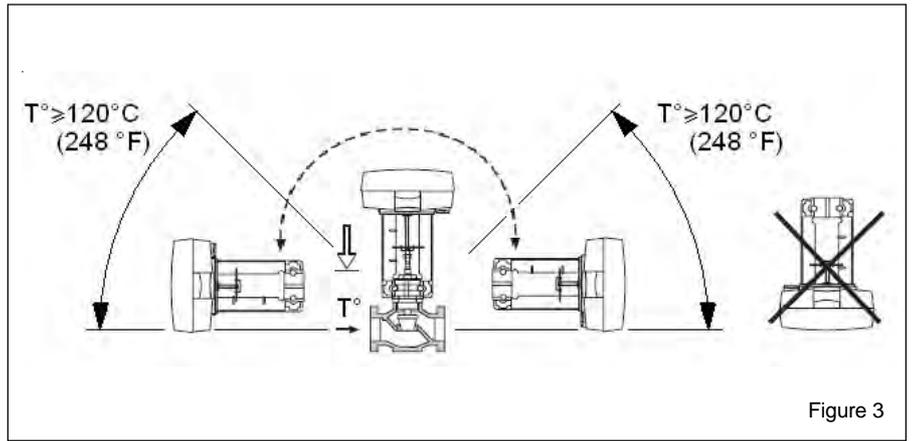


Figure 3

When T° exceeds 120° we recommend to mount the actuator between 45° and in horizontal position (see drawing)

CONNECTIONS

Block	Function	Description
G	24 V AC	Supply voltage
G0	24 V AC rtn	
X1	Input	Control signals (VH, VC short-circuited to G0)
MX	Input, neutral	
VH	Increase	
VC	Decrease	Supply for RC
G1	16 V DC	
Y	0-100 %	Feedback signal

N.B.! When installed with three conductors, where the control signal reference is connected to G0, the motor current of the actuator will cause varying voltage loss in the cable and thus in the reference level. Forta, which has a highly sensitive control signal input, will detect the varying signal and follow it, which makes it difficult for the actuator to find a stable position.

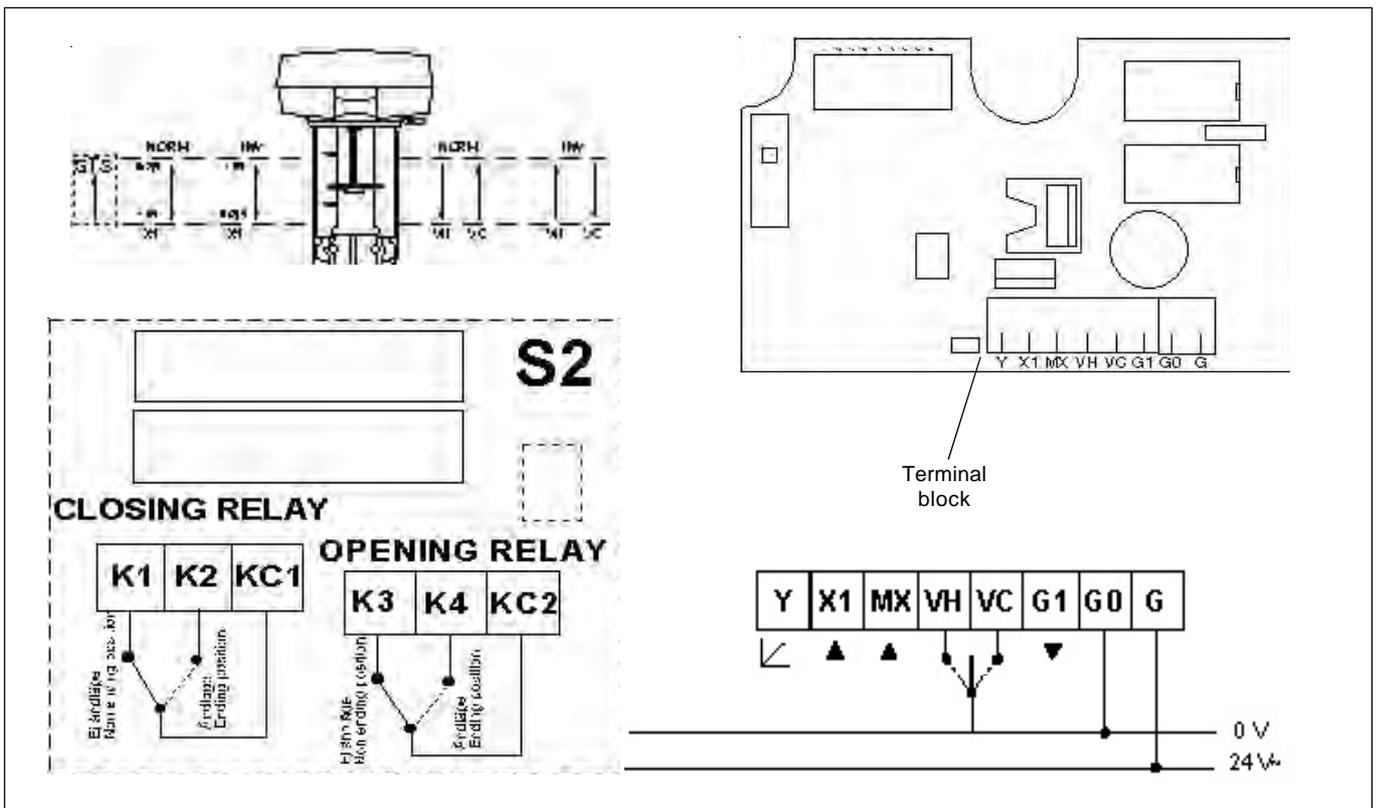
This variation may be accepted in simplified installations on the following conditions: the cables between the controller and actuator are shorter than 100 m (328 ft.), the cross-sectional area

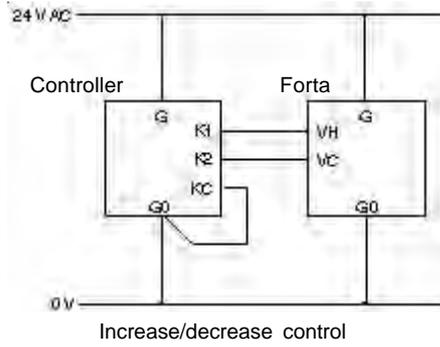
is larger than 1.5 mm^2 (AWG 16) and the cables are only connected to *one* actuator. Please refer to the figures labelled "Simplified installation" for wiring instructions.

Cable lengths

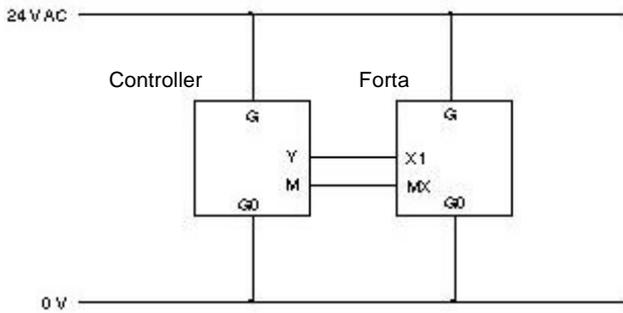
The cables to G, G0 and G1 should be max. 100 m (328 ft.) and have a cross-sectional area of min. 1.5 mm^2 (AWG 16).

Other cables should be max. 200 m (656 ft.) and have a cross-sectional area of min. 0.5 mm^2 (AWG 20).

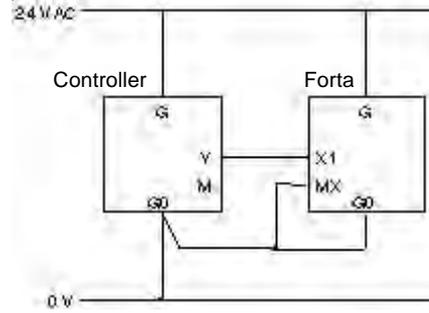




Normal installation (4 wires to the actuator)



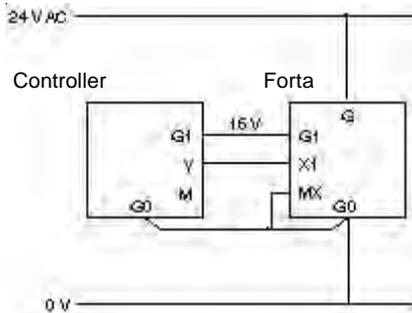
Short cable installation (3 wires to the actuator)



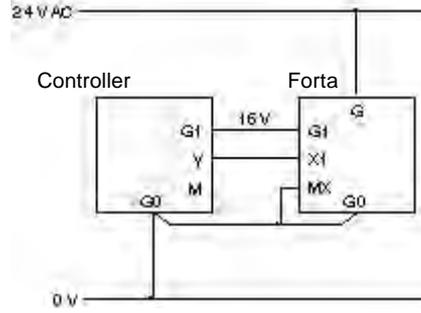
Modulating control, 24 V AC supply to the controller

(TAC 239W, TAC 6711, TAC Xenta, TAC 8000, TAC 230U, TAC 2000, TAC 9000, TAC 77xx)

Normal installation (5 wires to the actuator)



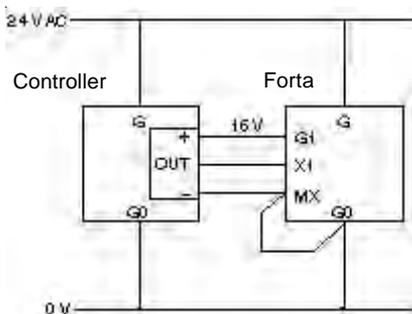
Short cable installation (4 wires to the actuator)



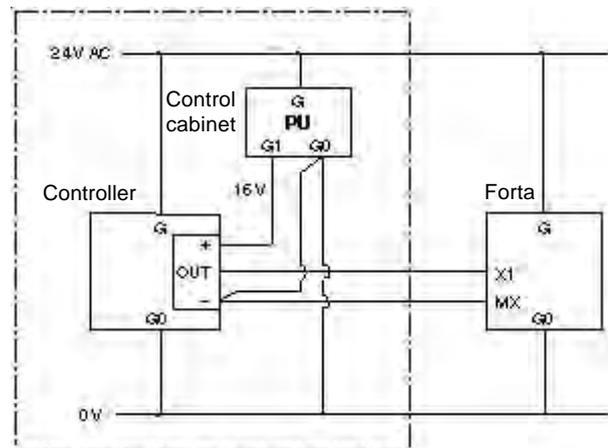
Modulating control, 16 V DC supply to the controller

(TAC 218E/RM, TAC 221L, TAC 228R/RL/RF, TAC 239W, TAC 258R/RL, TAC 268R/RL/RF)

Normal installation (5 wires to the actuator)

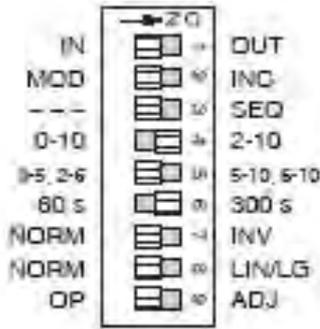


PU unit installation (4 wires to the actuator)



Modulating control, galvanically isolated output in the controller (TAC 6501, TAC 6505)

Figure 6



Function in the "OFF" pos.	"ON" position	Description
1 In	Out	Valve closing screw direction
2 Modulating	Increase/decrease	Control (not at Sequence)
3 -	Sequence	Sequence control
4 0-10 V	2-10 V	Voltage range
5 0-5 V, 2-6 V	5-10 V, 6-10 V	Part of voltage range
6 60 s	300 s	Running time
7 Normal	Inverted	Direction of movement
8 Normal	Linear/Logarithmic	Valve characteristic
9 Operation	End position adjust (mom.)	Operation/End position adjustment

Figure 8

There are nine 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.

Note! Y = 2 V at close valve.

2 Control signal—MOD / INC

TAC Forta can either be controlled by a variable direct voltage, a so called 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 by only one control signal.

For each of these you can choose which part of the voltage range to use, the upper one, 5-10 V (6-10 V) or the lower one, 0-5 V (2-6 V).

If the switch NORM / INV is in the NORM position, the higher voltage corresponds to 100% flow and the lower one to 0%.

With NORM / INV in the INV position you will get the opposite function.

Note! If sequence or parallel control is **not** used, the switch --- / SEQ must be in the OFF position, as the switch MOD / INC is not valid during sequence or parallel control.

4 Voltage range—0-10 / 2-10

You can choose whether to use the control signal voltage range 0-10 V or 2-10 V.

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

You can 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).

If the switch is in the NORM position, the higher voltage corresponds to 100% flow and the lower one to 0%. To achieve the opposite function, the switch should be put in its INV position.

6 Running time—60 s / 300 s

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

With modulating control, the running time is always 15 s / 20 s / 30 s depending of stroke valve.

7 Direction of movement— NORM / INV

When normal direction of movement is used, the screw of the actuator moves inwards when 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. If you wish for the characteristics to be affected, the setting LIN/LG will make the characteristics of an equally modified percentage (EQM) valve almost linear.

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

Note! For the actuator to register new settings of the switches, the supply voltage must be cut or the manual operation handle lowered, the settings done, and then the handle raised again.

Please refer to illustration on page 2. (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 will automatically find the end positions of the valve.

ACTUATOR INSTALLATION

The switches on the circuit board should be set before the actuator is installed. There are no other switches or potentiometers that should be set or adjusted.

To make an end position adjustment, you only have to switch the switch »OP/ADJ« into its ADJ position, when the supply voltage has been turned on, and then 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 will 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.

MAINTENANCE

The actuator is maintenance-free.

ACCESSORIES

S2-Forta	880-0104-000
Circuit board M1500	1-001-0677-0
Linkage Satchwell valves L2SV	880-0124-000
See data sheet "Valves and actuators Summary" (F-10-06)	