



**PART NUMBERS**

Designation	Explanation	Part Number
M310	modulating control signal or increase/decrease signal	880-0210-030
M310-S2	modulating control signal or increase/decrease signal and end point switches	880-0211-030

**DIMENSIONS mm**

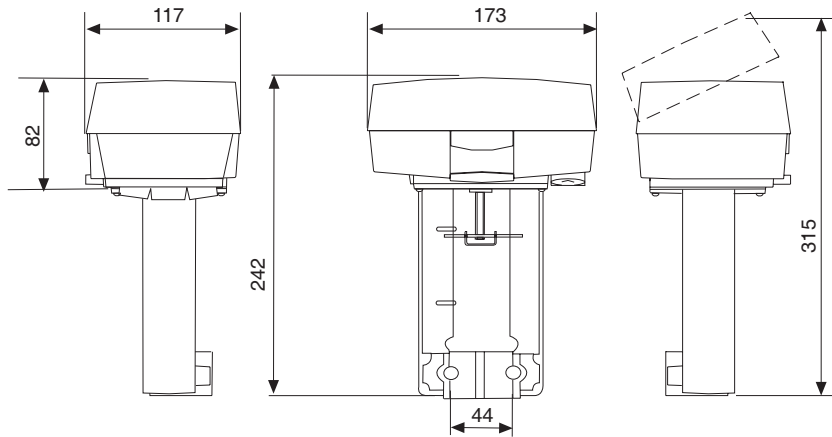


Fig 1

**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 which moves the stem of the valve.

**Control signal**

M310 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. The actuator is supplied with the manual operation lowered.

**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.

**FUNCTION**

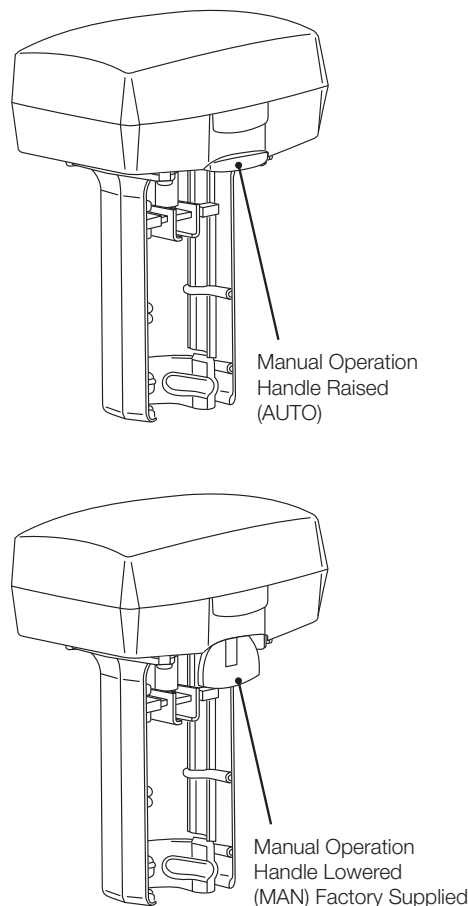


Fig 2

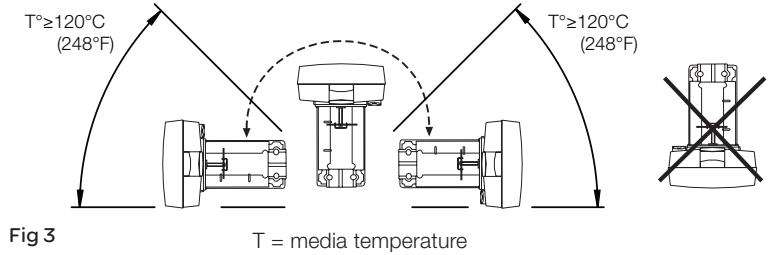
### MOUNTING

The actuator may be mounted horizontally, vertically and in any position in between, but not upside down, see figure 3.

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.

**WARNING:** If replacing an installed actuator: Depressurize the valve before removing the existing actuator and check integrity of the valve stem and plug by manually moving the stem up and down. If the valve stem and plug have been damaged, the stem may blow out under pressure and cause injury and equipment damage.

### MOUNTING



When media temperature exceeds 120° mount the actuator between 45° and the horizontal position (see drawing).

### ELECTRICAL CONNECTIONS

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

NB.! When installed with 3 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<sup>2</sup> (AWG 16) and the cables are only connected to one actuator. Please refer to the figures labelled "Wiring Examples" 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<sup>2</sup> (AWG 16).

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

### CONNECTIONS/PCB LAYOUT

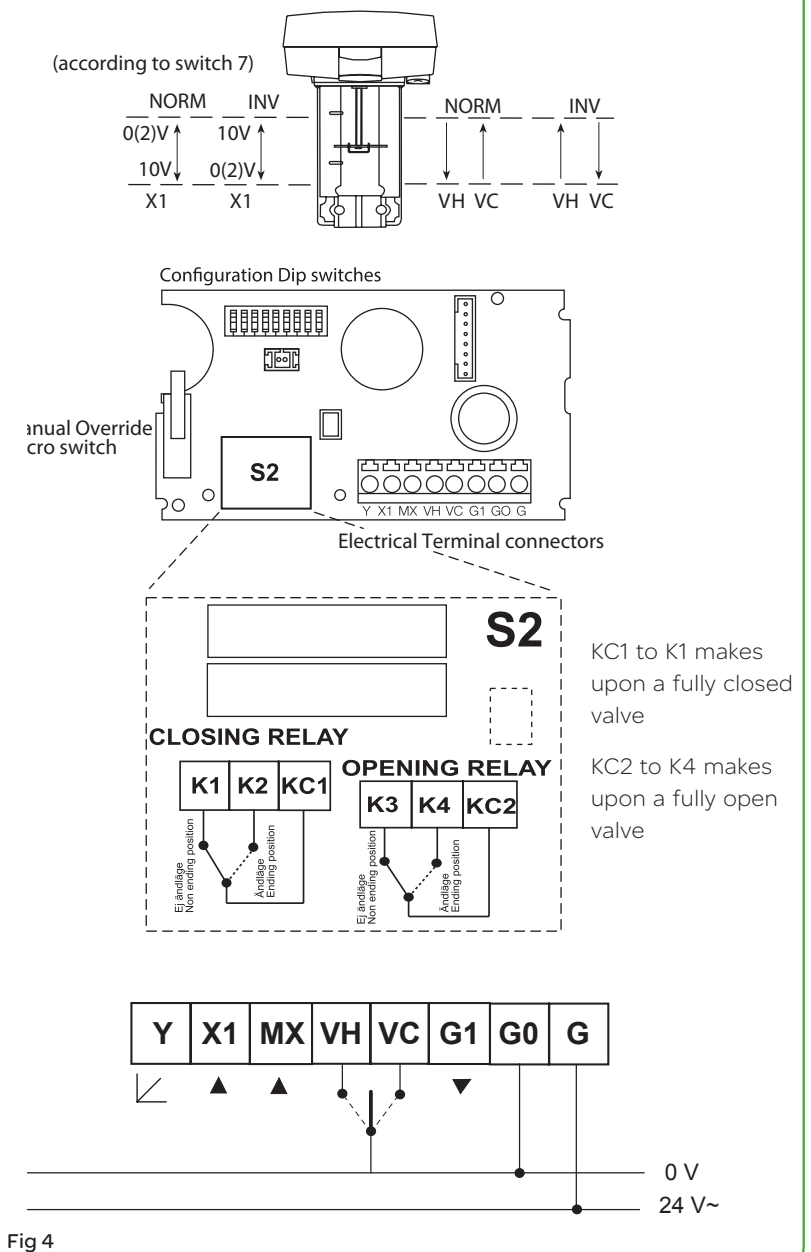


Fig 4

WIRING EXAMPLES

Typical Wiring

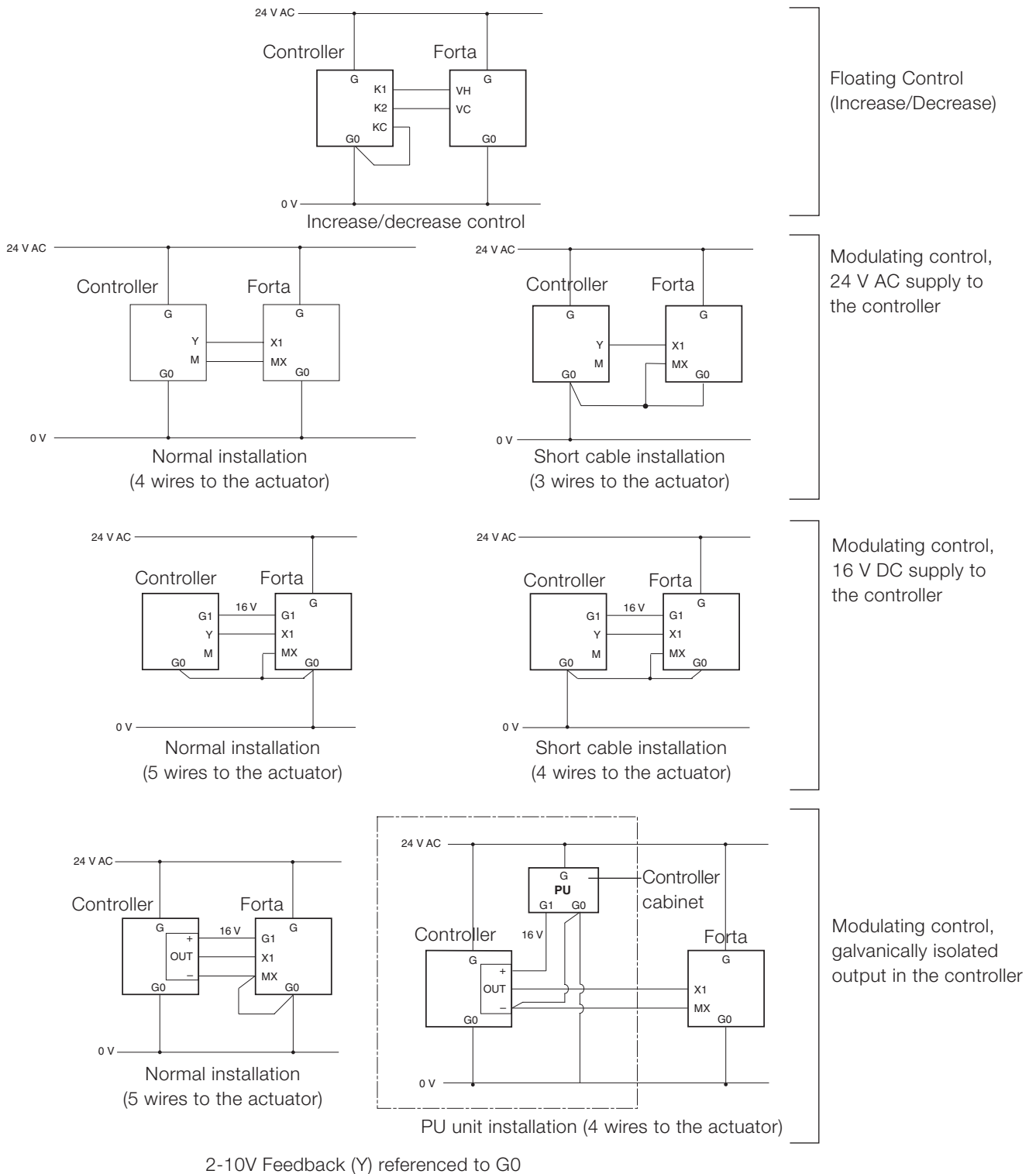
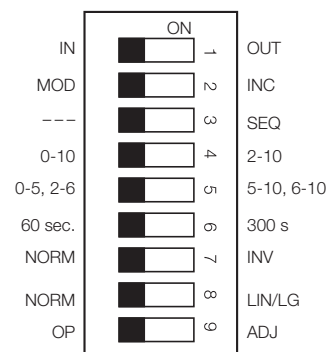


Fig 5

## PROGRAM SWITCH SETTINGS FOR THE FORTA NON-SPRING RETURN ACTUATOR

Switch Number	OFF Position	ON Position	Description
1	In (Retract)	Out (Extend)	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	Sequence Voltage Range (Dependency on Sw4)
6	60 s	300 s	Running time (floating Control)
7	Normal (Direct)	Inverted (Reverse)	Direction of movement
8	Normal	Linear/Logarithmic	Valve characteristic
9	Operation	End position adjust	Operation/End

### SETTINGS



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.

#### 2 Control signal—MOD / INC

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

Depending on switch 4 and 5, 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) (Bracketed control voltage range operational with switch 4 ON).

**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

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) (Bracketed control voltage range operational 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%. To achieve the opposite function, switch 7 for a closed valve 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 or 20 s depending on valve stroke length.

#### 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.

#### 8. Linearization – NORM / LIN/LG

The motorized valve characteristics can be modified. The setting LIN/LG will make the flow characteristics of an equal percentage valve linear.

Consequently, a linear valve characteristic will operate as 'Quick open'. i.e. with a small control signal, a linear valve will provide a high flow rate.



**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.**

(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

Before installing it is necessary to remove the antistatic protection placed under the cover.

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 (Aux. Switch) .....	880-0104-000
Adapter kit for DN15- V298.....	880-0252-000
Adapter kit for DN15 -V282/ V294/ V384/ V386/ V394 .....	880-0253-000
Circuit board M310 .....	1-001-0676-0
Linkage Satchwell valves L2SV ....	880-0124-000
Stem Extension, VG210R, VG310R.....	AV-823
Stem Heater (-20°C) .....	880 0108 000
Yoke Heater (-10°C) .....	880 0109 000