

MG600C-SR



Product Description

MG600C-SR is a linear electro-mechanical actuator with spring return operation for the control of two-way and three-way plug valves in:

- Hot water systems
- Heating and Cooling systems
- Air handling systems

Specifications

Part No.	
MG600C-SRU	Stem up (retract)
MG600C-SRD	Stem down (extend)
Voltage supply	24 Vac +/- 20% ±20% 50-60Hz
Power Consumption	
running	30 VA (21W)
rest	7 W
Transformer Size	50 VA
Running time	
Modulating 9-25 (mm)	15 sec.
Increase/decrease	60/300 sec. (selectable)
Spring return	13 sec.
Stroke (mm)	9 ...25
Factory set stroke (mm)	11
Force, nominal	600 N
Duty cycle	20%/60 minutes (full load, high amb. temp.) 80%/60 min. (half load, room temp.)
Analog input (X1, MX)	0...10 V
Ranges (selectable)	0...10, 2...10, 0...5, 2...6, 5...10, 6...10
Impedance	min 100 k Ohm
Digital inputs (VH-VC)	
Voltage across open input	
Current through closed input	24 V AC
Pulse time (minimum)	5 mA
	20 ms
Output (G1)	
Voltage	16 VDC ± 0,3 V
Load	25 mA short-circuit proof

Features

- Brushless DC motors and a high resolution control board allow a very fine fluid control in globe valves.
- Working range and end point switches adjust automatically to valve stroke.
- Firmware calibrates consistent running time regardless of valve stroke.
- On power loss the spring return mechanism drives the motor, generating power to control braking speed, avoiding mechanical stress and system water hammer.
- Configurable for either a 3-point increase/decrease signal or various modulating control signals including sequencing.
- U-Bolt connection allows direct mounting without any mounting kit or special tools.

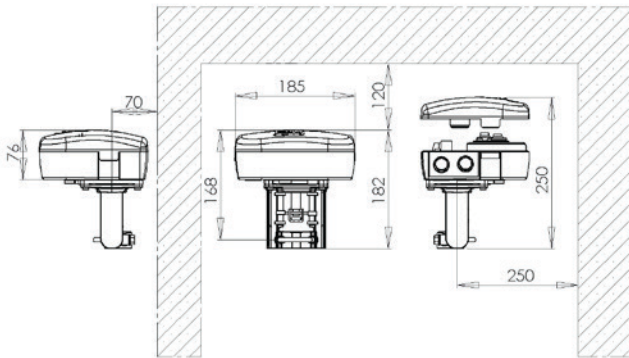
Output (Y) Feedback Load	2...10 V or 0...5 V (0...100%) 2 mA
Ambient Temperature	-10...+50 °C
Ambient Humidity	max 90% RH
Enclosure rating	IP54
Sound power level	43 dBa
Regulatory Compliance	Emission/Immunity EMC 2004/108/CE according to EN 61326-1:2006 Heat IEC-68-2-2 Humidity IEC-68-2-3 Cold IEC-68-2-1 Vibration IEC-68-2-6
Weight	2.8 Kg.
Materials Housing Cover	Aluminium ABS plastic, grey
Max cable core diameter	2.5 mm²
Direct connection to valves	VG210 / VG310
S2 Auxillary Switch Relay (optional accessory)	SPDT, 24V AC 4A AC1 (contacts made at 5% and 95% of end stroke)

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Dimensions (mm)



Actuator Spring Return Direction Vs Valve Function

	MG600C-SRU (Stem up)	MG600C-SRD (Stem down)
VG210	Normally closed	Normally open
VG310	Normally closed (A-AB)	Normally open (A-AB)

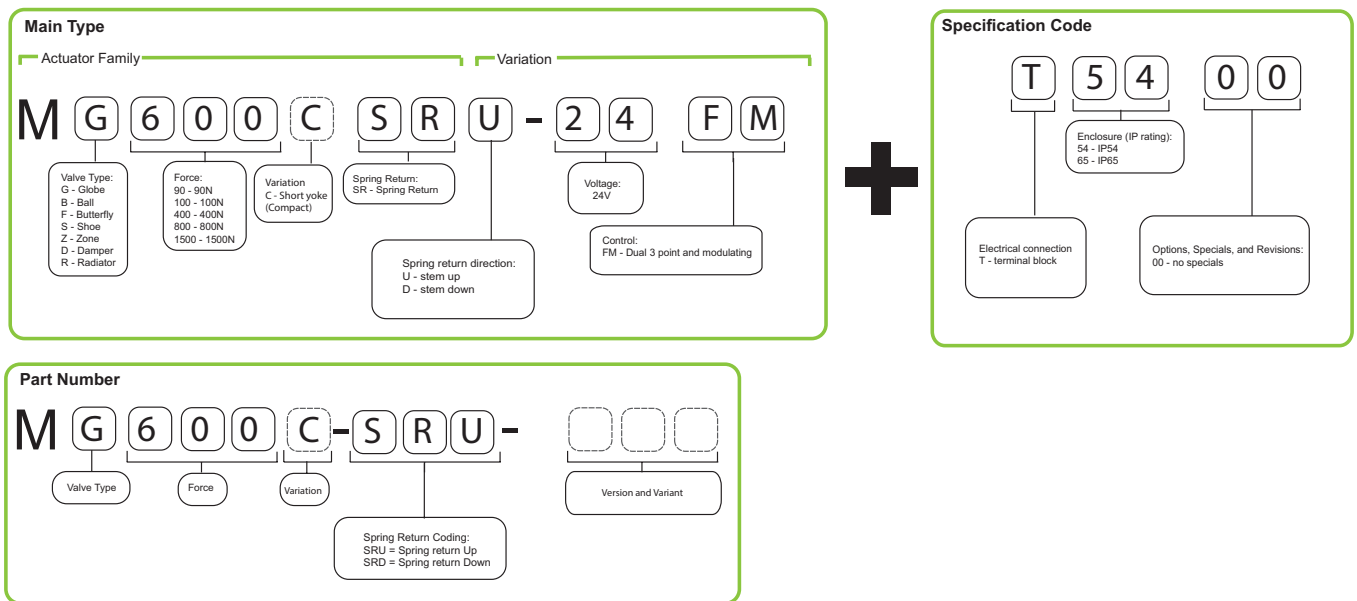
Accessories

Part number	Explanation
880 0104 000	S2 auxiliary end point switches
880 0109 000	Yoke Heater

Ordering

Part Number	Type Designation	Spring Return Direction
MG600C-SRU	MG600C-SRU-24FM T5400	Spring Return Stem UP
MG600C-SRD	MG600C-SRD-24FM T5400	Spring Return Stem Down

Type Designation & Part Numbering System



Function

Actuator

The actuator utilizes a brushless DC motor to accurately position the main spindle, via a gearbox in accordance to the control signal received from the controller.

Upon initial start up the and self stroking activation the actuator performs a full stroke cycle to lean the valve end stop positions and to calibrate the motor speed and actuator full stroke running time. End switch point adjustment is also calibrated during this process.

In case of power failure the actuator is equipped with spring return function which returns the valve and actuator back to the rest position.

The actuator can not be configured or modified between spring return stem up and spring return stem down.

Control signal

MG600C SR actuator can either be controlled by an increase/decrease signal or by a variable direct voltage.

The actuator is very flexible regarding the configuration of signal input and a direct or inverse actuation but normally for an increase/decrease the actuator moves inwards (up) on an increase signal and outwards (down) on a decrease signal.

Spring pretension

To ensure tight shut off from an assembled SR actuator and control valve for closure on spring return function, it is necessary during installation, to align the actuator spindle with the required valve stroke and stroke limits. Installation instructions 02-00148 should be referred to for the correct set-up.

Position feedback

MG600C SR actuators are equipped with a 2 -10 and 0...5V DC position feedback signal selectable by Switch No 1.

End point switch (Accessory)

When fitted, the End point switch (S2 Auxillary Switch relay) is calibrated during the initial stroke learning procedure. The switch points electronically make at 5% and 95% of the calibrated stroke position. When actuators are controlled in normal or sequence control it is possible to use the end point switches to toggle when the valve is fully open or fully closed.

Maintenance

The actuator is maintenance-free.

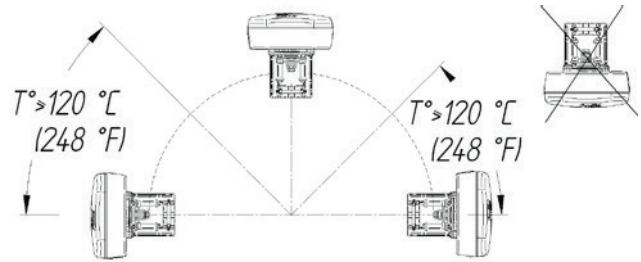
Manual Operation

To operate the manual override, the power to the actuator must be cut.

The manual override feature allows the actuator to be positioned independently of any external control signal can be operated with or without the cover attached. The operating direction of both the manual override and lock screw are clearly labelled on both the cover and inside the actuator.

The Manual override is driven by a 5mm Hex slot, a small 5mm hex (Allen)key is supplied with the actuator and retained in the actuator cover. The action of the manual override is always against the spring tension.

The actuator spindle position can be locked against the spring by twisting the lock screw in the direction as shown on the actuator. The manual override lock should only be

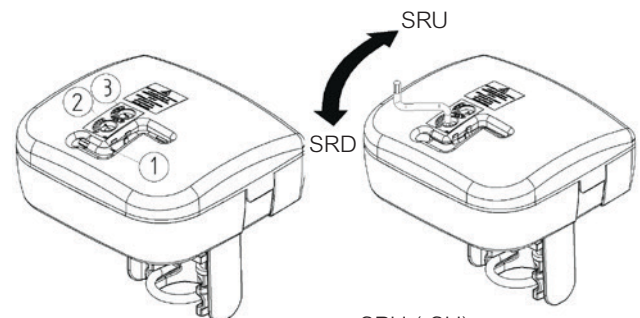


released by again; either by nudging the manual override by 10° in the normal direction (against the spring), or, by re-applying power to the actuator.

The Actuator when it is initially powered up will momentarily drive against the spring to release the manual override lock before being driven by an external control signal

The manual override and lock must only ever be operated in one direction. This direction is clearly labeled on both cover and inside the actuator.

If the hex key is left in the hex manual override drive socket, the hex key will rotate as the actuator is driven. This is not recommended and damage could occur if the key is not free to rotate.



1. Hex (Allen) Key

2. Manual override drive socket

3. Lock screw.

Flat screwdriver slot

SRU (-SU)

Manual override operation

Lock operation

Unlock operation. Twist manual override 10°

SRD (-SD)

Manual override operation

Lock operation

Unlock operation Twist manual override 10°

Cable Lengths

Power the cables to G, G0 and G1 should be max. 100 m and have a cross-sectional area of min. 1.5 mm² (AWG 16).

Other control cables should be max. 200 m and have a cross-sectional area of min. 0.5 mm² (AWG 20).

The max section cable is 2.5 mm² .

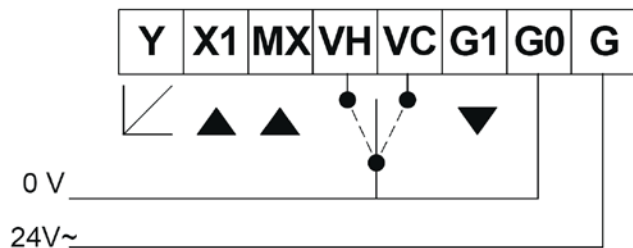
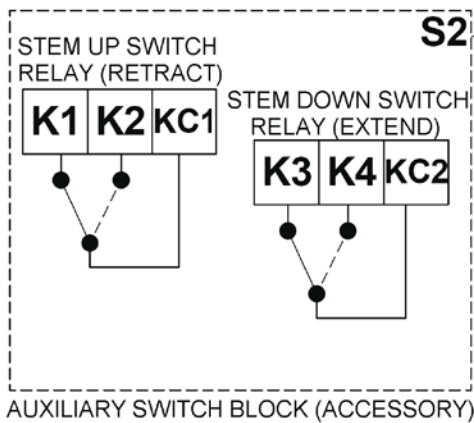
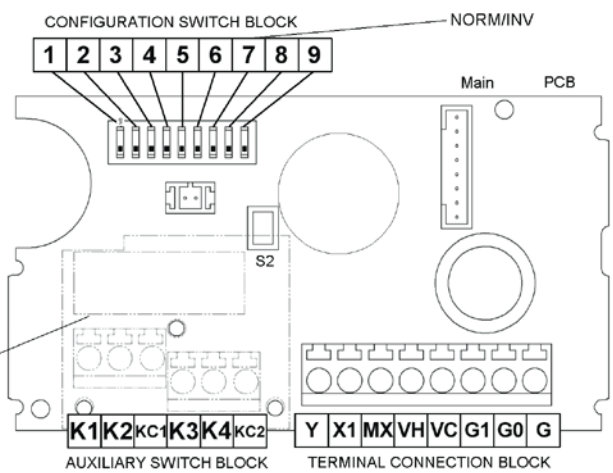
NOTE: When installed with 3 conductors, where the control signal reference is connected to G0, the motor current of the

actuator will cause varying voltage loss in the cable and thus in the reference level. The MG600C-SR has a highly sensitive control circuitry which can be influenced by interference in the control signal which the actuator can try to follow. This influence may be reduced in simple installations by shortening the cable lengths below 100m and /or increasing the cross sectional area of the cable above 1.5mm² (AWG 16) and the cables are spured to only one actuator.

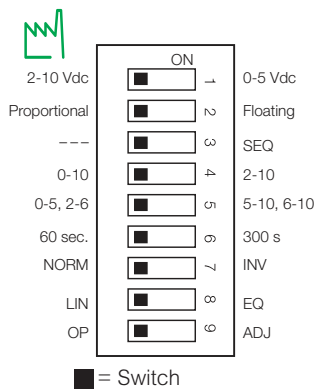
Electrical Connections

Terminal	Function	Description
G	24 V AC	Supply voltage
G0	Ground	
X1	Input, proportional	Control signal
MX	Input, neutral, proportional	
VH	Increase, 3-point	VH, VC connected to G0
VC	Decrease, 3-point	
G1	16 V DC	External supply, 25 mA max.
Y	0...100%	Feedback signal

Connections / PCB Layout



DIP Switch Settings

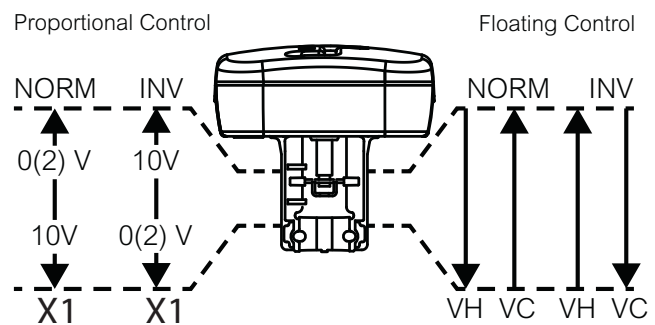


Switch	Description	Off Position	On Position
1	Feedback signal	2...10 Vdc	0...5 Vdc
2	Control mode	Proportional signal	Floating signal
3	Sequence control (Proportional mode only)	Off (Normal Operation)	Sequence ON
4	Input voltage range	0 to 10 Vdc	2 to 10 Vdc
5	Working Sequence Range (2) (Dependant on switch 4)	0 to 5 Vdc or 2 to 6 Vdc	5 to 10 Vdc or 6 to 10 Vdc
6	"Running time (floating control only)"	60 sec.	300 sec.
7	Direction of movement	Normal (Direct) actuator position to control signal	Inverse (Reverse) actuator position to control signal
8	Linearization	Normal	Electronic Flow curve adjustment EQ% Valve to LINEAR control or LINEAR to Quick Open
9	Operation / Stroke Calibration	Normal Operation	Initiate valve stroke calibration Note: Switch 9 must be in the off position for normal operation

There is a 9 switch configuration block on the circuit board. The factory setting is all switches in the "OFF" position. Upon initial installation, set up the configuration switch prior to applying power. Any subsequent changes to these settings will not be registered until the power has been interrupted to the board or switch No. 9 is initiated (End position adjustment) to re-calibrate the actuator and valve assembly.

- 1 Feedback signal
 - Select between 2...10V and 0...5V feedback voltage output.
- 2 Control signal MOD / INC
 - MG600C-SR is either controlled by a variable direct voltage, for a modulating signal (MOD), or by a 3-point increase/ decrease signal (INC).
- 3 Sequence or parallel control— --- / SEQ
 - With sequence (or parallel) control (SEQ), two actuators/valves can be controlled with one control signal. For each actuator using part signal control it is possible to determine which voltage range to use. An upper signal range of 5...10 V (6...10 V) or a lower signal range with 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 voltage to 0%. With the INV position selected the opposite function is obtained.
 - NOTE: If sequence or parallel control is not used, the switch --- / SEQ must be in the OFF position.
- 4 Input Voltage range—0...10 / 2...10
 - Choice of either 0...10V or 2...10V input control voltage signal.
- 5 Operational voltage range (SEQ / SPLIT)
 - When switch 3 (SEQ) ON Choice to split operational voltage range:
Off: low: 0 - 5 V (2 - 6 V)
On: high: 5...10V (6 - 10 V)
 - 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 should be put in its INV position.
- 6 Running time—60 s / 300 s
 - On increase/decrease control, it is possible to select the running time between 60 s (off) or 300 s (on). With modulating control, the running time is always 15 s / 20 s / 30 s depending on stroke.
- 7 Direction of movement—NORM / INV
 - The Norm / INV switch reverses the actuator direction of movement relative to signal change. With the switch in the NORM position, the actuator spindle moves up

Functionality According To Sw7 Inverse/Normal Operation



when the signal decreases. With the switch in the INV, the actuator spindle moves down when the signal decreases.

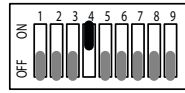
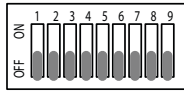
- 8 Linearization—NORM / LIN/LG
 - With the linearization switch then valve flow characteristic can be modified. Selecting LIN/LG will change characteristics of an equally modified percentage (EQM) valve to behave in a linear function. It will also change a valve designed for linear flow to operate with "Quick opening characteristics". i.e. with a small control signal, the valve will open quickly to allow high flow control.
- 9 Input signal and stroke Calibration
 - OP / ADJ Switch used to calibrate the actuator stroke with the valve end positions during actuator commissioning. Momentarily place the switch in the ON position. The actuator will automatically find the end positions of the valve. At the end of the adjustment all the other dip switch settings (1 to 8) will be registered again. Stroke calibration will only be initiated once power is applied to the actuator and the user has triggered this switch.

NOTE: For the actuator to register new settings for the switches, the supply voltage must be cut, the settings made, and then the power reconnected or the end position adjustment must be initiated again (see point 9). (This does not apply to the switch OP/ADJ).

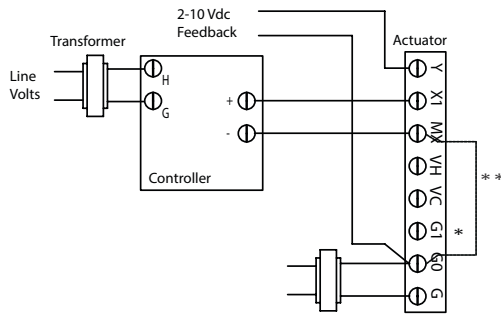
Wiring Examples

■ = Switch

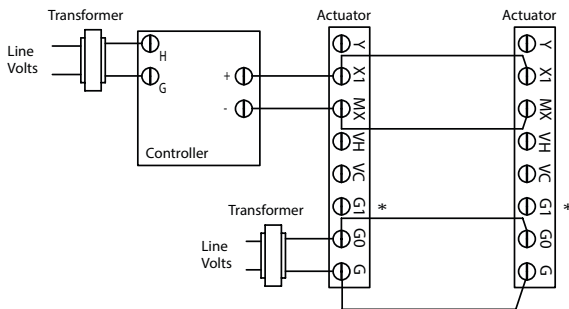
PROPORTIONAL



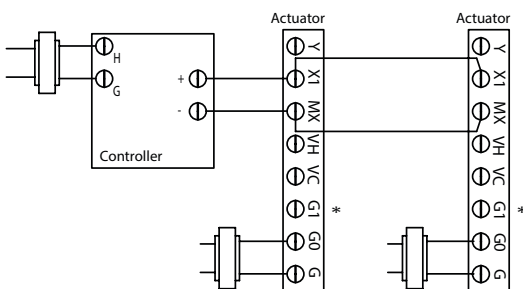
50 VA transformer required per actuator



0-10/2-10 Vdc Proportional Application
* Provides 16 Vdc, 25mA output source
** Optional Ground connection



0-10/2-10Vdc Proportional Multiple
Actuators powered from single source.
* Provides 16 Vdc, 25mA output source

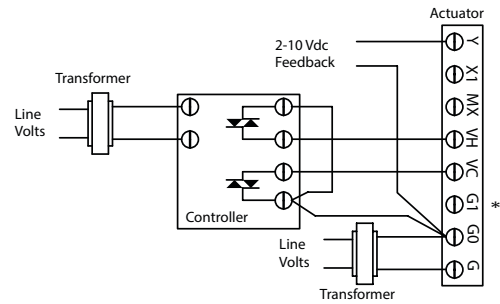


0-10/2-10Vdc Proportional Multiple
Actuators powered from separate sources.
* Provides 16 Vdc, 25mA output

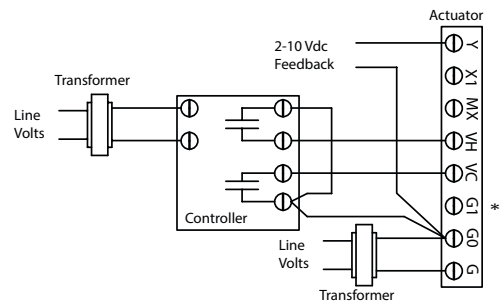
FLOATING



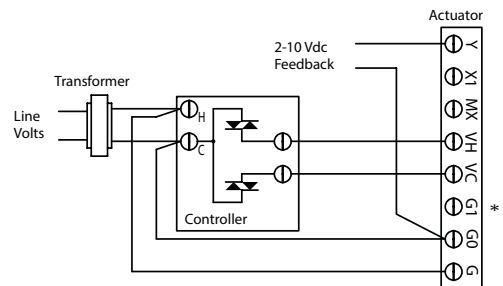
50 VA transformer required per actuator



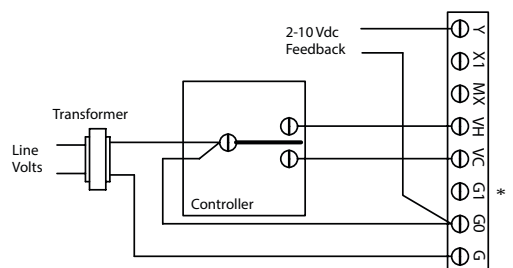
TRIAC SINK Application
Two power sources
* Provides 16 Vdc, 25mA output source



RELAY SINK Application
Two power sources
* Provides 16 Vdc, 25mA output source



TRIAC SINK Application
One power source
* Provides 16 Vdc, 25mA output source



RELAY SINK Application
One power source
* Provides 16 Vdc, 25mA output source