[FORTA]

MG900 SR

INTRODUCTION

MG900 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

MG900 SR family of actuators utilise brushless DC motors and a high resolution control board allow a very fine fluid control in globe valves.

The working range and end point switches of the actuator are adjusted automatically to the stroke of the valve.

When driven electrically, the firmware of the actuator calibrates a consistent running time regardless of the valve stroke.

Upon power failure, the mechanical spring return mechanism drives the motor in turn generating power to the board to control the spring return braking speed, avoiding mechanical stress and system water hammer.

All actuators can be configured for either a 3 point increase/decrease signal or various modulating control signals including sequencing. The U-Bolt connection allows quick and easy direct mounting onto the majority of venta valves without any mounting kit or special tools.

SPECIFICATIONS

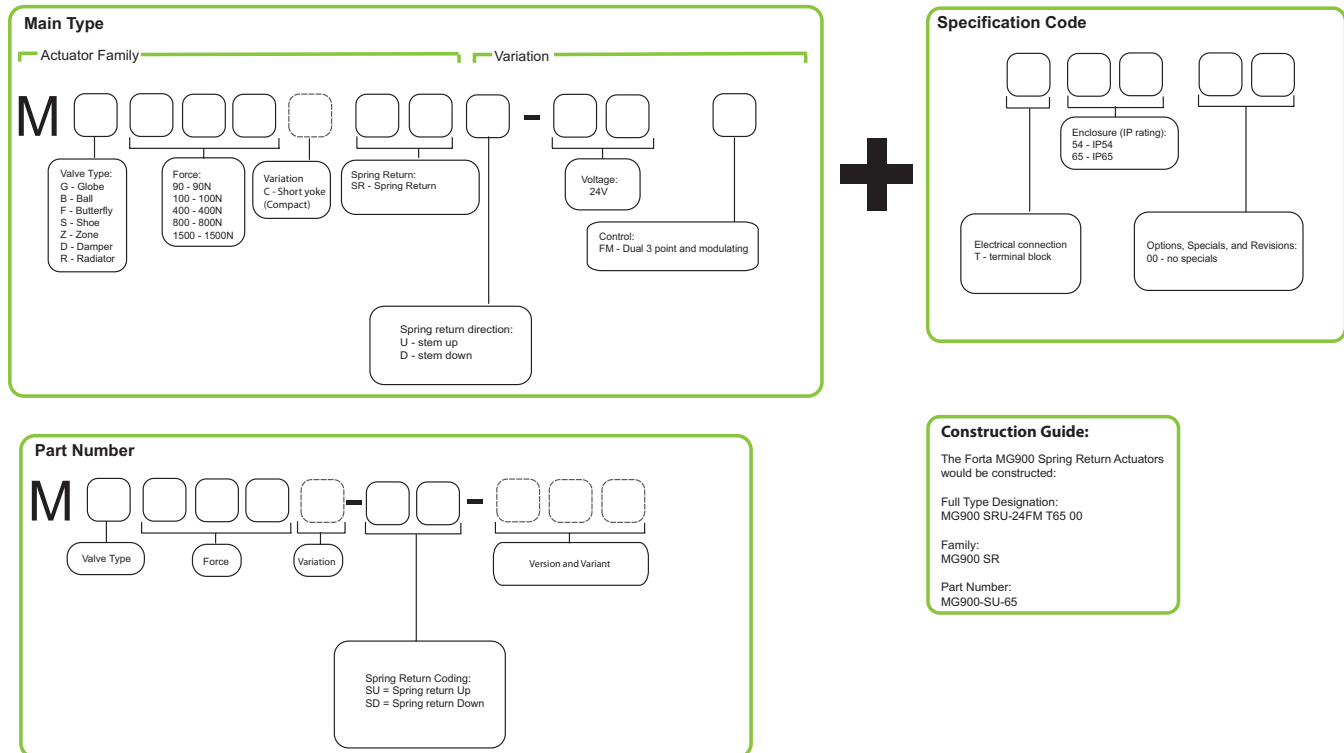| Part No.	MG900-SU	MG900-SD
Spring return direction	Stem up (retract)	Stem down (extend)
Voltage supply	24 Vac 120% 50-60Hz	
Power consumption running	21 W	
Power consumption rest	7 W	
Running time		
Modulating 9-25 (mm.)	15 sec.	
Modulating 25-30 (mm.)	20 sec.	
Increase/decrease	60/300 sec. (selectable)	
Spring return 9-25 (mm.)	13 sec.	
Spring return 25-30 (mm.)	18 sec.	
Transformer Size	50 VA	
Stroke	9 - 30 mm.	
Factory set stroke	20 mm.	
Force, nominal	900 N	
Duty cycle	20%/60 minutes (full load, high amb. temp.) 80%/60 min. (half load, room temp.)	
Analogue input	Voltage 0-10 V - impedance min 100 k Ohm (range: 0-10, 2-10, 0-5, 2-6, 5-10, 6-10)	
Digital inputs VH-VC	Voltage across open input 24 V AC - Current through closed input 5 mA - Pulse time min. 20 ms	
Output G1	16 VDC 1 0,3 V - Load 25 mA, short-circuit proof	
Output Y (Feedback)	2-10 V or 0-5 V (0-100%) - Load 2 mA	
Ambient temperature	Operation and storage -10 / +50 °C	
Ambient Humidity	max 90% RH	
Enclosure rating	IP54	
Sound power lever	43 dBa	
Standard	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	
Materials	Housing: Alluminium - Cover: ABS plastic, red	
Max cable core diameter	2.5 mm^2	
Direct connection to valves	V241/V341, V211T/V311T, V211/V311, V212, V212T, VG222 (up to DN65 only) VG321 (up to DN65 only), V231, V232	
S2 Auxillary Switch Relay (optional accessory)	SPDT, 24V AC 4A AC1 (contacts made at 5% and 95% of end stroke)	
Weight	2,8 Kg.	

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ORDERING TABLE

Part Number	Type Designation	Spring Return Direction
MG900-SU	MG900 SRU-24FM T54 00	Spring return stem up
MG900-SD	MG900 SRD-24FM T54 00	Spring return stem down

ACCESSORIES

Part number	Description
880 0104 000	S2 auxiliary end point switches
FYH50	Yoke Heater
MG900-SU-PCB	Circuit board for MG900 SRU
MG900-SD-PCB	Circuit board for MG900 SRD

TYPE DESIGNATION & PART NUMBERING SYSTEM

Main Type

Actuator Family

M

Valve Type:
G - Globe
B - Ball
F - Butterfly
S - Shoe
Z - Zone
D - Damper
R - Radiator

Force:
90 - 90N
100 - 100N
400 - 400N
800 - 800N
1500 - 1500N

Variation
C - Short yoke (Compact)

Variation

Spring Return:
SR - Spring Return

Spring return direction:
U - stem up
D - stem down

Voltage:
24V

Control:
FM - Dual 3 point and modulating

Specification Code

Enclosure (IP rating):
54 - IP54
65 - IP65

Electrical connection
T - terminal block

Options, Specials, and Revisions:
00 - no specials

Part Number

M

Valve Type

Force

Variation

Spring Return Coding:
SU = Spring return Up
SD = Spring return Down

Version and Variant

Construction Guide:

The Forta MG900 Spring Return Actuators would be constructed:

Full Type Designation:
MG900 SRU-24FM T65 00

Family:
MG900 SR

Part Number:
MG900-SU-65

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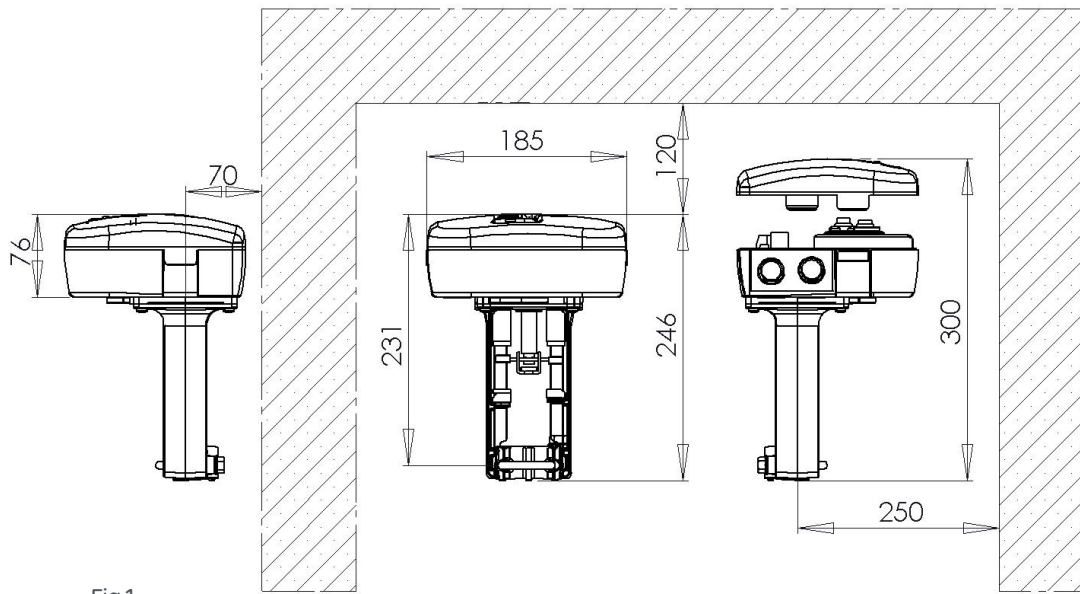03-00240-02-en

June 2010   sp

DIMENSIONS (mm)

Fig 1

FUNCTION

The actuator

The actuator utilises 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

MG900 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 02-00011-## should be referred to for the correct set-up.

Position feedback

MG900 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 Auxillay 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.

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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 labelled 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
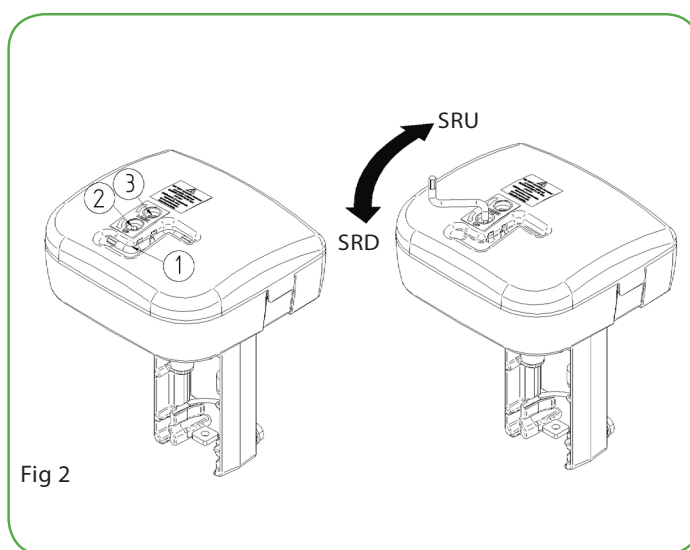

Fig 2

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 override10°

SRD (-SD)

Manual override operation

Lock operation

Unlock operation.
Twist manual override10°

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).
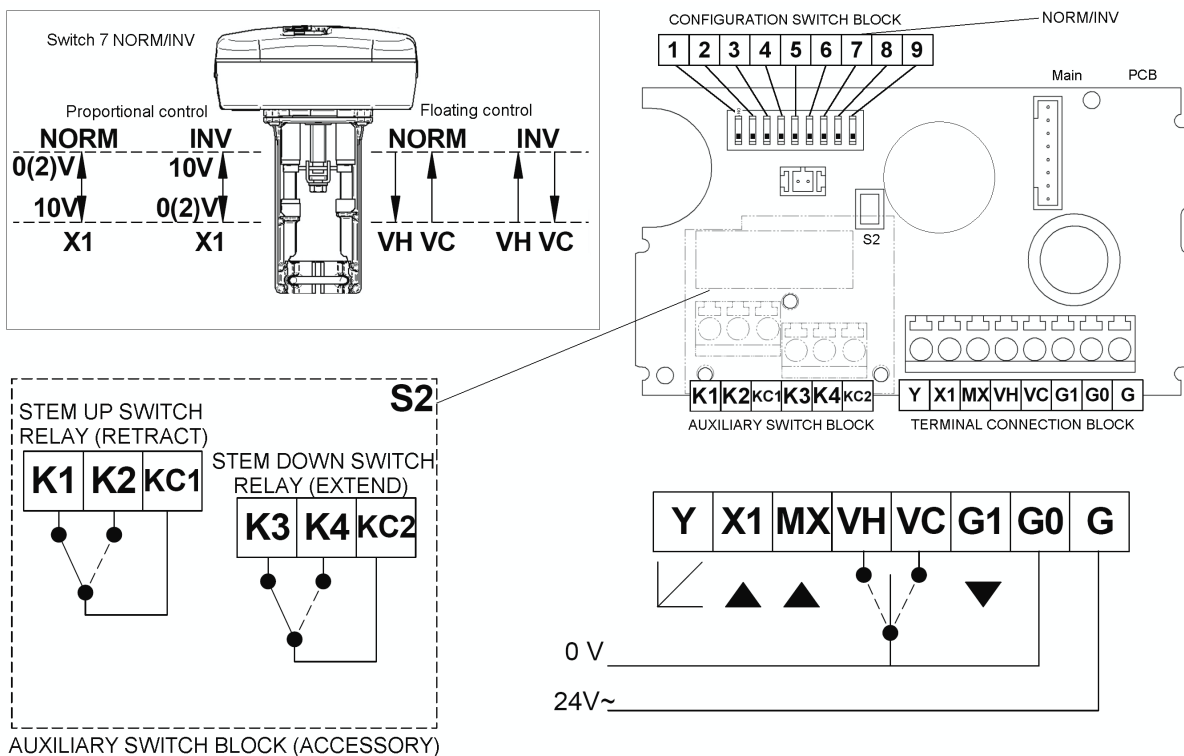The max section cable is 2.5 mm² .

N.B.! 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 MG900 SR has a highly sensitive control circuity 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.
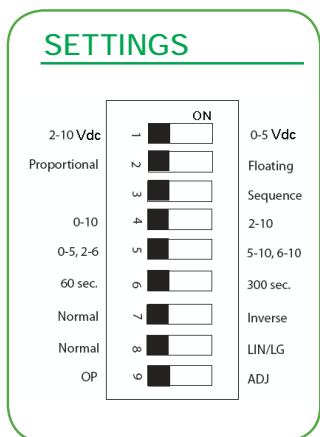

Fig 3
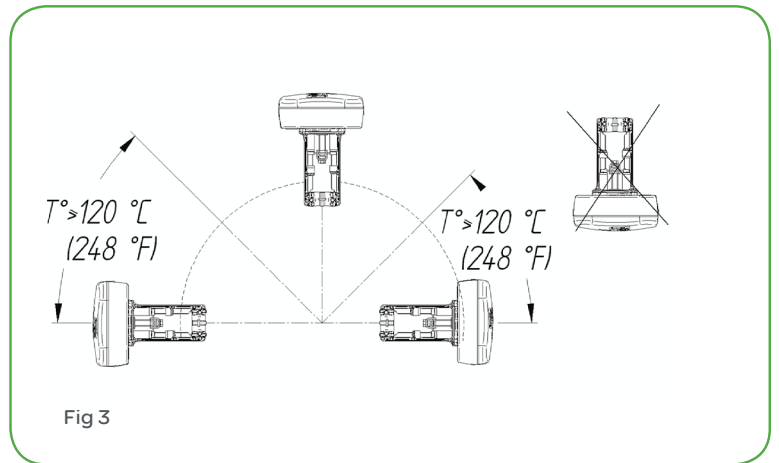
ELECTRICAL CONNECTIONS

Terminal	Function	Description
G	24 V AC	Supply voltage
G0	Ground	
X1	Input, proportional	Control signal
MX	Input, neutral, porportional	
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

Switch 7 NORM/INV

Proportional control

NORM	INV
0(2)V	10V
10V	0(2)V
X1	X1

Floating control

NORM	INV
VH VC	VH VC

CONFIGURATION SWITCH BLOCK

1 2 3 4 5 6 7 8 9

NORM/INV

Main   PCB

S2

K1 K2 KC1 K3 K4 KC2
AUXILIARY SWITCH BLOCK

Y X1 MX VH VC G1 G0 G
TERMINAL CONNECTION BLOCK

S2

STEM UP SWITCH RELAY (RETRACT)

| K1 | K2 | KC1 |

STEM DOWN SWITCH RELAY (EXTEND)

| K3 | K4 | KC2 |

AUXILIARY SWITCH BLOCK (ACCESSORY)

Fig 4

| Y | X1 | MX | VH | VC | G1 | G0 | G |

0 V
24V~

SETTINGS

2-10 **Vdc**	1	0-5 **Vdc**
Proportional	2	Floating
	3	Sequence
0-10	4	2-10
0-5, 2-6	5	5-10, 6-10
60 sec.	6	300 sec.
Normal	7	Inverse
Normal	8	LIN/LG
OP	9	ADJ

Switch Setting	Description	Off Position (1)	On Position
1	Feedback signal	2-10 Vdc	0-5 Vdc
2	Control mode	Proportional signal (no sequencing)	Floating signal
3	Sequence operation	Normal operation (no sequencing)	"SW 2 off, SW 3 on, SW 4 select base range (0-10 or 2-10) SW 5 select sequence range."
4	Input voltage range	0 to 10 Vdc	2 to 10 Vdc
5	Operational Working voltage range (if SW3, SEQ selected)	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	Normal Direction of movement	Actuator spindle moves upwards with a decreasing control signal. (Normal operation for stem up closed valve)	Actuator spindle moves up with an increasing control signal (Normal operation for a stem down closed valve)
8	Linearization	Normal	Changes a EQ valve to linear flow behavior. Changes a Linear valve to a logarithmic behaviour
9	Input signal/ Stroke Calibration	Normal	Calibrate input control signal and the valve stroke

There is a 9 switch configuration block on the circuit board. On delivery ('Factory'), all switches are 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
MG900 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 <u>not</u> used, the switch – – – / SEQ <u>must</u> 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 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 charateristic 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 Callibration OP / ADJ
Switch used to calibrate the actuator stroke with the valve end positions during actuator is commissioning.
By momentarily placing 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.
The MG900 SR actuator is delivered pre-programmed for Venta valves with a 20mm stroke
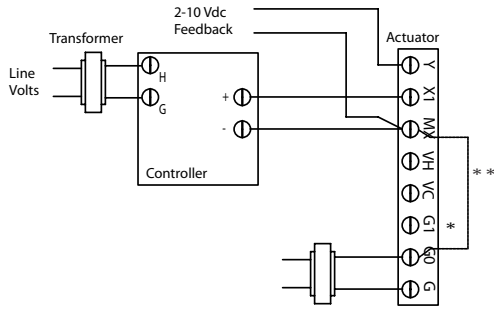
Note! For the actuator to register new settings for the switches, the supply voltage must be cut, the settings made, and then the power reconnected or the end position adjustment must be initiated again (see point 9). (This does not apply to the switch OP/ADJ).
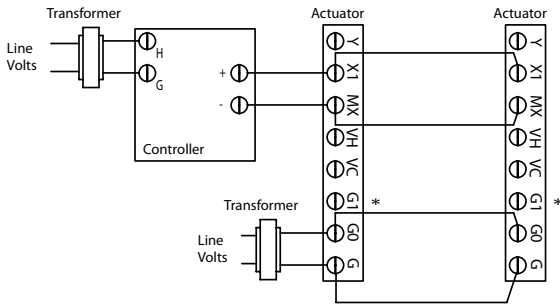
WIRING EXAMPLES

PROPORTIONAL
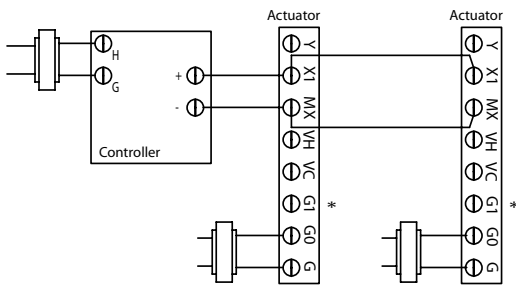

0-10 V
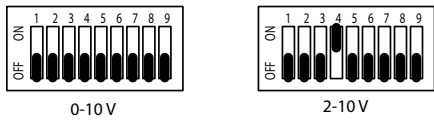
2-10 V

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.
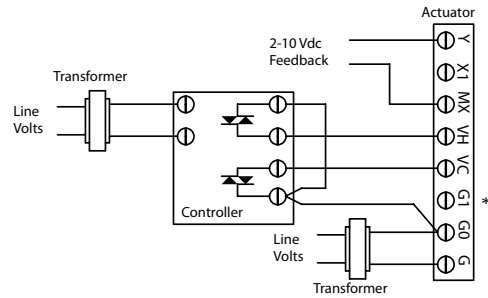* Provides 16 Vdc, 25mA output source

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

Caution: this product contains a half-wave retifier power supply and must not be powered off transformers used to power other devices utilizing non-isolated full-wave retifier power supplies.
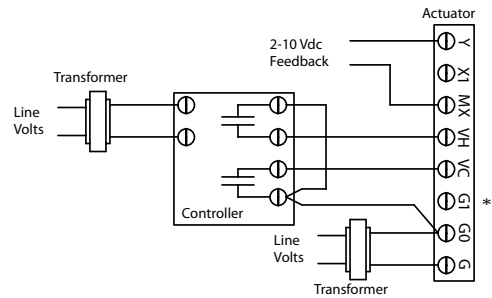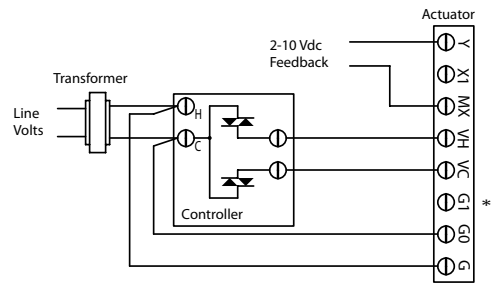
FLOATING

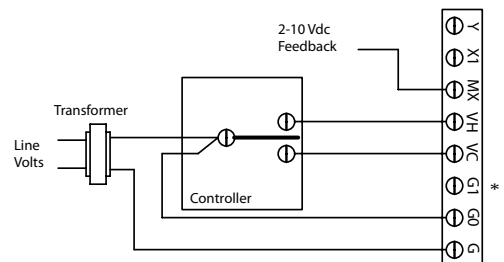50 VA transformer required per actuator

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

ACTUATOR SPRING RETURN DIRECTION VS VALVE FUNCTION

	MG900 SRU (Stem up)	MG900 SRD (Stem down)
V241	Normally closed	Normally open
V211T	Normally closed	Normally open
V212T	Normally closed	Normally open
V211	Normally closed	Normally open
V212	Normally closed	Normally open
VG211 (up to DN65)	Normally open	Normally closed
VG222 (DN65 only)	Normally closed	Normally open
V231	Normally closed	Normally open
V232	Normally closed	Normally open
V341	Normally closed	Normally open
V311T	Normally closed	Normally open
V311	Normally closed	Normally open
VG311 (up to DN65)	Normally closed	Normally open
VG222 (DN65 only)	Normally closed	Normally open