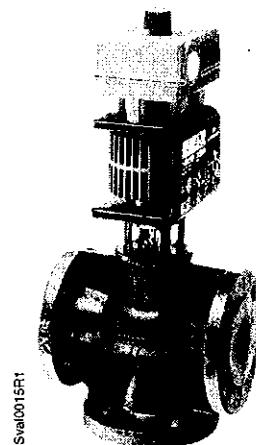


MXG461...U, MXF461...U Series

Modulating Control Valves with Magnetic Actuators



MXG461...U



MXF461...U

Description

Mixing or straight-through valves with magnetic actuators for modulating control of hot and chilled water systems in closed circuits.

Features

- Fast positioning time (1 second), high-resolution stroke (1:1000)
- Linear or equal-percentage valve characteristic (user-selected)
- Switch-selectable control signal: 0 to 10 Vdc, 2 to 10 Vdc, or 4 to 20 mA
- Wear-free inductive stroke measurement
- Heavy-duty, no maintenance required
- Fail-safe feature: A → AB closed when de-energized
- Positioning control
- Position feedback

Product Numbers

See *Table 2*.

Warning/Caution Notations

WARNING		Personal injury/loss of life may occur if a procedure is not performed as specified.
CAUTION		Equipment damage, or loss of data may occur if the user does not follow a procedure as specified.

Application

The MXG461...U (screw fitting) and MXF461...U (flange fitting) valves are mixing or straight-through valves with a factory calibrated and mounted magnetic actuator. The magnetic actuator incorporates an electronics module for position control and positioning feedback. Control path A → AB is closed when the valve is de-energized.



CAUTION:

The valve is suitable for straight-through normally closed or three-way applications and may be installed only in a mixing arrangement. The direction of flow (A → AB) **MUST** be as indicated on the valve.

The fast positioning time, high resolution and high rangeability make these valves ideal for modulating control of chilled and hot water systems in closed circuits. Sturdy construction makes maintenance and regular servicing unnecessary.

Ordering

When using flanged valves in straight-through applications, a blanking flange is required for the third port. If needed, this must be purchased from a local plumbing house.

For screwed valves, no additional ordering is required. The components required to create a straight-through valve are included with the valve.

Principles/ Construction

Automatic Control

The control signal is converted by the microprocessor in the electronics module into an output signal that generates a magnetic field in the core. This causes the only moving part, the armature, to change its position in accordance with the interacting forces (magnetic field, counter-spring, hydraulics etc.). The armature responds rapidly to any change in signal, transferring the corresponding movement directly to the control disc, enabling fast changes in load to be corrected quickly and accurately. The valve position is measured continuously. The positioning controller ensures an exactly proportional relationship between the control signal and the valve stroke.

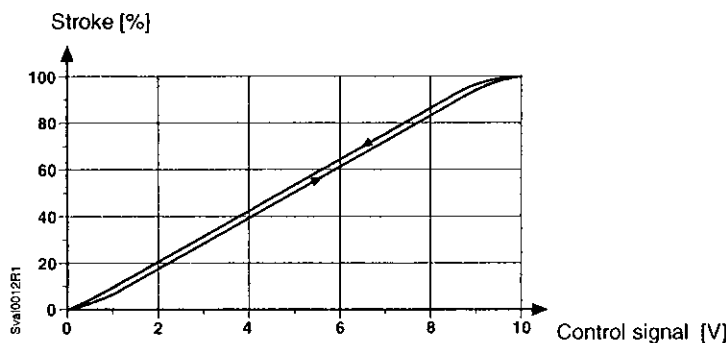


Figure 1. Stroke and Control Signal Proportion.

In the event of a power failure, or if the power is switched off, the spring force closes the valve automatically (control path ports A → AB normally closed).

Manual Control

The valve control path (ports A → AB) can be opened mechanically up to 95% of the full stroke by pressing the handwheel inward and turning it clockwise (to the MANUAL position). This disables the control signal from the controller.

To disable automatic control of the valve, press the handwheel inward and turn it counterclockwise (to the OFF position). The valve will close.

For automatic control, the handwheel must be set to the AUTO position (the handwheel will spring out).

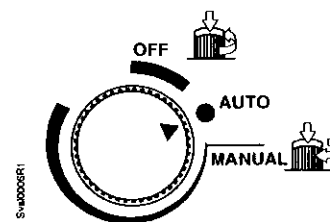


Figure 2. Selecting Automatic Control.

LED Indicators

The two-color LED display indicating operating status can be viewed by opening the cover of the electronics module.

Table 1. LED Display.

LED Display	Status	Description
LED green	On continuously	Automatic mode: Auto (normal, no faults)
	Flashing	– Mechanically set to Manual – Mechanically set to Off – Currently in auto-calibration mode
LED red	On continuously	– General fault – General calibration fault – Microcontroller fault
	Flashing	– Faulty 24 Vac supply (e.g., too low)
LED	Off	– No 24 Vac supply – Fault with electronics module

As a general rule, the LED can only assume the conditions in *Table 1* (continuously red or green, flashing red or green, or off).

Sizing**Table 2. MX.461...U - Valves Sizing.**

Product Numbers	Line Size	C _v	ΔP _{vmax}		Maximum Close-off Pressure	P _{NA} ¹	P _{med} ¹	P _{NT} ¹	Wire Gauge			
									18	16	14	12
	[in.]	[gpm]	[psi]	[bar]	[psi]	[VA]	[VA]	[VA]	Cable Length L [ft.]			
MXG461.15-0.6U	1/2	0.7	44	3	72	22	4	24	108	213	361	656
MXG461.15-1.5U	1/2	1.7	44	3	72	22	4	24	108	213	361	656
MXG461.15-3.0U	1/2	3.5	44	3	72	22	4	24	108	213	361	525
MXG461.20-5.0U	3/4	5.8	44	3	43	22	4	24	108	213	361	656
MXG461.25-8.0U	1	9.3	44	3	43	22	4	24	108	213	361	525
MXG461.32-12U	1-1/4	14.0	44	3	43	22	4	24	108	213	361	525
MXG461.40-20U	1-1/2	23.0	44	3	43	36	7	50	66	118	197	328
MXG461.50-30U	2	35.0	44	3	43	36	9	50	66	118	197	328
MXF461.65-50U	2-1/2	58.0	44	3	43	45	12	60	49	998	164	262

Key:

ΔP_{vmax} = Maximum admissible pressure differential with valve closed

P_{NA} = Nominal power at 113°F (45°C)

P_{med} = Mean operating power

P_{NT} = Nominal transformer power

C_v = Flow rate to IEC534-2-4

Control path A → AB (normally closed): Tolerance ±5%,

Control path B → AB (normally open): Tolerance ±10%

L = Maximum cable length. With 4-wire connections, the maximum permissible length of the separate 16 AWG Cu (copper) signal cable is 656 feet. With 3-wire connections, the maximum permissible cable length is reduced to 1/3 of the values shown in the table.

¹ = All data relates to a 24 Vac supply.

Table 3. Water Flow Chart.

Product Number	ΔP_{V100}	PSI															
	C_{VS}	1	2	3	4	5	6	7	8	9	10	15	20	30	40	50	
MXG461.15-0.6U	0.7	0.7	1	1.2	1.4	1.6	1.7	1.9	2.0	2.1	2.2	2.7	3.1	3.8	4.4	4.9	
MXG461.15-1.5U	1.7	1.7	2.4	2.9	3.4	3.8	4.2	4.5	4.8	5.1	5.4	6.6	7.6	9.3	10.8	12	
MXG461.15-30U	3.5	3.5	4.9	6.1	7	7.8	8.6	9.3	9.9	10.5	11	14	16	19	22	25	
MXG461.20-50U	5.8	5.8	8.2	10	12	13	14	15	16	17	18	22	26	32	37	—	
MXG461.25-8.0U	9.3	9.3	13	16	19	21	23	25	26	28	29	36	42	51	59	—	
MXG461.32-12U	14	14	20	24	28	31	34	37	40	42	44	54	63	77	89	—	
MXG461.40-20U	23	23	33	40	46	51	56	61	65	69	73	89	103	126	145	—	
MXG461.50-30U	35	35	49	61	70	78	86	93	99	105	111	136	157	192	221	—	
MXF461.65-50U	58	58	82	100	116	130	142	153	164	174	183	225	259	318	367	—	

Table 4. Ordering Gaskets and Union Connectors.

Product Number	Description
Gaskets	
41506	MXG461 1/2"
41507	MXG461 3/4"
41508	MXG461 1"
41509	MXG461 1-1/4"
41510	MXG461 1-1/2"
41511	MXG461 2"
Union Connectors	
46618	Union Connector Nut MXG461 (08 through 15)
46603	Union Connector Nut MXG461.20
46606	Union Connector Nut MXG461.25
46609	Union Connector Nut MXG461.32
46612	Union Connector Nut MXG461.40
46615	Union Connector Nut MXG461.50
NPT Union Connectors	
46709	NPT Union Connector 1/2"
46710	NPT Union Connector 3/4"
46711	NPT Union Connector 1"
46712	NPT Union Connector 1-1/4"
46713	NPT Union Connector 1-1/2"
46714	NPT Union Connector 2"

Mounting

Mounting and operating instructions are printed on the actuator and on the electronics module.

The valve is suitable only for straight-through or three-way applications and may be installed only in a mixing arrangement. In the case of the straight-through valve, strict observance of the direction of flow is essential.

Do not mount with actuator below horizontal position.

Access for Mounting

It is essential to maintain the specified minimum clearance above and to the side of the actuator and/or electronics module for servicing, installing and heat dissipation:

- 1/2-inch to 1-1/4 inches = 4 inches
- 1-1/2 inches to 2-1/2 inches = 6 inches

Also see *Dimensions*.

Straight-through Valves

Only three-way MX.461...U valves are supplied. They may be used as straight-through normally closed valves by closing off port "B":

Port "B" can be sealed with a blanking flange, which must be purchased from a local plumbing house.

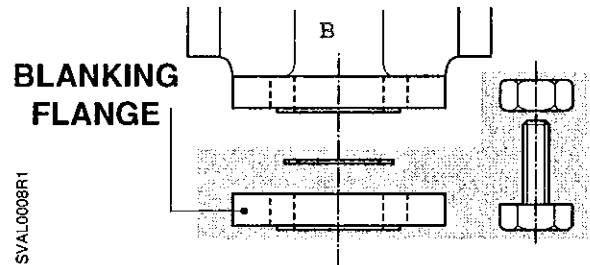


Figure 3. MXF461...U Flanged Valves in Straight-through Applications.

Port "B" can be sealed with the accessories supplied (blanking disk, gasket, and the nut).

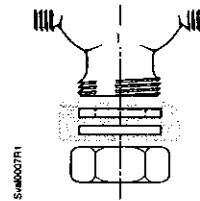


Figure 4. MXG461...U Screwed Valves in Straight-through Applications.

Installation

MXG461...U screwed valves are flat-faced to facilitate sealing with the gaskets supplied.

Do not use hemp, tape or thread-sealing compound.

Do not insulate the actuator.

For notes on electrical installation, see *Terminal Layout*.

Maintenance

The valves and actuators require no maintenance or service. The valve stem is sealed with a maintenance-free O-ring gland.

Should the valve electronics prove faulty, the electronics module should be exchanged for a replacement part, part number ASE1 (1/2-inch to 1-1/4 inches) or ASE2 (1-1/4 inches to 2-1/2 inches). Mounting instructions are enclosed (Ref. 35678).



WARNING:

Under operating conditions within the limits defined by the application data, the actuator will become hot, but this does not represent a fire risk. Always maintain the minimum clearance specified (see *Dimensions*).

Specifications	Power supply	Class 2	
	Electrical Interface	Supply voltage	24 Vac, 50/60 Hz
		– Maximum voltage tolerance	+20/–15%
	Control signal (user-selected)	0 to 10 Vdc, 2 to 10 Vdc or 4 to 20 mA	
	Software class	Class A	
	Nominal power	See <i>Sizing</i>	
	Position feedback:		
Output	0 to 10 Vdc = 0 to 100% stroke		
Maximum rating	2 mA		
Non-linearity	±2% of full scale		
Product Specific Data	Applications	To EN60730	
	Nominal pressure	232 psi (16 bar)	
	Operating pressure $p_{e\max}$	145 psi (1 Mpa) (10 bar)	
	Pressure differential $\Delta P_{v\max}$	See <i>Sizing</i>	
	Leakage at $\Delta P_v = 14.5$ psi (0.1 Mpa) (1bar)	A → AB	Max. 0.02 % k_{vs} (to IEC534-4)
		B → AB	Depends on application data (<0.2% C_v)
	Admissible media	Water, or water/glycol mixtures with maximum 50% glycol	
	Temperature of medium	36 to 248°F (2 to 120°C)	
	Valve characteristic (stroke, k_{vs})	Linear or equal percentage (user-selected), optimized in low opening range (to IEC534-2-4)	
	Stroke resolution $\Delta H / H_{100}$	1:1000 (H = stroke)	
	Hysteresis	Typically 3%	
	Type of operation	Modulating	
	Manual adjustment	Yes, with handwheel	
	Position with actuator de-energized	A → AB closed	
	Orientation	Upright to horizontal	
		Note that orientation affects protection standard	
Positioning time	≤1 second		
Materials (valve body)	Housing parts	Cast iron	
	Inner valve	Steel	
	Seat	Brass	
	Valve stem seal	EPDM (O-ring)	
	Bellows	Tombac, bronze, steel	
Electrical connection	Connection terminal	Screw terminals	
	Per terminal, with wire (no lug)	2 x 16 AWG or 1 x 14 AWG	
	Per terminal with wire	2 x 16 AWG or 1 x 12 AWG	
Miscellaneous	Weight (including packaging)	See <i>Dimensions</i>	
	Dimensions	See <i>Dimensions</i>	
Ambient conditions	Maximum ambient temperature	113°F (45°C)	
Agency Approvals	UL listing	Per UL 873	
	C-UL	Certified to Canadian Standard C22.2 No. 24	
		Suitable for use in air handling spaces NEMA Type 1	

Terminal Layout

WARNING:



Earth ground must be connected to the pipework.

1	G0	⊥	24 Vac
2	G	~	24 Vac
3	Y	⊕	Control signal input
4	YM	⊕	Control signal reference voltage
5	X	⊕	0 to 10 Vdc stroke signal output (position feedback)
6	YF	⊕	Override control

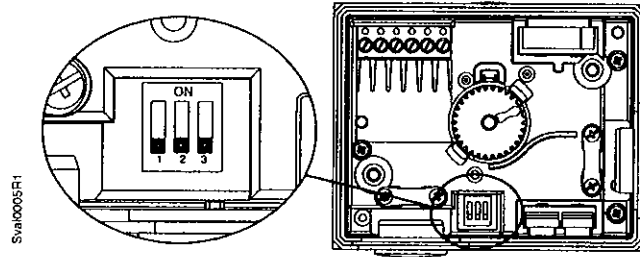
Figure 5. Terminal Layout for 4-wire Connections.

1	G0	⊥	24 Vac
2	G	~	24 Vac
3	Y	⊕	Control signal input (Reference voltage = G0)
4			
5	X	⊕	0 to 10 Vdc stroke signal output (position feedback)
6	YF	⊕	Override control

Figure 6. Terminal Layout for 3-wire Connections.

Configuration Switches

All three dip switches are factory-set to 'OFF', i.e., for a linear characteristic and a 0 to 10 Vdc control signal.



Switch	Position	Function
1	ON	Equal %
1	OFF	Linear
2	ON	2 — 10 or
2	ON	4 — 20
2	OFF	0 — 10
3	ON	mA
3	OFF	V
4	OFF	Factory setting

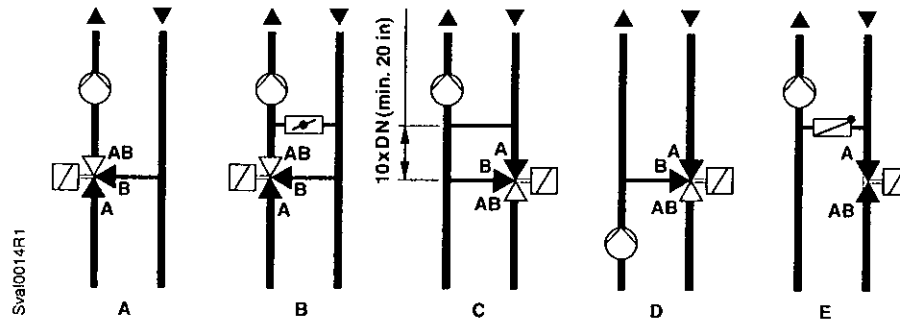
Figure 7. Dip Switches.

Application Example

CAUTION:



This valve is suitable for straight-through normally closed or three-way applications only, and should only be installed in a mixing arrangement.



- A Mixing circuit
- B Mixing circuit with bypass (underfloor heating)
- C Injection circuit
- D Diverting circuit
- E Injection circuit with straight-through valve

Figure 8. Hydraulic Circuits.

Dimensions

All dimensions in inches
 (millimeters)

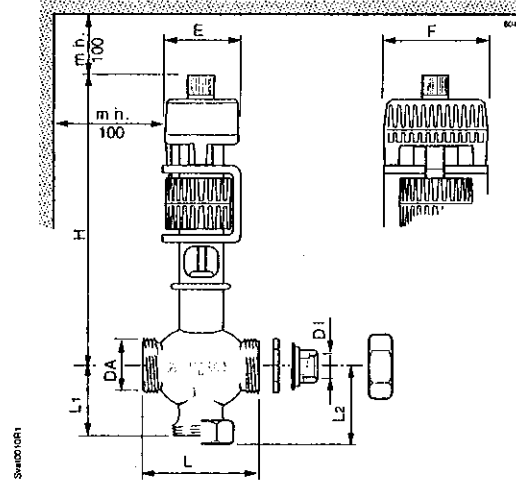


Table 5. MXG461...U –Valves with Electronics Module

Product Number	DI	DA	L	L1	L2 *	H	E	F	lbs. (kg)
MXG461.15-0.6U	1/2	1	3.15 (80)	1.67 (42.5)	2.01 (51)	9.45 (240)	3.15 (80)	3.94 (100)	8.4 (3.8)
MXG461.15-1.5U	1/2	1	3.15 (80)	1.67 (42.5)	2.01 (51)	9.45 (240)	3.15 (80)	3.94 (100)	8.4 (3.8)
MXG461.15-3.0U	1/2	1	3.15 (80)	1.67 (42.5)	2.01 (51)	9.45 (240)	3.15 (80)	3.94 (100)	8.4 (3.8)
MXG461.20-5.0U	3/4	1-1/4	3.74 (95)	2.07 (52.5)	2.40 (61)	10.24 (260)	3.15 (80)	3.94 (100)	9.3 (4.2)
MXG461.25-8.0U	1	1-1/2	4.33 (110)	2.22 (56.5)	2.56 (65)	10.63 (270)	3.15 (80)	3.94 (100)	10.4 (4.7)
MXG461.32-12U	1-1/4	2	4.92 (125)	2.66 (67.5)	2.99 (76)	11.22 (285)	3.15 (80)	3.94 (100)	12.3 (5.6)
MXG461.40-20U	1-1/2	2-1/4	5.51 (140)	3.17 (80.5)	3.70 (94)	12.60 (320)	3.94 (100)	4.72 (120)	20.5 (9.3)
MXG461.50-30U	2	2-3/4	6.69 (170)	3.68 (93.5)	4.29 (109)	13.39 (340)	3.94 (100)	4.72 (120)	26.2 (11.9)

* When used as a straight-through valve

lbs. (kg) = Weight (including packaging)

Dimensions, Continued

All dimensions in inches
(millimeters)

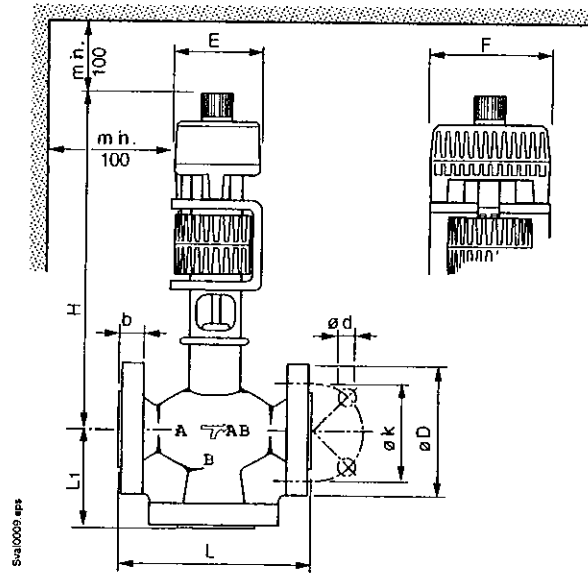


Table 6. MXF461...U – Flanged Valve with Electronics Module.

Product Number	L	L1	D	b	k	d 4X	H	E	F	lbs. (kg)
MXF461.65-50U	11.42 (290)	4.92 (125)	7.00 (177.8)	0.88 (22.4)	5.50 (139.7)	0.75 (19.05)	15.43 (392)	3.15 (80)	3.94 (100)	63.1 (28.6)

NOTE: Counterflanges must be supplied by installer.

lbs. (kg) = Weight (including packaging)

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. © 2000 Siemens Building Technologies, Inc.

Siemens Building Technologies, Inc.
Landis & Staefa Division
1000 Deerfield Parkway
Buffalo Grove, IL 60089-4513
U.S.A.

Your feedback is important to us. If you have comments about this document, please send them to technical.editor@sbt.siemens.com

Document No. CA1N4455E-P25
Printed in the U.S.A.

