SIEMENS

4460

acvatix

Modulating valves PN16 with stainless steel valve body and magnetic actuator MXG469S...

with position control and position feedback signal for cold and hot water plant and semi-industrial applications

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Mixing and throughport valves with magnetic actuator for modulating control of cold and hot water plant and for closed-circuit control in semi-industrial applications.

- **Short positioning time (1 s), high resolution of stroke (1 : 1000)**
- **Selectable valve characteristic: Equal-percentage or linear**
- **Great rangeability**
- **Selectable positioning signal: DC 0...10 V , DC 2...10 V or DC 4...20 mA**
- **With external interface SEZ91.6 for DC 0...20 V phase-cut positioning signals**
- **Inductive acquisition of stroke free from wear**
- **Robust and maintenance-free**
- **Spring return function: A → AB closed when deenergized**
- **With position control, position feedback signal and manual adjustment**

CA1N4460en
13.12.2006

Use

MXG469S... are mixing and throughport valves with the magnetic actuator ready mounted. The actuator is equipped with valve electronics for position control and position feedback signals. When deenergized, control path A → AB is closed.

Caution **The valve may only be used as a mixing or throughport valve, never as a diverting valve. Direction of flow A → AB is mandatory!**

Due to their short positioning times, high resolution and great rangeability, the valves are ideally suited for modulating control of cold and hot water plant and for closed-circuit control in semi-industrial applications.
The valves are of robust design, maintenance-free, requiring no service and ensuring a long service life.

Type summary

Threaded **MXG469S...** valves DN15, 25 and 32.

For an overview of all types, refer to the tables under «Valve sizing».

Ordering

Valve body and magnetic actuator form one integral unit and cannot be separated. When ordering, please give quantity and type reference.

For example: **1 valve MXG469S.32-12**

Technical and mechanical design

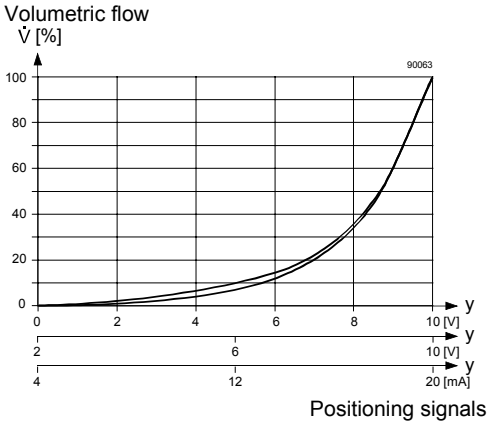
For a detailed description of functions, refer to Data Sheet CA1N4028E.

Automatic control

With the help of a microprocessor, the valve's electronics convert the positioning signal to a phase-cut power signal which is delivered to the magnetic actuator. The power signal generates a magnetic field in the coil. The field's force brings the armature into a position that results from the interplay of the various forces (magnetic field, closing spring, hydraulic forces, etc.). The armature responses instantly to every change in signal. That response is transferred directly to the control disk so that disturbance variables will be offset fast and accurately.
The valve's position is continuously acquired by inductive measurement. Any plant-related deviation is quickly offset by the built-in positioner, which ensures an exact proportional relationship between positioning signal and valve stroke.
In the event of a power failure, or if power is turned off, the closing spring will automatically close control path A → AB.

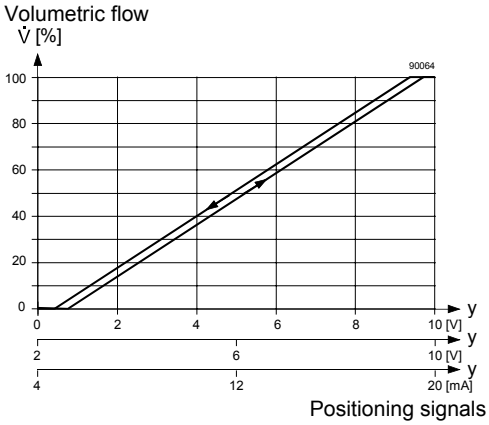
Valve characteristic

Equal-percentage



Positioning signals

Linear



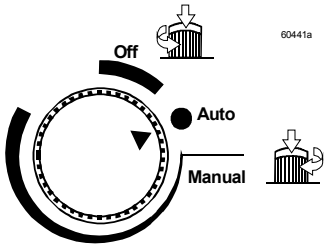
Positioning signals

Manual control

By pressing and then turning the manual knob in clockwise direction, control path A → AB is mechanically opened by 80 to 100 % of the full stroke, depending on the valve's nominal size («Manual» position). The controller's positioning signal will thereby be interrupted.

By pressing and then turning the manual knob in counterclockwise direction to position «Off», automatic control will be switched off and the valve closes.

For automatic control, the manual knob must be turned back to the «Auto» position (manual knob jumps out).



LED indication

The operating state is indicated by a 2-color LED, which is only visible when the cover is open (refer to illustration on page 8).

Green LED	Steady on	Automatic control: «Auto», all o.k.
	Flashing	– Manual adjustment on «Manual» – Manual adjustment on «Off» – Presently in «Calibration»
Red LED	Steady on	– General fault – General calibration not o.k. – Microcontroller fault
	Flashing	– AC 24 V not o.k. (e.g. too low)
LED	Dark	– AC 24 V not available – Electronics housing faulty

The LED can be steady on (red or green), it can flash (red or green), or it can be dark.

Accessories

SEZ91.6 external interface for DC 0...20 V phase-cut positioning signal (refer to Data Sheet CA1N5143E).

Union fittings made of stainless steel must be delivered by thirds.

4-wire connection

The 4-wire connection should always be given preference!

Type reference	DN [mm]	k_{vs} [m^3/h]	Δp_{max} / Δp_S [kPa]	[bar]	P_{NA} 1) [VA]	P_{med} 1) [VA]	P_{NT} [VA]	Cross-sectional area [mm^2] 0.75 Max. cable length L [m]	1.5	2.5	4.0
MXG469S.15-1.5	10/15	1.5	300	3	22	4	38	33	65	110	160
MXG469S.25-8.0	25	8.0	300	3	22	4	38	33	65	110	160
MXG469S.32-12	32	12	300	3	22	4	38	33	65	110	160

3-wire connection

Type reference	DN [mm]	k_{vs} [m^3/h]	Δp_{max} / Δp_S [kPa]	[bar]	P_{NA} 1) [VA]	P_{med} 1) [VA]	P_{NT} [VA]	Cross-sectional area [mm^2] 0.75 Max. cable length L [m]	1.5	2.5	4.0
MXG469S.15-1.5	10/15	1,5	300	3	22	4	38	11	21	36	53
MXG469S.25-8.0	25	8.0	300	3	22	4	38	11	21	36	53
MXG469S.32-12	32	12	300	3	22	4	38	11	21	36	53

Legend:

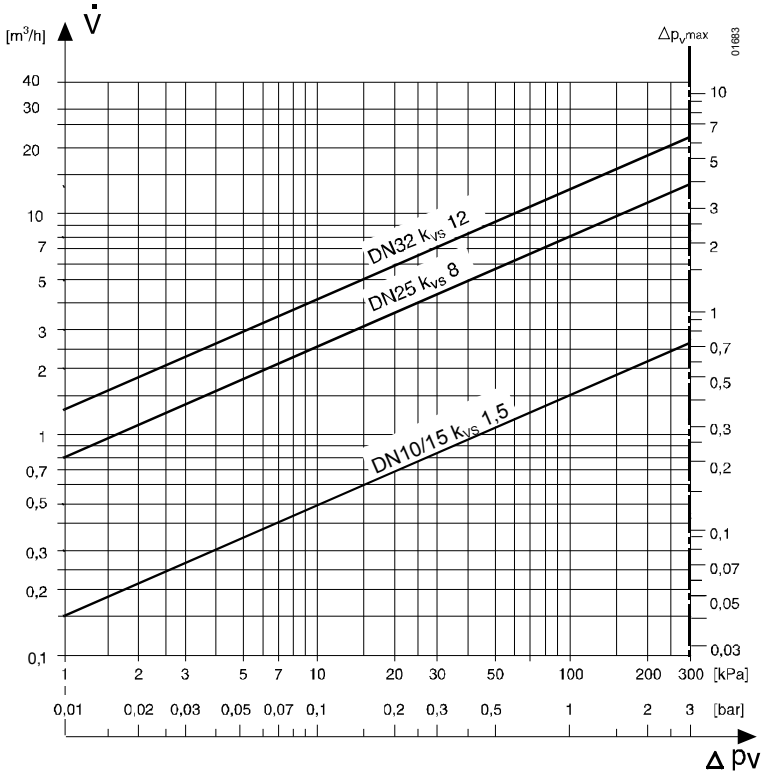
Δp_{max} = max. permissible differential pressure in control mode across the entire stroke range
Δp_S = max. permissible differential pressure at which the valve closes reliably (shutoff function)
P_{NA} = rated power consumption (at 45 °C); fuse (slow) rated at least 1.5 times the power consumption; local regulations must be complied with!
P_{med} = mean operating output
P_{NT} = rated capacity of transformer
k_{vs} = flow rate to IEC 534-2-4
control path A → AB: tolerance ±5 %,
control path B → AB: tolerance ±10 %
L = max. cable length; with 4-wire connection, the maximum length of the separate positioning signal line with 1.5 mm^2 copper cable is 200 m

1) Based on AC 24.0 V operation

Water flow chart

Flow rate as a function of the pressure differential.

The kvs value represents the volumetric flow of water $\dot{V}$ in m^3/h passing through the open valve at a pressure differential Δp_v of 100 kPa (1 bar).
For calculation of kvs value, refer to Data Sheet CA1N4023E.



Mounting notes

Mounting and operating instructions are printed on the actuator and on the connecting housing.
The valve may only be used as a mixing or throughport valve, never as a diverting valve.
The direction of flow through the throughport valve must be observed.

Degree of protection

When mounted from vertically to horizontally:
With cable entry gland PG13.5 supplied by thirds IP54

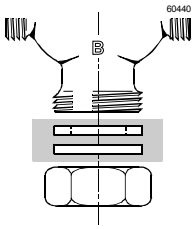
Accessibility for mounting

The minimum clearance at the top and at the side between wall and actuator and / or connecting housing (100 mm) must be observed!
Also refer to «Dimensions».

MXG469S... as throughport valves

The MXG469S... are always supplied as 3-port valves.
When used as throughport valves, port B must be closed off with a union fitting.
The valves are supplied complete with sealing ring made of brass and flat seals.

Union fittings conforming to ISO 49 / DIN 2950.



Installation notes

- The MXG469S... must be used with the flat seals supplied with them
- Do not use hemp on the valve's threaded connections
- The actuator may not be lagged
- For electrical installation, refer to page 7 under «Connection terminals»

Maintenance notes

The valves and actuators are maintenance-free and require no service. The valve stem uses a maintenance-free gland.

Spare parts

Should the valve's electronics become faulty, the entire connecting housing ASE1 is to be replaced.
The electronics housing is supplied complete with mounting instructions (reference no. 35678).

⚠ **Warning**

If the valves are used close to their operating limits, the actuator produces heat, but there is no risk of burning. A minimum clearance between actuator and sorroundings walls must be observed however (also refer to «Dimensions»).

Valve body, magnetic coil and steel bracket form one integral unit. Dismantling destroys the magnetic valve.

Technical data

Electrical interface	Power supply	extra low-voltage only (SELV, PELV)
	Operating voltage	AC 24 V, 50 / 60 Hz (concentric transformator winding)
	Max. voltage tolerance	+20/–15 %
	Positioning signal, selectable	DC 0 ...10 V, DC 2 ...10 V or DC 4 ... 20 mA
	Input impedance	> 100 kOhm (load < 0.1 mA) at DC 0(2) ...10 V
	Burden resistance	100 Ohm with positioning signal DC 4 ... 20 mA
	Software class	A
	Rated power consumption	see tables under «Sizing»
	Position feedback signal	stroke acquisition: inductive
	Output	DC 0 ...10 V corresponding to 0 ...100 % volumetric flow or stroke
	Max. current	2 mA
	Nonlinearity	± 2 % of end value
Product-specific data	Field of use	to EN 60 730
	Nominal pressure	PN16
	Operating pressure pemax	1 MPa (10 bar)
	Pressure differential Δp_{vmax}	see tables under "Sizing"
	Leakage rate	A → AB max. 0.02 % k_{vs} (to IEC534-4)
	at Δp_v = 0.1 MPa (1bar)	B → AB depending on operating data (< 0.2 % k_{vs})
	Suitable media	water, quality recommendation to VDI 2035 or water / glycol mixture with max. 50 % glycol
	Medium temperature	2 ... 120 °C
	Valve characteristic	equal-percentage n_{gl} = 5.3 to VDI / VDE2173 (factory setting) or linear (selectable), optimized near the closing point (to IEC 534-2-4)
	Stroke resolution $\Delta H / H_{100}$	1 : 1000 (H = stroke)
	Hysteresis	typically 3 %
	Mode of operation	modulating
	Manual adjustment	with manual knob, refer to «Manual control»
	Position when deenergized	A → AB closed
	Mounting position	from vertical to horizontal
	Positioning time	≤ 1 s
Materials in contact with the medium	Valve body	cast stainless steel GX5CrNiMo 19-11-2 (W. no. 1.4581)
	Plug	CrNi steel X12CrNi 17 7 (1.4310)
	Seat	brass CuZn39Pb3 (2.0401)
	Valve stem seal	EPDM (O-ring)
	Bellows	Tin bronze CuSn9 (2.1020), CuZn38Pb2; X12CrNiS18 8 (1.4305) Loctite 270, 603, 971; soft solder SNPb60; unisilicon grease L250 L
Electrical connections	Connection terminals	screw terminals
	– Per terminal, with stranded wire (without ferrule)	2 x 1.5 mm^2 or 1 x 2.5 mm^2
	– Per terminal, with stranded wire (with ferrule)	2 x 1.5 mm^2 or 1 x 2.5 mm^2
	– Per terminal, with solid wire	2 x 1,5 mm^2, 2 x 2.5 mm^2 or 1 x 4 mm^2
	Cable entries	2 pieces for PG13.5, G½ or M20 x 1.5
Weight, dimensions	Weight	refer to tables under «Dimensions»
	Dimensions	refer to tables under «Dimensions»

General environmental conditions	Operation	to IEC721-3-3
	– Climatic requirements	Class 3K5
	Ambient temperature	– 5 ... 45 °C
	Humidity	≤ 95 % r.h. / max. 29 g/m^3
	– Biological requirements	Class 3B2
	– Chemically active substances	Class 3C1
	– Mechanically active substances	Class 3M2
	Transport	to IEC721-2
	– Climatic requirements:	Class 2K3
	Ambient temperature	– 25 ... 70 °C
	Humidity	< 95 % r.h. at 40 °C
	– Mechanical requirements	Class 2M2
	Storage	to IEC721-1
	– Climatic requirements:	Class 1K3
	Ambient temperature	– 5 ... 45 °C
	Humidity	5 ... 95 % r.h.
	– Mechanical requirements	Class 1M2
Product safety	Safety (electrically)	safety class III (VDE 0100, Part 410A2)
	SELV requirements	to EN 60 730, also PELV-compatible
	ESD requirements	valves to be connected to technical earth (e.g. metal piping)
	Degree of protection (mechanically) – Mounting position: Vertical to horizontal	to EN 60 730 IP54 (with PG13.5 cable entry gland)
Norms and standards	**CE** conformance	73/23EEC, 89/336/EEC
	UL	UL 873
	PED 97/23/EC	pressure-bearing equipment Article 1, Paragraph 2.1.4 Article 3, Paragraph 3 for fluid Group 2
	Approvals	tested to EN 60 730 and EN 60 730-2-8
	EMC standard	immunity, industrial, EN 61 000-6-2 emissions, residential, EN 61 000-6-3

Connection terminals

⚠ Warning **Piping must be connected to potential earth!**

G0 of the transformer **must** be connected to earth with the 3-wire connection and **may be** connected to earth with the 4-wire connection.

Terminal assignment with 4-wire connection (to be preferred!)

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1	G0	⊥	AC 24 V
2	G	~	AC 24 V
3	Y	⊕	Positioning signal input +
4	YM	⊕	Reference potential positioning signal (–)
5	X	⊕	Stroke signal output DC 0 ...10 V (position feedback signal, reference potential = G0)
6	YF	⊕	Forced control input

Terminal assignment with 3-wire connection

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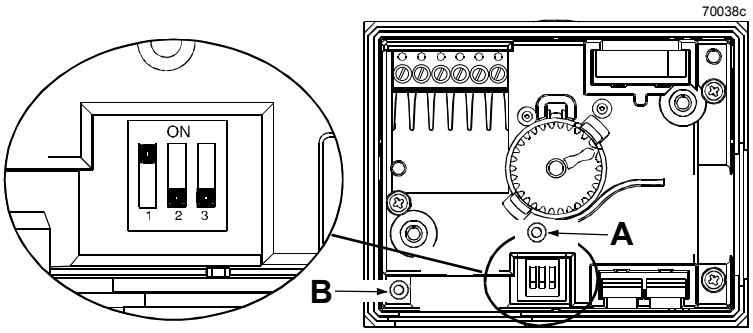
1	G0	⊥	AC 24 V
2	G	~	AC 24 V
3	Y	⊕	Positioning signal input + (reference potential = G0)
4			
5	X	⊕	Stroke signal output DC 0 ...10 V (position feedback signal, reference potential = G0)
6	YF	⊕	Forced control input

Function of forced control (input terminal YF / 6)

AC 0 V (link G0 – YF):	Control path A → AB closed
AC 24 V (link G – YF):	Control path A → AB closed
DC 1...9 V at YF:	Infinitely variable minimum limitation 10...90 % of volumetric flow (higher value YF or Y is given priority)

Function selector



Selector	OFF	ON
1 Characteristic	Linear	Equal-percentage *
2 Positioning signal	DC 0...10 V *	DC 2...10 V or DC 4...20 mA
3 Volts or mA	DC 0(2)...10 V *	DC 4...20 mA

***** Factory setting: Equal-percentage characteristic, positioning signal DC 0...10 V

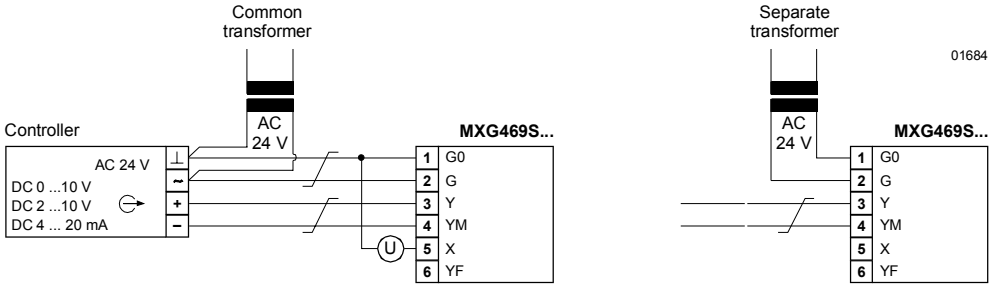
Calibration

The MXG469S... come factory-calibrated at 0 % and 100 % stroke. In exceptional cases (especially under extreme operating conditions), leakage may still occur across control path A → AB with a 0 % stroke positioning signal (DC 0 V, DC 4 mA or DC 2 V) when commissioning the valve. If that is the case, the valve can be easily recalibrated. For that purpose, press once the button behind opening [**A**] of the connecting housing using a pin of 2 mm diameter. During recalibaration, the green LED [**B**] in the connecting housing will flash for about 10 seconds. During that period of time, the valve will automatically close for a short moment and then fully open.

Connection examples

Connection to controller with 4-wire output

(to be preferred!)



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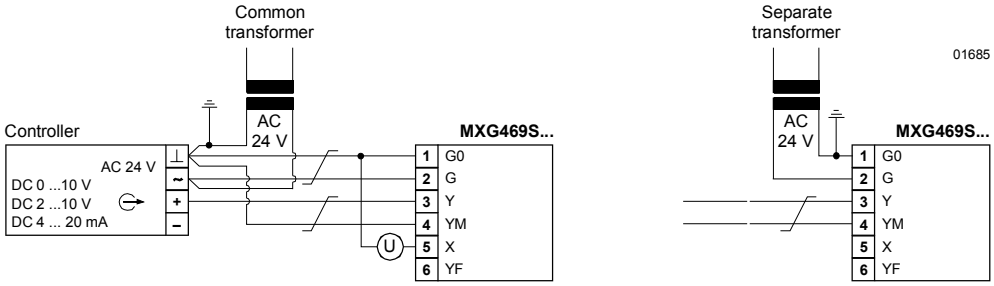
Indication of valve position (only if required). DC 0 ...10 V → 0...100 % volumetric flow

Twisted pairs. If the lines for AC 24 V power supply and the DC 0...10 V (DC 2...10 V, DC 4... 20 mA) positioning signal are routed separately, the AC 24 V line need not be twisted.

Connection to controller with 3-wire output



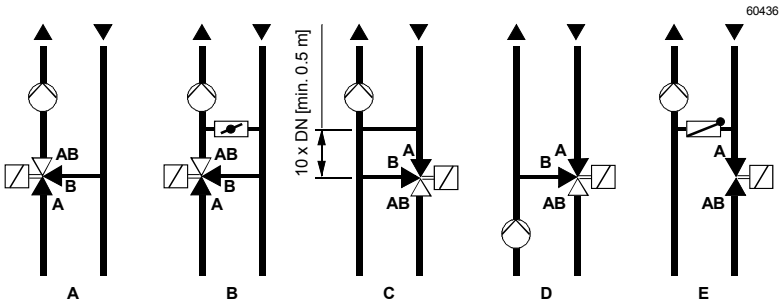
Application example

Hydraulic circuits

The application examples shown below are basic diagrams with no installation-specific details.

Caution

The valve may only be used as a mixing or throughport valve, never as a diverting valve. The correct direction of flow must be observed!

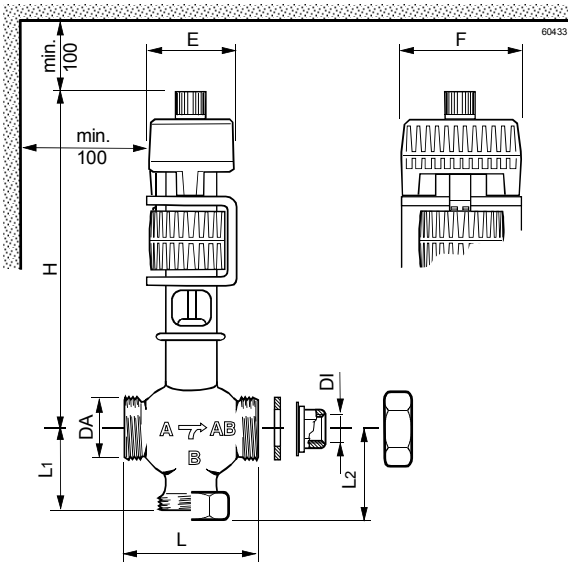


Legend :

A Mixing circuit
B Mixing circuit with bypass (underfloor heating system)
C Injection circuit
D Diverting circuit
E Injection circuit with throughport valve

Dimensions

Threaded MXG469S... valves with electronics housing



Dimensions in mm

- Externally threaded G...B to ISO 228/1
- Internally threaded Rp... to ISO 7/1
- Union fittings to ISO 49 / DIN 2950

* When used as a throughport valve

G Weight in kg (incl. packaging)

Type reference	**DI** [inch.]	**DA** [inch.]	**L**	**L_1**	**L_2 ***	**H**	**E**	**F**	**G**
MXG469S.15-1.5	Rp½	G1B	80	42.5	51	240	80	100	3.8
MXG469S.25-8.0	Rp1	G1½B	110	56.5	65	270	80	100	4.7
MXG469S.32-12	Rp1¼	G2B	125	67.5	76	285	80	100	5.6