ACVATIX™

Modulating control valve MXG462S.. with magnetic actuator, PN16 stainless steel

- Short positioning time (< 2 s), high-resolution stroke (1 : 1000)
- Selectable valve characteristic: equal-percentage or linear
- High rangeability
- Operating voltage AC / DC 24 V
- Selectable standard signal inputs DC 0/2...10 V or DC 0/4...20 mA
- DC 0...20 V Phs phase-cut signal input for Staefa controllers
- Indication of operating state, visible from the outside
- Wear-free inductive stroke measurement
- Low friction, robust and maintenance-free
- Spring return facility: A → AB closed when de-energized
- Positioning control, position feedback and manual control
- Parts in contact with medium in CrNi steel
- Applications with demineralized water upon request

Use

The control valves MXG462S.. are mixing or through-port valves. They are supplied with the magnetic actuator ready fitted, equipped with an electronics module for position control and position feedback.

The short positioning time, high resolution and high rangeability make these valves ideal for modulating control of open and closed circuits with the highest control requirements.
Type summary

<table>
<thead>
<tr>
<th>Type reference</th>
<th>DN Connection</th>
<th>kVS</th>
<th>Δp_max</th>
<th>Δp_s</th>
<th>Operating voltage</th>
<th>Positioning signal</th>
<th>time</th>
<th>Spring return function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXG462S50-30</td>
<td>50 G 2½B</td>
<td>30</td>
<td>600</td>
<td>600</td>
<td>AC 24 V</td>
<td>DC 0/2...10 V or</td>
<td>2 s</td>
<td>✓</td>
</tr>
</tbody>
</table>

DN = Nominal size  
kVS = Nominal flow rate of cold water (5 to 30 °C) through the fully opened valve (H100) at a differential pressure of 100 kPa (1 bar)  
Δp_max = Maximum permissible differential pressure across the valve’s control path, valid for the entire actuating range of the motorized valve (mixing: path A-AB, B-AB)  
Δp_s = Maximum permissible differential pressure at which the motorized valve will close securely against the pressure (close off pressure)

Accessories

<table>
<thead>
<tr>
<th>Type reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z366</td>
<td>Stem heating element for media temperatures &lt; 0 °C, AC / DC 24 V, 10 W</td>
</tr>
</tbody>
</table>

Ordering

Valve body and magnetic actuator form one assembly and cannot be separated.

Example:

<table>
<thead>
<tr>
<th>Type reference</th>
<th>Stock number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXG462S50-30</td>
<td>MXG462S50-30</td>
<td>Modulating control valve with magnetic actuator</td>
</tr>
<tr>
<td>Z366</td>
<td>Z366</td>
<td>Stem heating element</td>
</tr>
</tbody>
</table>

Delivery

A CrNi-steel seal disc is part of the delivery.  
Union fittings and gaskets must be supplied by the installer.  
The Z366 stem heating is delivered in a separate package.

Rev. no.

Overview table, see page 12.

Replacement electronics module

ASE12

Should the valve electronics prove faulty, the electronics module must be replaced by the ASE12 replacement electronics module. Mounting instruction no. 74 319 0404 0 is included.

Technical and mechanical design

For a detailed description of operation, refer to data sheet CA1N4028E.

Control operation

The electronics module converts the positioning signal to a phase-cut power signal which generates a magnetic field in the coil. This causes the armature to change its position in accordance with the interacting forces (magnetic field, counter spring, hydraulics). The armature responds rapidly to any change in signal, transferring the corresponding movement directly to the valve plug, enabling fast changes in load to be corrected quickly and accurately.  
The valve’s position is measured continuously (inductive). The internal positioning controller balances any disturbance in the system rapidly and delivers the position feedback signal. The valve stroke is proportional to the positioning signal.

Control

The magnetic actuator can be driven by a Siemens controller or a controller of other manufacture that deliver a Dc 0...10 V, DC 2...10 V, DC 0...20 mA or DC 4...20 mA output signal.  
To achieve optimum control performance, it is recommended to use a 4-wire connection. In case of DC power supply, a 4-wire connection is mandatory!

Spring return facility

If the positioning signal is interrupted, or in the event of a power failure, the valve’s return spring will automatically close control path A → AB.
MANUAL
By pressing (a) and turning (b) the hand wheel in:
- clockwise (CW) direction, control path A \(\rightarrow\) AB can be mechanically opened to between 80...90 %.

OFF
By pressing (a) and turning (b) the hand wheel in:
- counterclockwise (CCW) direction, the actuator will be switched off and the valve closed.

As soon as the hand wheel is pressed and turned, neither the forced control signal Z nor the input signal Y or the phase-cut signal acts on the actuator. The green LED will flash.

AUTO
For automatic control, the hand wheel must be set to the Auto position. The green LED will be lit.

Operator controls and indicators in the electronics housing

Configuration
DIL switches

<table>
<thead>
<tr>
<th>Switch</th>
<th>Function</th>
<th>ON / OFF</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Positioning signal Y</td>
<td>ON</td>
<td>[mA]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>[V] (^1)</td>
</tr>
<tr>
<td>2</td>
<td>Positioning range Y and U</td>
<td>ON</td>
<td>2...10 V, 4...20 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>0...10 V, 0...20 mA (^1)</td>
</tr>
<tr>
<td>3</td>
<td>Valve characteristic</td>
<td>ON</td>
<td>(V_{lin}) (linear) (^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>(V_{log}) (equal-percentage)</td>
</tr>
</tbody>
</table>

\(^1\) Factory settings
Selection positioning signal and range Y
Voltage and current

<table>
<thead>
<tr>
<th>Y</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...10 V</td>
<td>2...10 V</td>
<td></td>
</tr>
<tr>
<td>0...20 mA</td>
<td>4...20 mA</td>
<td></td>
</tr>
</tbody>
</table>

Selection positioning range Y and U:
0...10 V / 0...20 mA or 2...10 V / 4...20 mA

Output signal U (position feedback signal) is dependent on the load resistance Ri.
Ri > 500 Ω, → voltage signal
Ri < 500 Ω, → current signal

Selection valve characteristics
Equal-percentage or linear

Forced control input Z

| Z - function |
|---|---|---|
| no function | fully open | closed |

Connections

| Connections |
|---|---|
| G0 | G |
| G | Y |
| Y | M |
| M | U |
| U | Z |
| Z | Phs |

Transfer

Function

- Z is not connected
- The valve will follow the Y-signal or phase-cut signal
- Z connected to G
- The valve will fully open via control path A → AB
- Z connected to G0
- The valve will close via control path A → AB

Signal priority
1. Hand wheel position Man (open) or Off
2. Forced control signal Z
3. Phase-cut signal
4. Signal input Y
Calibration

If the electronics module is replaced or the actuator turned through 180°, the valve’s electronics must be recalibrated. For that, the hand wheel must be set to Auto.

The printed circuit board has a slot (position 3, preceding page). Calibration is made by bridging the contacts located behind the slot using a screwdriver. The valve will then travel across the full stroke to store the end positions.

While calibration is in progress, the green LED will flash for about 10 seconds (also refer to «Indication of operating state»).

<table>
<thead>
<tr>
<th>LED</th>
<th>Indication</th>
<th>Function</th>
<th>Remarks, troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Lit</td>
<td>Control mode</td>
<td>Normal operation; everything o.k.</td>
</tr>
<tr>
<td></td>
<td>Flashing</td>
<td>Calibration</td>
<td>Wait until calibration is finished (green or red LED will be lit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In manual control</td>
<td>Hand wheel in Man or Off position</td>
</tr>
<tr>
<td>Red</td>
<td>Lit</td>
<td>Calibration error</td>
<td>Recalibrate (bridge contacts behind the calibration slot)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal error</td>
<td>Replace electronics module</td>
</tr>
<tr>
<td></td>
<td>Flashing</td>
<td>Mains fault</td>
<td>Check mains network (outside the frequency or voltage range)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC Supply -/+</td>
<td>DC supply +/− connection rectify</td>
</tr>
<tr>
<td>Both</td>
<td>Dark</td>
<td>No power supply</td>
<td>Check mains network, check wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electronics faulty</td>
<td>Replace electronics module</td>
</tr>
</tbody>
</table>

Sizing

Flow chart

\[ \Delta p_{\text{V100}} = \text{differential pressure across the fully open valve and the valve’s control path by a volumetric flow} \ V_{\text{V100}} \]

\[ \dot{V}_{100} = \text{volumetric flow with valve fully open} \ (H_{100}) \]

\[ \Delta p_{\text{max}} = \text{maximum permissible differential pressure across the valve’s control path, valid for the entire actuating range of the motorized valve (mixing: path A-AB, B-AB)} \]

100 kPa = 1 bar = 10 mWC
1 m³/h = 0.278 l/s water at 20 °C
Valve characteristic

Equal percentage

Volumetric flow

\[ \dot{V} \text{ [%]} \]

Linear

Volumetric flow

\[ \dot{V} \text{ [%]} \]

Connection type

The 4-wire connection should always be given preference!

<table>
<thead>
<tr>
<th>Type reference</th>
<th>( S_{\text{NA}} )</th>
<th>( P_{\text{MED}} )</th>
<th>( S_{\text{TR}} )</th>
<th>( P_{\text{TR}} )</th>
<th>( I_{\text{F}} )</th>
<th>wire cross-section ([\text{mm}^2])</th>
<th>( L ) ([\text{m}])</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXG462S..</td>
<td>65</td>
<td>26</td>
<td>( \geq 100 )</td>
<td>( \geq 70 )</td>
<td>6.3</td>
<td>1.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

4-wire connection

\( S_{\text{NA}} \) = nominal apparent power

\( P_{\text{med}} \) = typical power consumption in the application

\( S_{\text{TR}} \) = Minimal apparent transformer power

\( P_{\text{TR}} \) = Minimum DC supply power

\( I_{\text{F}} \) = Minimal required slow fuse

\( L \) = max. cable length; with 4-wire connections, the max. permissible length of the separate 1.5 mm\(^2\) copper positioning signal wire is 200 m

Engineering notes

Attention

Conduct the electric connections in accordance with local regulations on electric installations as well as the internal or connection diagrams.

\textbf{Safety regulations and restrictions designed to ensure the safety of people and property must be observed at all times!}

\( \bullet \) In open circuits, there is a risk of valve disc seizing caused by scale deposits. Additionally, periodic actuation (twice or three times per week) must be planned.

\( \bullet \) With closed and open circuits always use a strainer upstream of the valve to increase the valve's functional safety.

Mounting notes

The valve is supplied complete with Mounting Instruction no. 74 319 0378 0.

Caution

The valve may only be used as a mixing or through port valve, not as a diverting valve. Observe the direction of flow \( A \rightarrow AB! \)

Orientation

Degree of protection valid only when M20 cable gland supplied by the installer.

When used as a through port valve

Only three-way MXG462S.. valves are supplied. They may be used as straight-through valves by closing off port «B».
Threaded valves
MXG462S.. as through-port valves

Close off port B with a union fitting.
A Cr-Ni-Stahl seal disc with 3 gaskets is part of the delivery.
Union fittings conforming to ISO 49 / DIN 2950 must be supplied by the installer.

Installation notes

- The MXG462S.. valves are flat-faced allowing sealing with the gaskets provided.
- Do not use hemp for sealing the valve body threads.
- The actuator may not be lagged.

- For electrical installation, refer to «Connection diagrams», page 10.

Maintenance notes

The valves are maintenance-free.
The low friction and robust design make regular servicing unnecessary and ensure a long service life. The valve stem is sealed from external influences by a maintenance-free gland.
If the red LED is lit, the electronics must be recalibrated or replaced.

Repair
Should the valve electronics prove faulty, the electronics module must be replaced by the ASE12 replacement electronics module (refer to Mounting Instruction no 74 319 0404 0).

Caution
Always disconnect power before fitting or removing the electronics module.
After replacing the electronics module, calibration must be triggered in order to optimally match the electronics to the valve (refer to «Calibration », page 5)

Disposal

The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Application-specific technical data must be observed.
If specified limits are not observed, Siemens will not assume any responsibility.
### Technical data

#### Functional actuator data

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Extra low-voltage only (SELV, PELV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 24 V</td>
<td>Operating voltage AC 24 V ±20% (SELV) or AC 24 V class 2 (US)</td>
</tr>
<tr>
<td></td>
<td>Frequency 45...65 Hz</td>
</tr>
<tr>
<td></td>
<td>Typical power consumption $P_{\text{MED}}$ 22 W Stand by &lt; 1 W (valve closed)</td>
</tr>
<tr>
<td></td>
<td>Apparent power $S_{\text{A}}$ 65 VA</td>
</tr>
<tr>
<td></td>
<td>Minimum power of transformer $S_{\text{TR}}$ 100 VA</td>
</tr>
<tr>
<td></td>
<td>Required fuse $I_{\text{F}}$ 6.3 A, slow</td>
</tr>
<tr>
<td></td>
<td>External supply line protection Fuse slow max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898 or Power source with current limitation of max. 10 A</td>
</tr>
</tbody>
</table>

| DC 24 V      | Operating voltage DC 20...30 V |
|              | Current draw at DC 24 V 0.5 A / 4 A (max.) |
| Input        | Positioning signal Y DC 0/2...10 V or DC 0/4...20 mA 0...20 V |
|              | Impedance DC 0/2...10 V 100 kΩ // 5nF DC 0/4...20 mA 240 Ω // 5nF |
|              | Forced control Z Impedance 22 kΩ Close valve (Z connected to G0) < AC 1 V; < DC 0.8 V Open valve (Z connected to G) > AC 6 V; > DC 5 V No function (Z not wired) phase-cut- or positioning signal Y active |
| Output       | Position feedback signal U Voltage Current DC 0/2...10 V; load resistance > 500 Ω DC 0/4...20 mA; load resistance ≤ 500 Ω Stroke measurement Inductive Nonlinearity ± 3 % of end value |
| Positioning time | Positioning time < 2 s |
| Electrical connections | Cable entry point 2 × 20.5 mm (for M20) Connecting terminal terminal for 4 mm² wire Min. wire cross-section 0.75 mm² |

| Max. cable length | refer to «connection type», page 5 |

#### Functional valve data

<table>
<thead>
<tr>
<th>PN class</th>
<th>PN 16 as per EN 1333</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible operating pressure $1)^1$</td>
<td>1.6 MPa (16 bar)</td>
</tr>
<tr>
<td>Differential pressure $\Delta p_{\text{max}} / \Delta p_{\text{S}}$</td>
<td>refer to table «Type summary», page 2</td>
</tr>
<tr>
<td>Valve characteristic $2)^2$</td>
<td>equal percentage or linear, $n_{\gamma} = 3$ as per VDI / VDE 2173, optimized near the closing point (refer to Data Sheet N4023)</td>
</tr>
<tr>
<td>Leakage rate at $\Delta p = 0.1$ MPa (1 bar)</td>
<td>A → AB &lt; 0.05 % of $k_{\text{VS}}$ value B → AB &lt; 0.2 % $k_{\text{VS}}$ depending on operation conditions</td>
</tr>
<tr>
<td>Permissible media</td>
<td>chilled, cold and hot water, water with anti-freeze, demineralized water upon request $7)^1$ (super-clean water, desalinated water, VE water, osmosis water, deionized water) recommendation: water treatment as per</td>
</tr>
</tbody>
</table>
### VDI 2035

**Medium temperature** ³) -20...130 °C

**Stroke resolution** $\Delta H / H_{100}$ 1 : 1000 (H = stroke)

**Mode of operation** modulating

**Hysteresis** typical 3%

**Position when de-energized** A $\rightarrow$ AB closed

**Mounting position** upright to horizontal (observe safety standard)

**Stroke resolution** $D$ / $H$ 1 : 1000 (H = stroke)

**Mode of operation** modulating

**Valve body, Covering flange** CrNi steel (1.4409)

**Seat, inner valve, plug** CrNi steel

**Entire inner suit** CrNi steel

**Valve stem seal** EPDM (O-ring)

**Dimensions / weight** refer to «Dimensions», page 12

**Threaded connection** as per ISO 228-1

**Electromagnetic compatibility** For use in residential, commerce and light-industrial environments

**Product standard** EN60730-x

**Automatic electrical controls for household and similar use**

**EU Conformity (CE)** CA2T4461.1 ⁴)

**RCM Conformity** A5W00004453 ⁴)

**EAC Conformity** Eurasia Conformity for all MXG..

**Protection class** Class III as per EN 60730

**Emissions** Class 2 as per EN 60730

**Housing protection** IP31 as per EN 60529

**Vibration** ⁵)

IEC 68-2-6

(1 g acceleration, 1...100 Hz, 10 min)


**CSA certification** C22.2 No. 24, [http://csagroup.org](http://csagroup.org)

**Environmental compatibility** The product environmental declaration contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

**Pressure Equipment Directive** PED 2014/68/EU

**Pressure accessories** Scope: Article 1, section 1

**Definitions:** Article 2, section 5

**Fluid group 2** DN 50 without CE-marking as per article 4, section 3 (sound engineering practice) ⁶)

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1) Tested at 1.5 x PN (24 bar), similar to DIN 3230-3.

2) Can be selected via DIL switch.

3) Medium temperatures < 0 °C, the Z366 stem heating element is required.


5) In case of strong vibrations, use high-flex stranded wires for safety reasons.

6) Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

7) The application with demineralized water may result in premature valve wear. Please contact your local Siemens office to determine the optimum use for the valve.
**General environmental conditions**

<table>
<thead>
<tr>
<th>Climatic conditions</th>
<th>Operation EN 60721-3-3</th>
<th>Transport EN 60721-3-2</th>
<th>Storage EN 60721-3-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 3K5</td>
<td>Class 2K3</td>
<td>Class 1K3</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>–5...+45 °C</td>
<td>–25...+70 °C</td>
<td>–5...+45 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>5...95 % r.h.</td>
<td>5...95 % r.h.</td>
<td>5...95 % r.h.</td>
</tr>
</tbody>
</table>

**Connection terminals**

- **System neutral AC 24 V, DC 20...30 V**
- **System potential AC 24 V, DC 20...30 V**
- **Control signal DC 0/2...10 V, DC 0/4...20 mA**
- **Measuring neutral (= G0)**
- **Position feedback signal DC 0/2...10 V, DC 0/4...20 mA**
- **Forced- control input Z**
- **Phase-cut signal DC 0...20 V Phs, interchangeable, galvanically isolated**
- **Phase-cut signal DC 0...20 V Phs, interchangeable, galvanically isolated**

**Connection diagrams**

- **Caution** If controller and valve receive their power from separate sources, only one transformer may be earthed on the secondary side.
- **Caution** In case of DC power supply, a 4-wire connection is mandatory!

**Terminal assignment for controller with 4-wire connection** (to be preferred!)
- **DC 0...10 V**
- **DC 2...10 V**
- **DC 0...20 mA**
- **DC 4...20 mA**
Terminal assignment for controller with 3-wire connection
DC 0...10 V
DC 2...10 V
DC 0...20 mA
DC 4...20 mA

Indication of valve position (only if required). DC 0...10 V → 0...100 % volumetric flow V_100
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.

Warning
Piping must be connected to potential earth!

Controllers with phase-cut
DC 0...20 V Phs

Stem heating element Z366

2 AC/DC 24 V power supply for heating element
4 Power supply, positioning signals
Dimensions

Dimensions in mm

<table>
<thead>
<tr>
<th>Type reference</th>
<th>DN</th>
<th>G [inch]</th>
<th>Rp [inch]</th>
<th>L1 [mm]</th>
<th>L2 [mm]</th>
<th>L3 * [mm]</th>
<th>H [mm]</th>
<th>E [mm]</th>
<th>F [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXG462S50-30</td>
<td>50</td>
<td>G 2¾B</td>
<td>Rp 2</td>
<td>170</td>
<td>93,5</td>
<td>108</td>
<td>402</td>
<td>100</td>
<td>125</td>
</tr>
</tbody>
</table>

- Externally thread G...B as per ISO 228-1
- Internally thread Rp... as per ISO 7-1
- Union fittings as per ISO 49 / DIN 2950

* When used as through port valve
G Weight in kg (incl. packaging)

Revision numbers

<table>
<thead>
<tr>
<th>Type reference</th>
<th>Valid from rev. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXG462S50-30</td>
<td>..A</td>
</tr>
</tbody>
</table>