



Modulating control valves PN16 with magnetic actuators

MXG461B...

with position control and position feedback signal
for the control of domestic water, cold water and hot water systems

- Short positioning time (<2 s), high resolution (1 : 1000)
- Selectable valve characteristic: Equal-percentage or linear
- High rangeability
- Selectable standard interface DC 0/2...10 V or DC 0/4... 20 mA
- Phase-cut signal input for Staefa controllers
- Position control and position feedback signal
- Wear-free inductive stroke measurement
- Spring return facility: A → AB closed when deenergized
- Low friction, robust and maintenance-free

Use

The MXG461B... are mixing or throughport valves. They are supplied with the magnetic actuator ready fitted. The actuator is equipped with an electronics module for position control and position feedback. When deenergized, the valve's control path A → AB is closed.

The short positioning time, high resolution and high rangeability make these valves ideal for modulating control of domestic water (mains water and water in open circuits), hot and cold water systems.

Type summary

Type reference	DN	k_{VS} [m ³ /h]	Δp_{max} [kPa]	Δp_S [kPa]	S_{NA} [VA]	P_{med} [W]	I_N Fuse [A]	Wire cross-section [mm ²] 4-wire connection 1.5 2.5 4.0 Max. cable length L [m]		
								1.5	2.5	4.0
MXG461B15-0.6	15	0.6	500	1000	33	15	3.15	60	100	160
MXG461B15-1.5	15	1.5	500	1000	33	15	3.15	60	100	160
MXG461B15-3	15	3	500	1000	33	15	3.15	60	100	160
MXG461B20-5	20	5	500	800	33	15	3.15	60	100	160
MXG461B25-8	25	8	300	700	33	15	3.15	60	100	160
MXG461B32-12	32	12	300	600	43	20	4	40	70	120
MXG461B40-20	40	20	300	600	43	20	4	40	70	120
MXG461B50-30	50	30	300	600	65	22	6.3	30	50	80

Δp_{max} = max. permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorised valve (maximum recommended operating differential pressure)

Δp_S = max. permissible differential pressure at which the motorised valve will close securely against the pressure (close off pressure)

S_{NA} = nominal apparent power for selecting the transformer

P_{med} = average true power

I_N = slow fuse (mandatory)

k_{VS} = nominal flow rate of cold water (5 to 30 °C) through the fully openend valve (H_{100}) at a differential pressure of 100 kPa (1 bar)

L = max. cable length; with 4-wire connections, the max. permissible length of the separate 1.5 mm² copper positioning signal cable is 200 m

Accessory

Z366 Stem heating element for AC / DC 24 V / 10 W. Required for medium temperatures < 0 °C.

Ordering

When ordering, please give quantity, product name and type reference.
Valve body and magnetic actuator form one assembly and cannot be separated.
The brass / bronze fittings are part of the delivery.
The Z366 stem heating element must be ordered as a separate item.

Example: **1 valve MXG461B15-0.6 and 1 stem heating element Z366**

Technical and mechanical design

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

Automatic control

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, counterspring, hydraulics, etc.). 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.

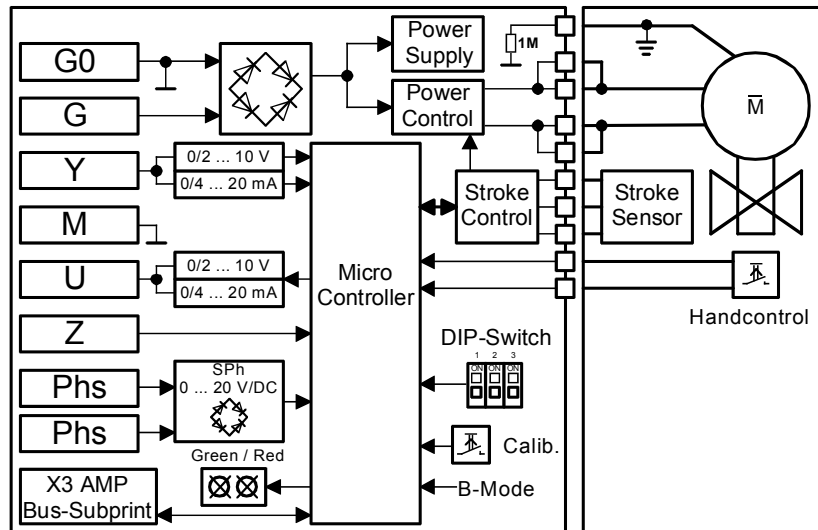
The valve's position is measured continuously. Any disturbance in the system is rapidly corrected by the internal positioning controller, which ensures that the positioning signal and the valve stroke are exactly proportional, and also delivers the position feedback signal.

Control

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

The controller's signal ground terminal M must be connected to the valve's terminal M. Terminals M and GO have the same potential and are internally interconnected in the valve's electronics.

Basic diagram



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.

Indication of operating state

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

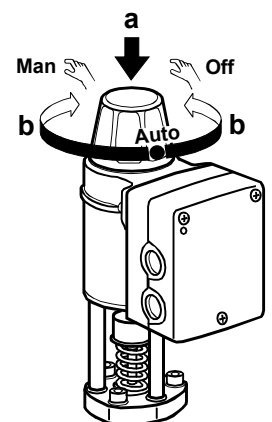
Manual control

By pressing (a) and turning (b) the hand wheel

- in clockwise (CW) direction, control path A → AB can be mechanically opened to between 80 and 90 %
- 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.

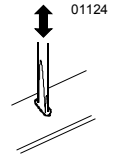
For automatic control, the hand wheel must be set to the Auto position. The green LED will be lit.



Calibration

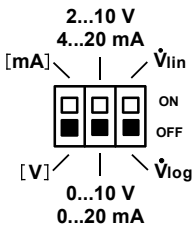
If the electronics module is replaced or the actuator turned through 180°, the valve's electronics must be recalibrated. For that, the hand wheel must be set to Auto.

The printed circuit board has a slot. 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»).

Configuration DIP switches



DIP	Function	OFF (default)	ON	Remarks
1	Voltage or current input	[V]	[mA]	Assignment of terminal Y: Voltage or current
2	Correcting span Terminals Y and U	0...10 V, 0...20 mA	2...10 V, 4...20 mA	Offset settings of input or output
3	Characteristic	\checkmark lin (Equal-percentage)	\checkmark lin (linear)	

Assignment positioning signal Y: Voltage or current

Y		
	0 ... 10 V	2 ... 10 V
	0 ... 20 mA	4 ... 20 mA

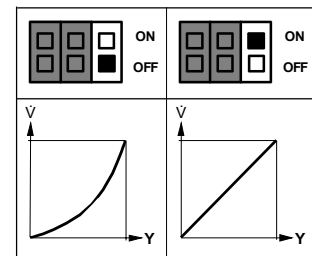
Assignment of correcting span Y and U: 0 ... 10 V / 0 ... 20 mA or 2 ... 10 V / 4 ... 20 mA

U		
$R_i > 500 \Omega$	0 ... 10 V	2 ... 10 V
$R_i < 500 \Omega$	0 ... 20 mA	4 ... 20 mA

Output signal U (position feedback signal) is dependent on the load resistance. Above 500 Ω, it is automatically a voltage signal, below 500 Ω a current signal.

Selection of valve characteristic:

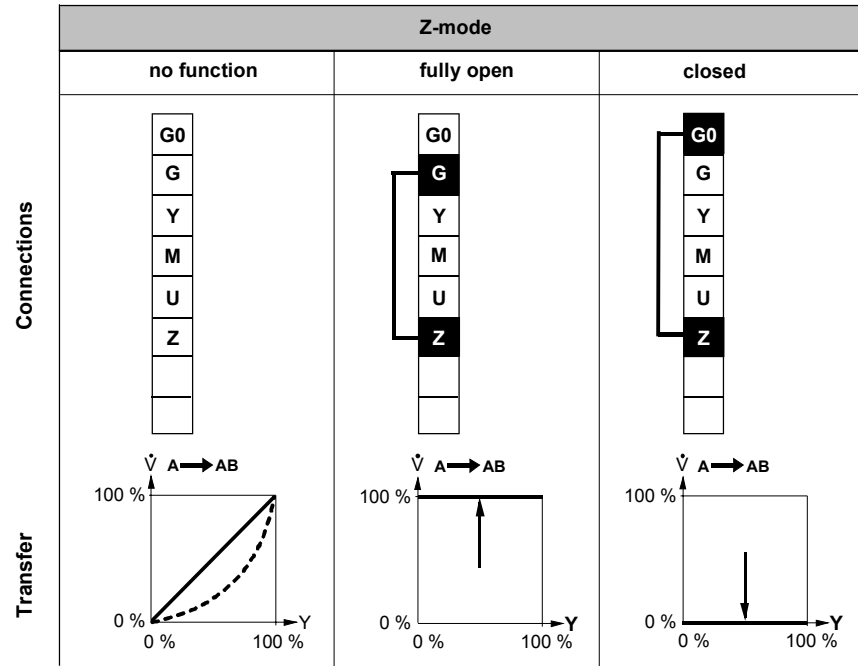
Equal-percentage or linear



Forced control input

If terminal Z for the forced control input

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



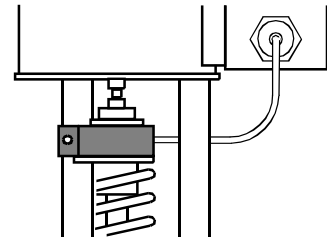
Signal priority

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

Accessories

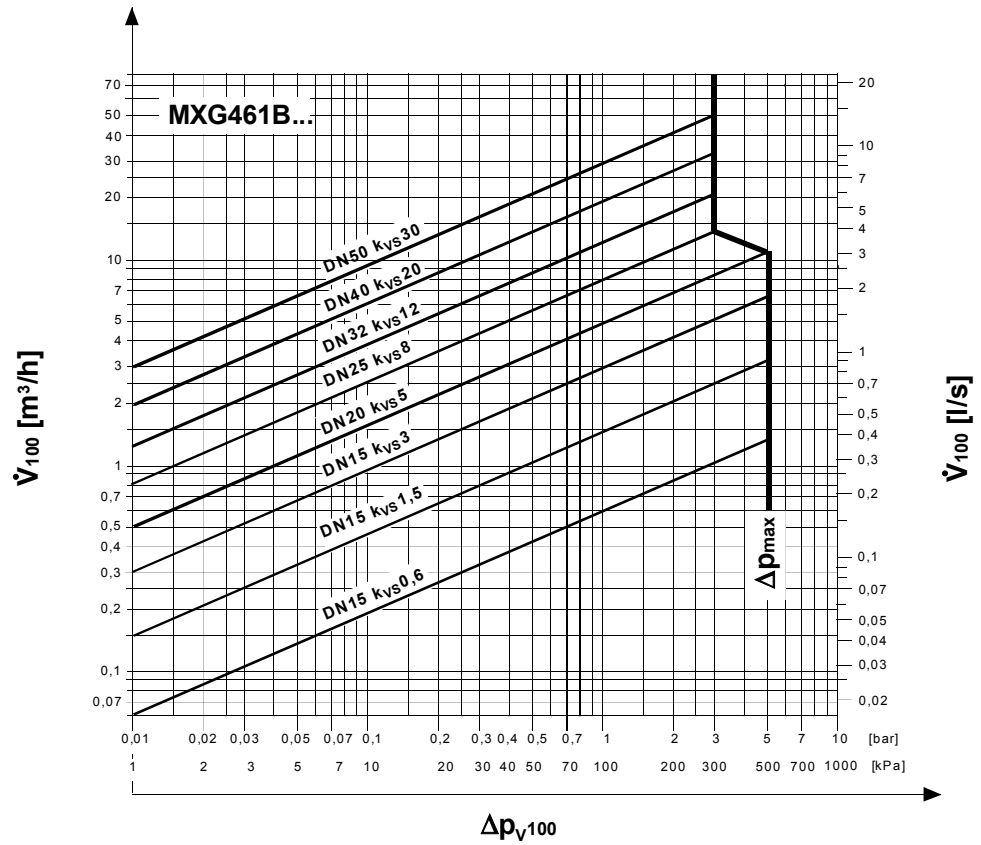
Stem heating element Z366

Stem heating AC/DC 24 V / 10 W.
Required for medium temperatures < 0 °C.



Valve sizing

Flow chart



Δp_{V100} = differential pressure across the fully open valve and the valve's control path by a volume flow \dot{V}_{100}

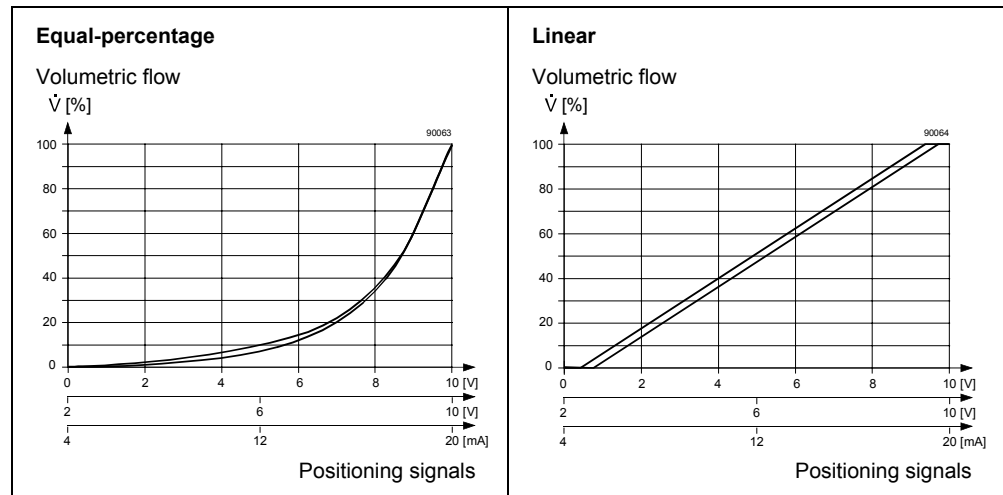
\dot{V}_{100} = volume flow through the fully open valve (H_{100})

Δp_{max} = max. permissible differential pressure across the valve's control path for the entire actuating range of the motorised valve (maximum recommended operating differential pressure)

100 kPa = 1 bar \approx 10 mWG

1 m^3/h = 0.278 l/s water at 20 °C

Valve characteristic



Mounting notes

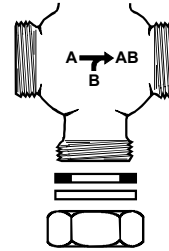
The valve is supplied complete with Mounting Instructions 74 319 0378 0.



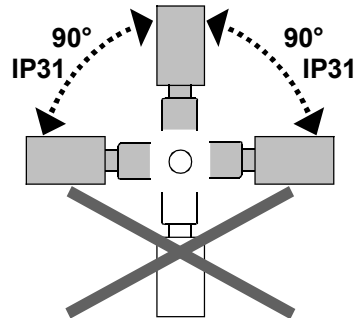
The valve may only be used as a mixing or throughport valve, not as a diverting valve. Observe the direction of flow!

When used as a throughport valve

The MXG461B... valves are supplied as three-port valves, but can also be used as throughport valves: In that case, close off port "B" with the accessories provided (nut, cover and gasket).



Mounting position



Installation notes

- The MXG461B... 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
- **The valves are supplied complete with brass / bronze fittings**

For electrical installation, refer to «Connection diagrams».

Maintenance notes

The low friction and robust, maintenance-free design makes regular servicing unnecessary and ensure a long service life.

The valve stem is sealed from external influences by a maintenance-free gland.

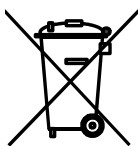
If the red LED is lit, the electronics must be recalibrated or replaced.

Should the valve electronics prove faulty, the ASE12 electronics module must be replaced (refer to Mounting Instructions 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»).

Disposal notes



The actuator contains electric and electronic components and may not be disposed of together with household waste.

Local and currently valid legislation must be observed.

Technical data

Power supply	For use with low-voltage only (SELV, PELV)	
• AC 24 V	Operating voltage	AC 24 V +20 / -15 %
	Frequency	45...65 Hz
	Typical power consumption P_{med}	refer to «Type summary»
	Standby	< 1 W (valve fully closed)
	Nominal apparent power S_{NA}	refer to «Type summary»
	Suitable fuse	slow (refer to «Type summary»)
• DC 24 V	Operating voltage	DC 20 ... 30 V
Functional data of actuator		
• Input	Positioning signal Y	DC 0/2 ... 10 V or DC 0/4 ... 20 mA
	Impedance DC 0/2 ... 10 V	100 k Ω // 5nF
	DC 0/4 ... 20 mA	240 Ω // 5nF
	Forced control	
	Impedance	22 k Ω
	Closing the valve (Z connected to G0)	< AC 1 V; < DC 0,8 V
	Opening the valve (Z connected to G)	> AC 6 V; > DC 5 V
	No function (Z not wired up)	phase-cut or positioning signal Y active
• Output	Position feedback signal voltage	DC 0/2 ... 10 V; load resistance > 500 Ω
	current	DC 0/4 ... 20 mA; load resistance \leq 500 Ω
	Stroke measurement	inductive
	Nonlinearity	\pm 3 % of end value
Functional data of valve	Pressure class	PN16 to EN 1333
	Perm. operating pressure ¹⁾	1.6 MPa (16 bar)
	Differential pressure $\Delta p_{max} / \Delta p_s$	refer to «Type summary»
	Leakage rate at $\Delta p = 0.1$ MPa (1 bar)	A \rightarrow AB max. 0.05 % k_{VS} (to IEC 534-4) B \rightarrow AB depending on the application (< 0.2 % k_{VS})
	Medium temperature ²⁾	-20 ... 120 $^{\circ}$ C
	Valve characteristic ³⁾	equal-percentage or linear, optimized near the closing point (refer to Data Sheet 4023)
	Stroke resolution $\Delta H / H_{100}$	1 : 1000 (H = stroke)
	Control mode	modulating
	Position when actuator is deenergized	A \rightarrow AB closed
	Mounting position	upright to horizontal
	Positioning time	< 2 s
Materials	Valve body	CC491K (Rg 5)
	Covering flange	CC491K (Rg 5)
	Seat / plug	CrNi steel
	Valve stem seal	EPDM (O-ring)
Pipe connections	Fittings	bronze / brass
	Cable entries	3 x M20 x 1.5 or PG13.5 / G1/2
Electrical connections	Connection terminals	screw terminals for 4 mm ² wires
	Min. cross-sectional area ⁴⁾	0.75 mm ²
	Max. cable length	refer to «Type summary»
	Dimensions	refer to «Dimensions»
	Weight	refer to «Dimensions»

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

²⁾ For medium temperatures < 0 $^{\circ}$ C, the Z366 stem heating element is required

³⁾ Can be selected via DIP switch

⁴⁾ In case of strong vibrations, use high-flex stranded wires

Norms and standards


Degree of protection	IP31 to IEC 529
Conforming to	CE requirements UL 873 certified to Canadian standard C22.2 No. 24 C-Tick N 474 PED 97/23/EC: pressure-carrying parts Par. 1, section 2.1.4 / Par. 3, section 3 Fluid group 2
AC + DC: Immunity	Industrial IEC 61000-6-2
AC: Emissions	Residential IEC 61000-6-3
DC: Emissions	CISPR 22, class B
Immunity (HF)	IEC 1000-4-3; IEC 1000-4-6 (10 V/m)
Emissions (HF)	EN 55022, CISPR 22, class B
Vibration ⁴⁾	IEC 68-2-6 (1 g acceleration, 1...100 Hz, 10 min)

⁴⁾ In case of strong vibrations, use high-flex stranded wires

General environmental conditions

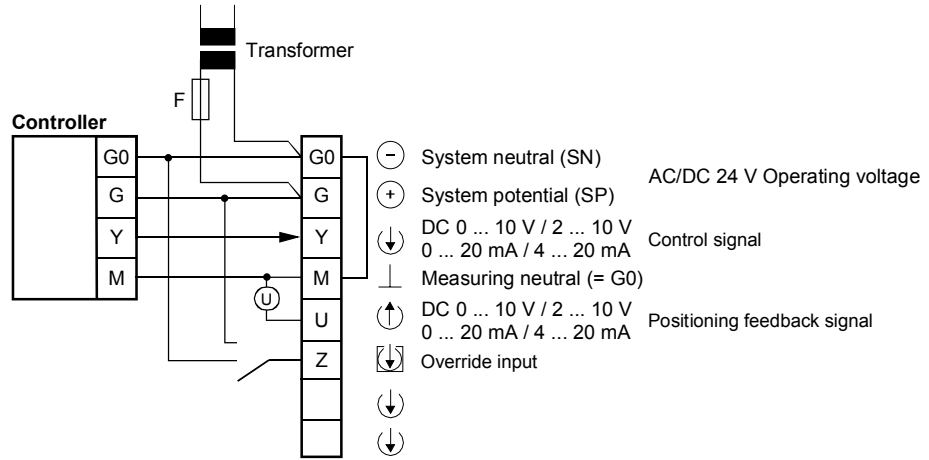
	Operation IEC 721-3-3	Transport IEC 721-3-2	Storage IEC 721-3-1
Climatic conditions	Class 3K5	Class 2K3	Class 1K3
Temperature	-5...+45 °C	-25...+70 °C	-5...+45 °C
Humidity	5...95 % r.h.	5...95 % r.h.	5...95 % r.h.
Mechanical conditions	IEC 721-3-6 Class 6M2		

Connection diagrams

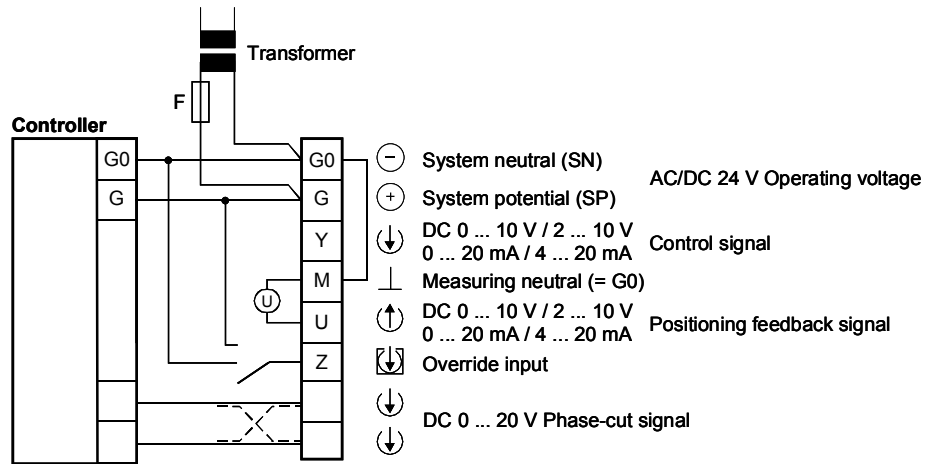
Caution  If controller and valve receive their power from separate sources, only one transformer may be earthed on the secondary side.

Caution  In case of DC power supply, a 4-wire connection is **mandatory!**

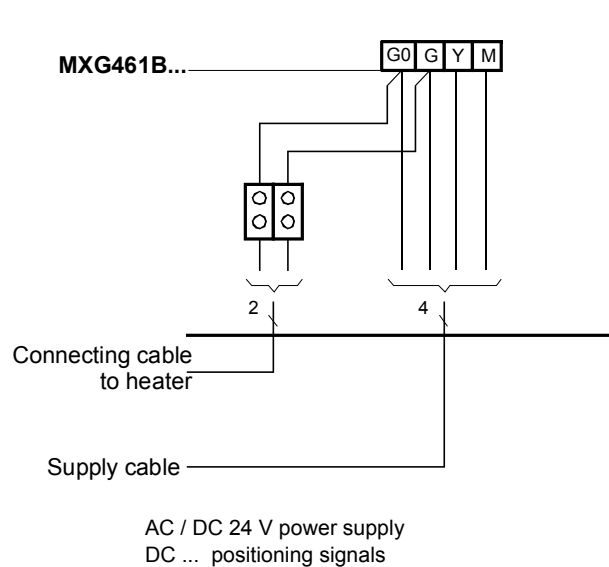
Controllers with
 DC 0 ... 10 V
 DC 2 ... 10 V
 DC 0 ... 20 mA
 DC 4 ... 20 mA



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



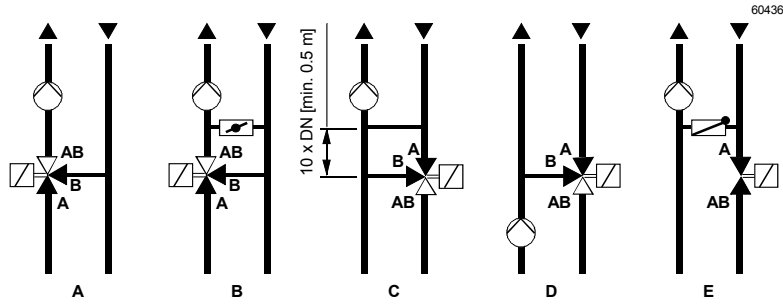
Stem heating element
 Z366



Application examples


Hydraulic circuits

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

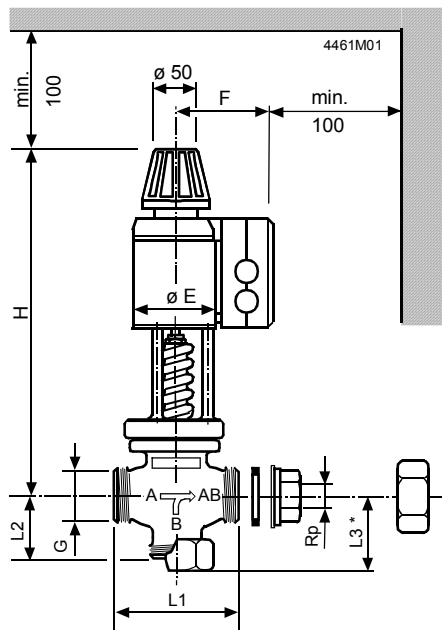


Legend:

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

Caution  **The valve may only be used as a mixing or throughport valve, not as a diverting valve. The direction of flow must be observed!**

Dimensions



Externally threaded G...B to ISO 228/1
Internally threaded Rp... to ISO 7/1

Fittings to ISO 49 / DIN 2950
(supplied complete with flange gaskets)

Type reference	DN	G [inch]	Rp [inch]	L1 [mm]	L2 [mm]	L3* [mm]	H [mm]	E [mm]	F [mm]	Weight [kg]
MXG461B15-0.6	15	G1B	Rp ½	80	42.5	50	340	80	115	7.1
MXG461B15-1.5	15	G1B	Rp ½	80	42.5	50	340	80	115	7.3
MXG461B15-3	15	G1B	Rp ½	80	42.5	50	340	80	115	7.3
MXG461B20-5	20	G1¼B	Rp ¾	95	52.5	60	339	80	115	7.7
MXG461B25-8	25	G1½B	Rp 1	110	56.5	64	346	80	115	8.5
MXG461B32-12	32	G2B	Rp 1¼	125	67.5	75	384	100	125	12.8
MXG461B40-20	40	G2½B	Rp 1½	140	80.5	93	401	100	125	14.6
MXG461B50-30	50	G2¾B	Rp 2	170	93.5	108	402	100	125	18.6

* When used as a throughport valve
Weight incl. packaging

