



P-K COMPACT® Temperature Control Equipment Guide

To be used in conjunction with the latest editions of:
P-K COMPACT® Semi-Instantaneous Water Heater I&OM
P-K COMPACT® Supplemental Equipment Guide

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**P-K COMPACT® (01/03/2020)
1004905927 - SIEMENS MVF,
MXF/MXG, and M3P**

P-K COMPACT
TEMPERATURE
CONTROL EQUIPMENT
GUIDE

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NOTES:

Electric MVF Control Valve

SIEMENS

4₃₆₁



Modulating control valves with magnetic actuator, PN 16

MVF461H..

for hot water, high temperature hot water and steam

- 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 MVF461H.. valve types are through-port control valves with fitted magnetic actuator. The actuator is equipped with connecting electronics for positioning control and position feedback. When deenergized, the valve is closed. The short positioning time, high resolution and high rangeability make these valves ideal for proportional control of district heating stations and heating plant using HTHW and steam. For closed circuits only.



Table 1. Product Numbers.

Product Number	Line Size (in)	Cv	Δp_s	Δp_{Vmax}	S_{NA} (VA)	P_{med} (W)	I_N Fuse	Wire Gauge (AWG)		
			(psi)	(psi)				16	14	12
MVF461H15-0.6	1/2	0.7	145	145	33	15	3.15	130	215	360
MVF461H15-1.5	1/2	1.8	145	145	33	15	3.15	130	215	360
MVF461H15-3	1/2	3.5	145	145	33	15	3.15	130	215	360
MVF461H20-5	3/4	5.9	145	145	33	15	3.15	130	215	360
MVF461H25-8	1	9.4	145	145	33	15	3.15	130	215	360
MVF461H32-12	1-1/4	14.0	145	145	43	20	4	100	165	260
MVF461H40-20	1-1/2	23.3	145	145	65	20	6.3	100	165	260
MVF461H50-30	2	35.0	145	145	65	26	6.3	65	100	165

Δp_{max} = max. permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve

Δp_s = max. permissible differential pressure (close off pressure) at which the motorized valve will close securely against the pressure (used as through-port valve)

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

When ordering, please give quantity, product name and type reference.

Ordering

Type reference	Stock number	Description
MVF461H15-0.6	MVF461H15-0.6	Flanged valve with magnetic actuator

Replacement electronics module ASE12

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

Should the valve electronics prove faulty, the electronics module must be replaced by the ASE12 replacement electronics module.

Mounting Instructions 74 319 0404 0 are included.

Rev. no.

Overview table, see page 14.

Technical and mechanical design

Control operation

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

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.

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.

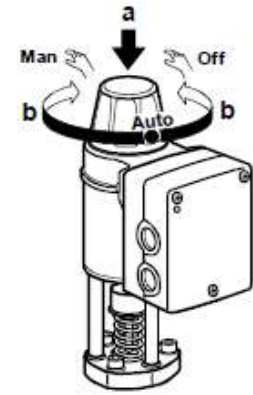
Manual control

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

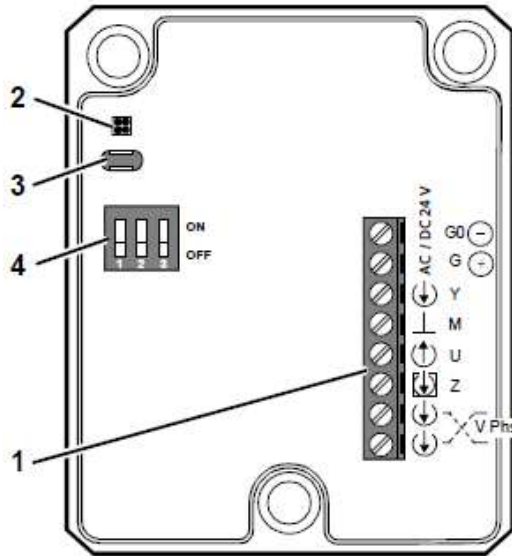
- in clockwise (CW) direction, control path A → AB can be mechanically opened to between 80 and 90 %
- in counterclockwise (CCW) direction, the actuator will be switched off and the valve closed

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.

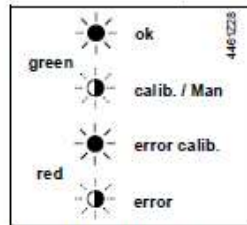
For automatic control, the hand wheel must be set to the Auto position. The green LED will be lit.



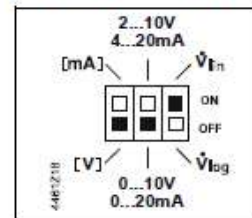
Operator controls and indicators in the electronics housing



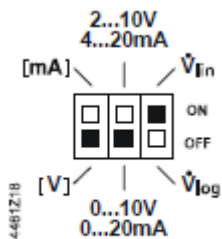
- 1 Connection terminals
- 2 LED for indication of operating state



- 3 Slot for autocalibration
- 4 DIL switch for mode control



Configuration DIL switches



Switch	Function	ON / OFF	Description
	Positioning signal Y	ON	[mA]
		OFF	[V] ¹⁾
	Positioning range Y and U	ON	2...10 V, 4...20 mA
		OFF	0...10 V, 0...20 mA ¹⁾
	Valve characteristic	ON	\dot{V}_{lin} (linear) ¹⁾
		OFF	\dot{V}_{log} (equal-percentage)

¹⁾ Factory settings




Selection positioning signal and range Y

Voltage and current

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

Selection positioning range Y and U:

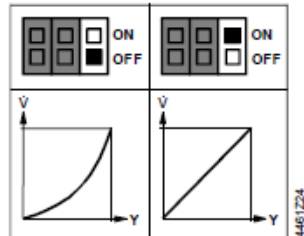
0...10 V / 0...20 mA or
2...10 V / 4...20 mA

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



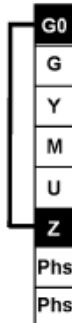
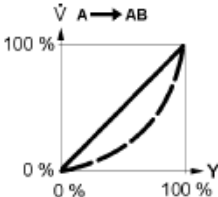
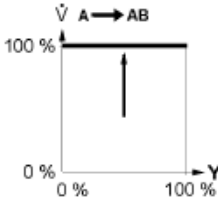
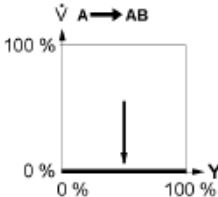
Output signal U (position feedback signal) is dependent on the load resistance R_i .
 $R_i > 500 \Omega$, → voltage signal
 $R_i < 500 \Omega$, → current signal

Selection valve characteristics

Equal-percentage or linear



Forced control input Z

Z - function			
	no function	fully open	closed
Connections			
Transfer			
Function	<ul style="list-style-type: none">• Z is not connected• The valve will follow the Y-signal or phase-cut signal	<ul style="list-style-type: none">• Z connected to G• The valve will fully open via control path A → AB	<ul style="list-style-type: none">• Z connected to G0• The valve will close via control path A → AB

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Signal priority

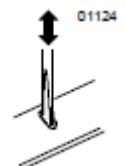
1. Hand wheel position Man (open) or Off
2. Forced control signal Z
3. Phase-cut signal Phs
4. Signal input Y

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»).



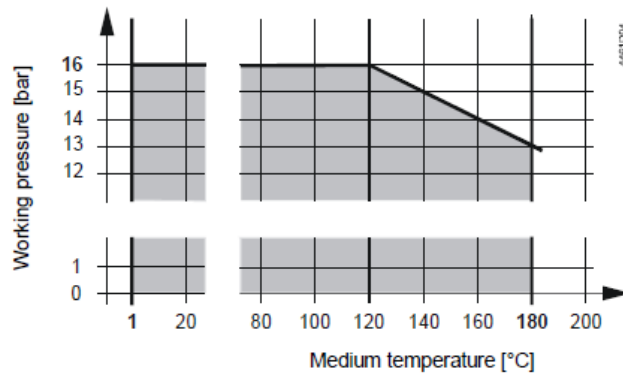


Indication of operating state

LED	Indication	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

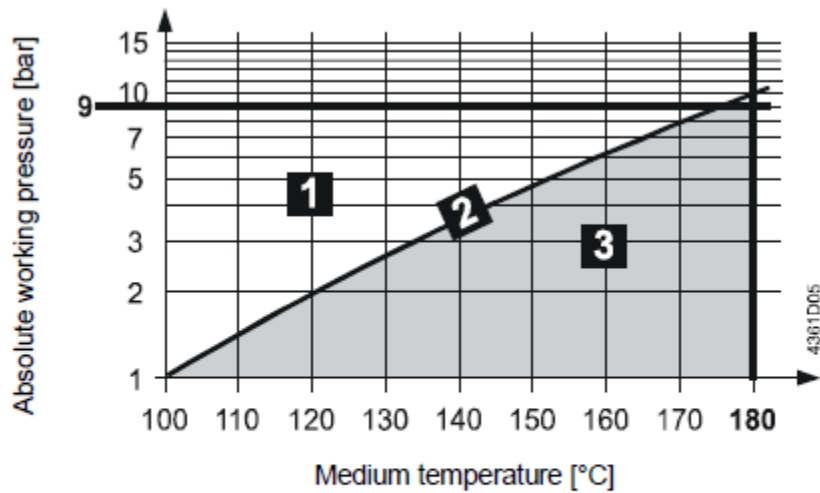
Dimension

Working pressure and medium temperature Fluids



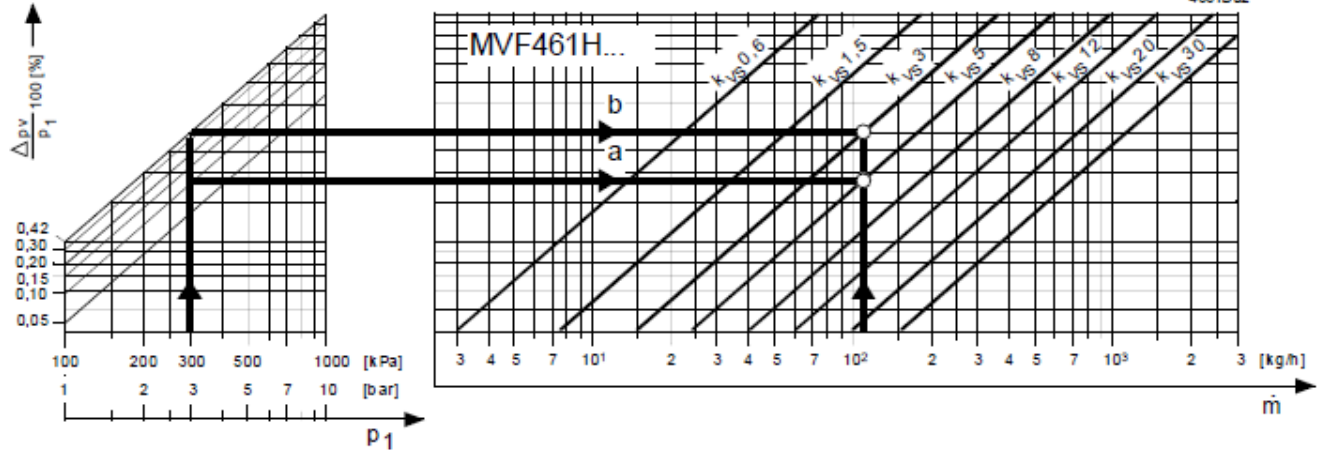
⚠ Current local legislation must be observed.

Saturated steam Superheated steam



1	wet steam	avoid
2	saturated steam	permissible range of use
3	superheated steam	

Saturated steam flow chart



Recommendation

For saturated steam and superheated steam, the differential pressure Δp_{\max} across the valve should be close to the critical pressure ratio.

$$\text{Pressure ratio} = \frac{p_1 - p_3}{p_1} \cdot 100\%$$

p_1 = absolute pressure before valve in kPa
 p_3 = absolute pressure after valve in kPa

Calculation of the k_{vs} value for steam

$$\frac{p_1 - p_3}{p_1} \cdot 100\% < 42\%$$

Pressure ratio < 42% subcritical

$$k_{vs} = 4.2 \cdot \frac{\dot{m}}{\sqrt{p_3 \cdot (p_1 - p_3)}} \cdot k$$

$$\frac{p_1 - p_3}{p_1} \cdot 100\% \geq 42\%$$

Pressure ratio $\geq 42\%$ supercritical
(not recommended)

$$k_{vs} = 8.4 \cdot \frac{\dot{m}}{p_1} \cdot k$$

\dot{m} = steam quantity in kg/h

k = factor for superheating of steam = $1 + 0.0013 \cdot \Delta T$ ($k = 1$ for saturated steam)

ΔT = temperature differential in K between saturated steam and superheated steam

Example

given saturated steam 133.54 °C
 p_1 = 300 kPa (3 bar)
 \dot{m} = 110 kg/h
pressure ratio = 12 %

required k_{vs} , valve type

$$p_3 = p_1 - \frac{12 \cdot p_1}{100}$$

$$p_3 = 300 - \frac{12 \cdot 300}{100} = 264 \text{ kPa (2.64 bar)}$$

$$k_{vs} = 4.2 \cdot \frac{110}{\sqrt{264 \cdot (300 - 264)}} \cdot 1 = 4.74 \text{ m}^3/\text{h}$$

selected $k_{vs} = 5 \text{ m}^3/\text{h} \Rightarrow \text{MVF461H20-5}$

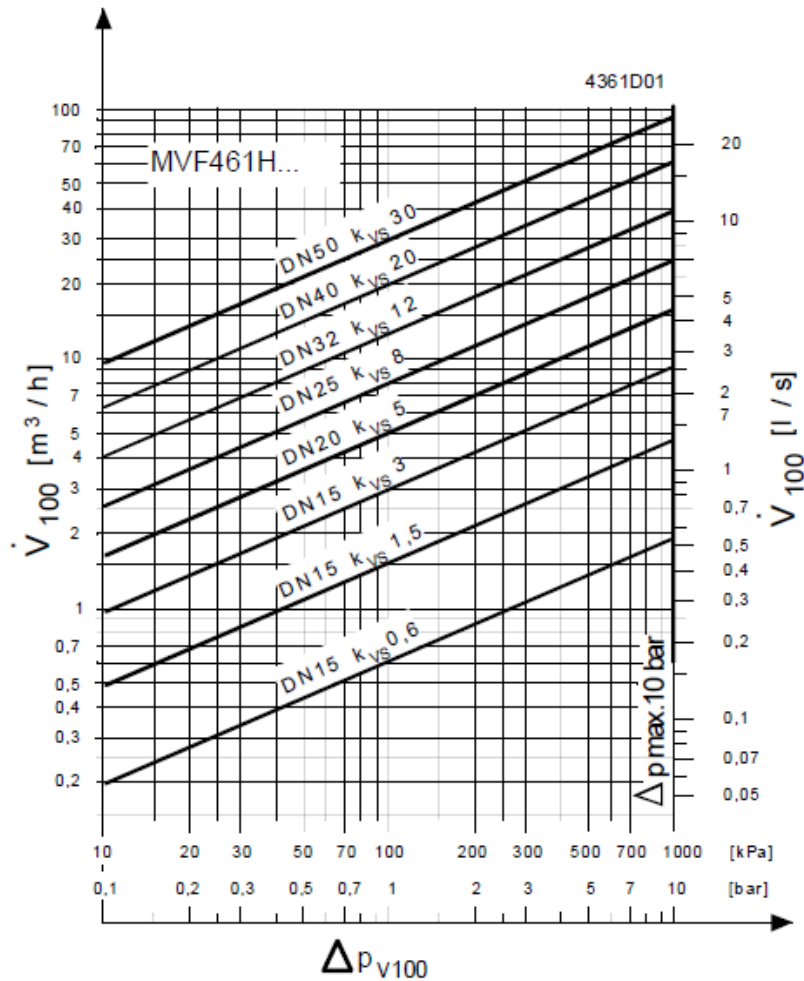
saturated steam 133.54 °C
 p_1 = 300 kPa (3 bar)
 \dot{m} = 110 kg/h
pressure ratio $\geq 42\%$
(supercritical permitted)

k_{vs} , valve type

$$k_{vs} = 8.4 \cdot \frac{110}{300} \cdot 1 = 3.08 \text{ m}^3/\text{h}$$

$k_{vs} = 3 \text{ m}^3/\text{h} \Rightarrow \text{MVF461H15-3}$

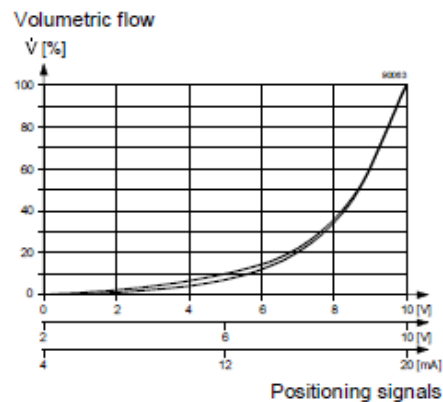
Water flow chart



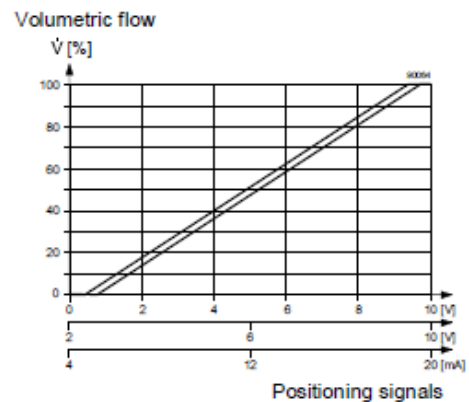
- Δp_{v100} = differential pressure across the fully open valve and the valve's control path A → AB by a volume flow V_{100}
 V_{100} = volume flow through the fully open valve (H_{100})
 Δp_{max} = max. permissible differential pressure across the valve's control path for the entire actuating range of the motorized valve
 100 kPa = 1 bar ≈ 10 mWC
 1 m³/h = 0,278 l/s water at 20 °C

Valve characteristic

Equal-percentage



Linear



Connection type ¹⁾

The 4-wire connection should always be given preference!

4-wire connection

	S _{NA}	P _{MED}	S _{TR}	I _F	Wire cross-section [mm²] 1,5 2,5 4,0		
Type reference	[VA]	[W]	[VA]	[A]	max. cable length L [m]		
MVF461H15-0.6	33	15	50	3.15	60	100	160
MVF461H15-1.5							
MVF461H15-3							
MVF461H20-5							
MVF461H25-8							
MVF461H32-12	43	20	75	4	40	70	120
MVF461H40-20	65			6.3	30	50	80
MVF461H50-30		26	100				

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

P_{med} = typical power consumption

S_{TR} = Minimal require transformer power

I_N = required slow fuse

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

¹⁾ All information at AC 24 V

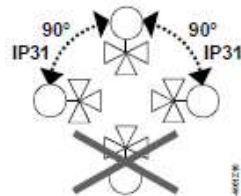
Mounting notes

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

Caution

**The valve may only be used in flow direction (A → AB).
Observe the direction of flow!**

Mounting position



Installation notes

- The actuator may not be lagged
For electrical installation, refer to «Connection diagrams».

Maintenance notes

Repair

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



The valve is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage.

- Disassemble the valve into individual parts prior to disposing of it and sort the individual parts by the various types of materials.
- 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 Switzerland Ltd / HVAC Products will not assume any responsibility.

Technical data

Functional data of actuator		For use with low-voltage only (SELV, PELV)	
Power supply	AC 24 V	Operating voltage	AC 24 V $\pm 20\%$ (SELV) or AC 24 V class 2 (US)
		Frequency	45...65 Hz
		Typical power consumption P_{med} Standby	refer to «Connection type», < 1 W (valve fully closed)
		Rated apparent power S_{NA}	refer to «Connection type»,
		Required fuse I_F	slow, «Connection type»,
		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
Signal inputs	DC 24 V	Operating voltage	DC 20...30 V
		Control signal Y	DC 0/2...10 V or DC 0/4...20 mA
		or phase cut signal	DC 0...20 V Phs
		Impedance DC 0/2...10 V	100 k Ω // 5nF (load < 0.1 mA)
		DC 0/4...20 mA	240 Ω // 5nF
		Forced control Z	
Signal outputs		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 control signal Y active
		Position feedback signal voltage	DC 0/2...10 V; load resistance > 500 Ω
		current	DC 0/4...20 mA; load resistance \leq 500 Ω
Positioning time		Stroke measurement	inductive
		Nonlinearity	$\pm 3\%$ of end value
		Positioning time	< 2 s
Electrical connections		Cable entries	2 x \varnothing 20,5 mm (for M20)
		Connection terminals	screw terminals for 4 mm ² wires
		Min. wire cross-section	0.75 mm ²
		Max. cable length	refer to «Connection type»

Functional data of valve

Pressure class	PN16 to EN 1333
Permissible operating pressure ¹⁾	within the permissible "medium temperature" range according to the diagram Water up to 120 °C: 1.6 MPa (16 bar) Water above 120 °C: 1.3 MPa (13 bar) Saturated steam: 0.9 MPa (9 bar)
Differential pressure $\Delta p_{\max} / \Delta p_s$	1 MPa (10 bar)
Leakage rate at $\Delta p = 0.1$ MPa (1 bar)	A → AB max. 0.05 % k_{VS}
Valve characteristic ²⁾	equal percentage, $n_{gl} = 3$ to VDI / VDE 2173 or linear, optimized near the closing point
Permissible media	Water chilled water, low temperature hot water, high temperature hot water, water with anti-freeze; recommendation: water treatment to VDE 2035 Steam Saturated steam, superheated steam dryness at inlet minimum 0.98
Medium temperature	>1...180 °C
Stroke resolution $\Delta H / H_{100}$	1 : 1000 (H = stoke)
Position when actuator is deenergized	A → AB closed
Mounting position	upright to horizontal
Control mode	modulating
Valve body	modular cast iron EN-GJS-400-18-LT
Covering flange	modular cast iron EN-GJS-400-18-LT
Seat / plug	CrNi-steel
Valve stem seal	EPDM (O-ring)
Dimensions	refer to «Dimensions»
Weight	refer to «Dimensions»
Electromagnetic compatibility (Application)	For residential, commercial and light-industrial environments
Product standard	EN60730-x
EU Conformity (CE)	CE1T4361.1 ³⁾
RCM Conformity	A5W00004454 ³⁾
EAC Conformity	Eurasia Conformity for all MVF..
Housing protection	
Upright to horizontal	IP31 to EN 60529
Vibration ⁴⁾	EN 60068-2-6 (1 g acceleration, 1...100 Hz, 10 min)
UL certification (US)	UL 873, http://ul.com/database
CSA certification	C22.2 No. 24, http://csagroup.org
Environmental compatibility	The product environmental declaration CE1E4361en ³⁾ 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	without CE-marking as per article 4, section 3 (sound engineering practice) ⁵⁾

¹⁾ Tested at 1.5 x PN (24 bar), similar to EN 12266-1

²⁾ Can be selected via DIL switch

³⁾ The documents can be downloaded from <http://siemens.com/bt/download>.

⁴⁾ In case of strong vibrations, use high-flex stranded wires for safety reasons.

⁵⁾ Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

Materials

Weight and dimensions

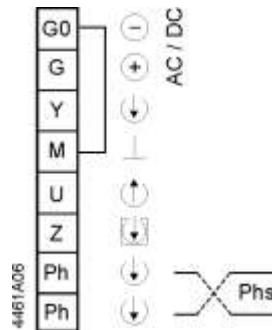
Norms and directives



General environmental conditions

	Operation EN 60721-3-3	Transport EN 60721-3-2	Storage EN 60721-3-1
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	EN 60721-3-6 Class 3M2		

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

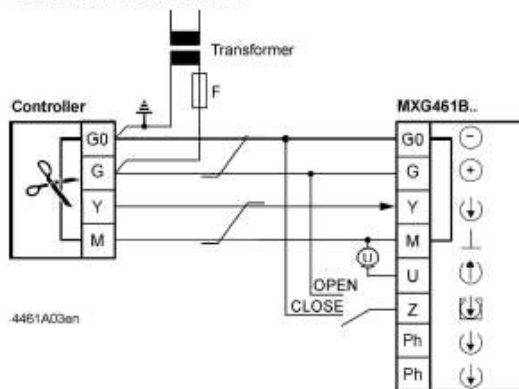
Caution ⚠ If controller and valve receive their power from separate sources, only one transformer may be earthed on the secondary side.

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

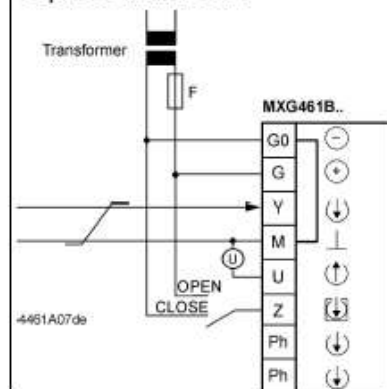
Terminal assignment for controller with 4-wire connection (to be preferred!).

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

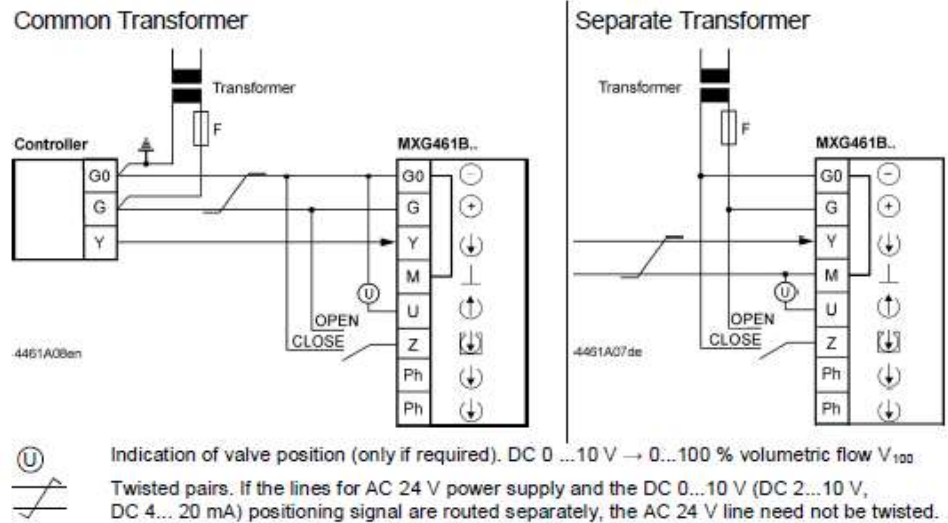
Common Transformer



Separate Transformer

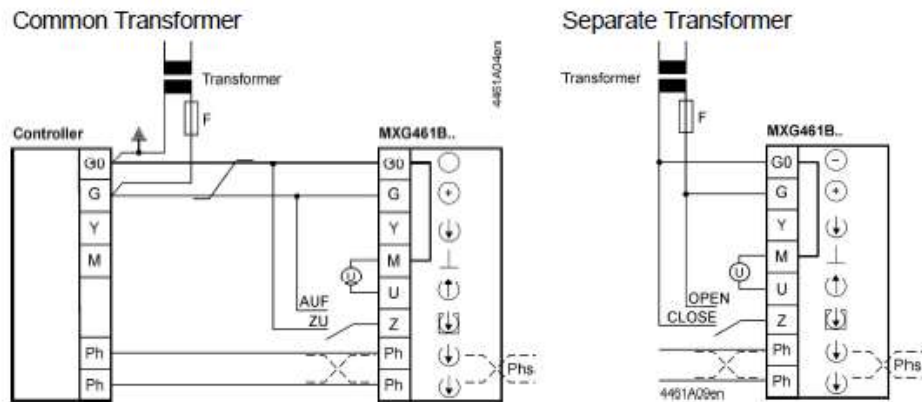


Terminal assignment
for controller with
3-wire connection
DC 0...10 V
DC 2...10 V
DC 0...20 mA
DC 4...20 mA



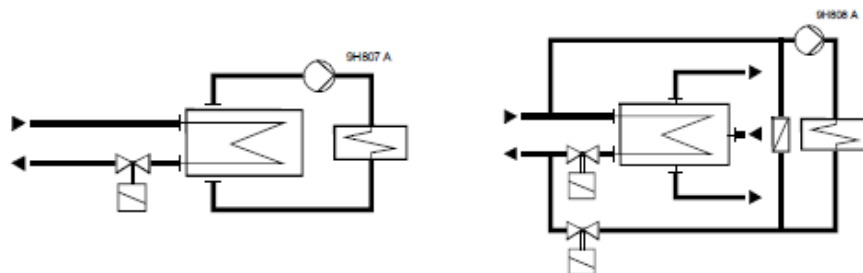
Warning Piping must be connected to potential earth!

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



Application examples

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



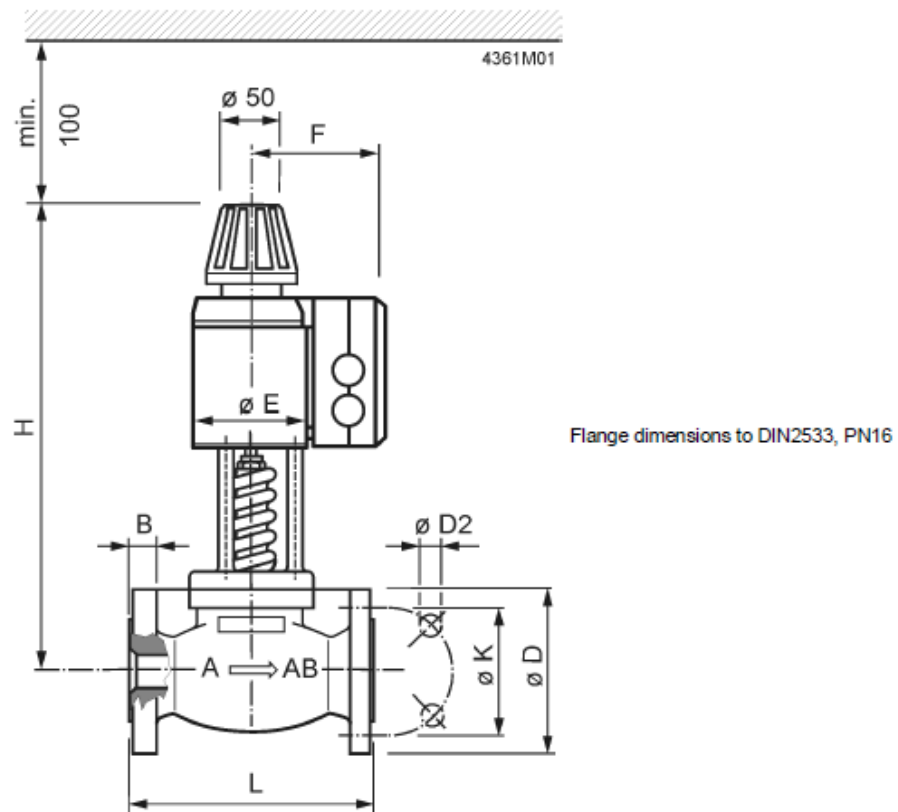
District heating (supply heating) system,
indirect connection.

District heating (supply heating) system,
directly connected to water-heating
system

Caution

The valve may only be used in flow direction (A → AB). The direction of flow must be observed!

Dimensions



Type reference	DN	L [mm]	ø D [mm]	ø D2 [mm]	B [mm]	ø K [mm]	H [mm]	ø E [mm]	F [mm]	Weight [kg]
MVF461H15-0.6	15	130	95	4x14	14	65	340	80	115	8,3
MVF461H15-1.5	15	130	95	4x14	14	65	340	80	115	8,3
MVF461H15-3	15	130	95	4x14	14	65	340	80	115	8,3
MVF461H20-5	20	150	105	4x14	16	75	339	80	115	8,9
MVF461H25-8	25	160	115	4x14	16	85	346	80	115	10,0
MVF461H32-12	32	180	140	4x18	18	100	384	100	125	15,7
MVF461H40-20	40	200	150	4x18	18	110	401	100	125	17,8
MVF461H50-30	50	230	165	4x18	20	125	449	125	138	27,2

Weight incl. packaging



Revision numbers

Type reference	Valid from rev. No.
MVF461H15-0.6	..C
MVF461H15-1.5	..C
MVF461H15-3	..C
MVF461H20-5	..B
MVF461H25-8	..B
MVF461H32-12	..B
MVF461H40-20	..C
MVF461H50-30	..B

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MXF/MFG Control Valve

SIEMENS

4₄₅₅



**Modulating control valves
with magnetic actuators,
PN 16**

**MXG461..
MXG461..P
MXF461..
MXF461..P**

for chilled and low-temperature hot water systems or
for systems with media containing mineral oils (MX..461..P)

- Fast positioning time (<2 s), high-resolution stroke (1 : 1000), high rangeability
- Equal-percentage or linear valve characteristic (user-selected)
- Operating voltage AC / DC 24 V
- Switch-selected control signal DC 0/2...10 V or DC 4...20 mA
- DC 0...20 V phase cut control signal with SEZ91.6 external interface
- Indication of operating state, position feedback and manual control
- Wear-free inductive stroke measurement
- Fail-safe feature: A ↑ AB closed when de-energized
- Low friction, robust, no maintenance required

Use

The control valves are mixing or throughport valves with the ready fitted magnetic actuator for position control and position feedback. The short positioning time, high resolution and high rangeability make these valves ideal for modulating

- control of chilled and low-temperature hot water systems
- control or dosing control of fluids containing mineral oil (SAE05...SAE50), mineral-oilbased diesel fuels, heat transfer oils in closed circuits.

Application examples MX..461..P

- Temperature control in mixing circuits for motor oil circulation
- Temperature control in mixing circuits for screw-compressors (compressed air)
- Temperature control of fuel circuits in mixing circuits for petrol and diesel oil
- High pressure control for the calibration of components for electronic injection components
- Control of cutting-oil emulsion for industrial grinding machines

Type Summary

Type reference		DN	k _{vs}	Δp _{max}	Δp _s	Operating voltage	Positioning		Spring return
MX..461..	MX..461..P ¹⁾		[m ³ /h]	[kPa]	[kPa]		signal	time	
MX..461.15-0.6	MX..461.15-0.6P	15	0.6	300	300	AC / DC 24 V	DC 0...10 V or DC 2...10 V or DC 4...20 mA	<2 s	✓
MX..461.15-1.5	MX..461.15-1.5P		1.5						
MX..461.15-3.0	MX..461.15-3.0P		3.0						
MX..461.20-5.0	MX..461.20-5.0P	20	5.0						
MX..461.25-8.0	MX..461.25-8.0P	25	8.0						
MX..461.32-12	MX..461.32-12P	32	12						
MX..461.40-20	MX..461.40-20P	40	20						
MX..461.50-30	MX..461.50-30P	50	30						
MXF461.65-50	MXF461.65-50P	65	50						
M3P80FY	M3P80FYP	80	80	see datasheet N4454					
M3P100FY	M3P100FYP	100	130						

¹⁾ for media containing mineral oils

... = F for flanged valves
G for threaded valves

Δp_{max} = max. permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve

Δp_s = max. permissible differential pressure (close off pressure) at which the motorized valve will close securely against the pressure (used as throughport valve)

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

High performance range

Type	DN	Type suffix	Description	Examples	Datasheet
MXG461..U	15...50	U	Set of 3 NPT threaded fittings enclosed	MXG461.15-3.0U	N4455
MXF461..U	65	U	Flanges to ASME/ANSI B16.1 Class125	MXF461.65-50U	N4455

Accessories

Type	Description
ALG..3 (... = DN)	Set of 3 threaded fittings for 3-port valves, consisting of 3 union nuts, 3 discs and 3 flat seals
Z155/.. (... = DN)	Blank flange set with blank flange, seal, screws, spring washers and nuts
SEZ91.6	External interface for DC 0...20 V phase cut control signal, refer to data sheet N5143

Order

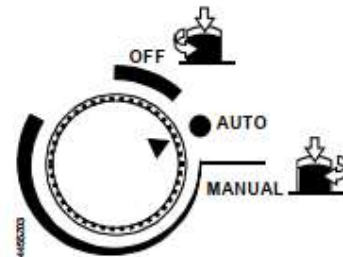
When ordering, please give quantity, product name and type reference.

Product number	Stock number	Description
MXG461.25-8.0	MXG461.25-8.0	Threaded valve with magnetic actuator
ALG253	ALG253	Set of threaded union fittings
MXF461.20-5.0	MXF461.20-5.0	Flanged valve with magnetic actuator
Z155/20F	Z155/20F	Set of blank flanges

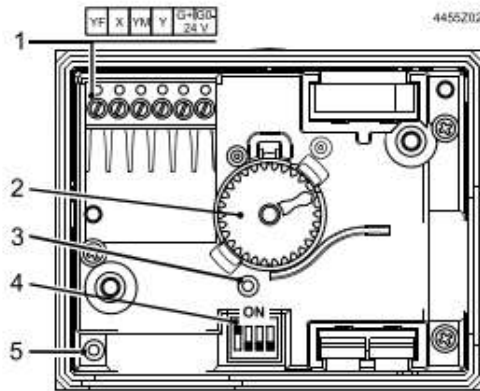
Delivery	Valve body and magnetic actuator form one assembly and cannot be separated. The threaded fitting sets and blank flanges are packed and supplied separately.
Replacement electronics module ASE1, ASE2	Should the valve electronics prove faulty, the electronics module must be replaced by the ASE1 (DN 15...32) or ASE2 (DN 40...65) replacement electronics module. Mounting Instructions no. 35678 are included.
Rev. no.	See overview

Technical and Mechanical Design

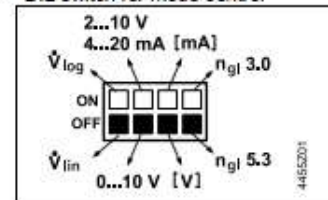
	For a detailed description of operation, refer to data sheet CA1N4028E.
Control operation	<p>The electronics module converts the positioning signal to a phase-cut power signal which generates a magnetic field in the coil. This causes the armature to change its position in accordance with the interacting forces (magnetic field, counterspring, hydraulics). 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.</p> <p>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.</p>
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.
Control	<p>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 4...20 mA output signal.</p> <p>To achieve optimum control performance, it is recommended to use a 4-wire connection.</p>
Manual control	<p>MANUAL</p> <p>The valve control path (ports A → AB) can be opened manually to between 80 and 90 % of the full stroke (depending on DN) by pressing the hand wheel inwards and turning it clockwise (MANUAL setting). This disables the control signal from the controller, the green LED is flashing.</p> <p>OFF</p> <p>To disable automatic control of the valve, press the hand wheel inwards and turn it anti-clockwise (to the OFF position). The valve will close, the green LED is flashing.</p> <p>AUTO</p> <p>For automatic control, the hand wheel must be set to the AUTO position (the hand wheel will spring out), the green LED is lit.</p>



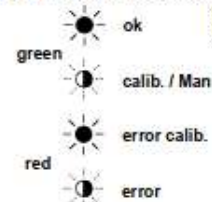
Operator controls and indicators in the electronics housing



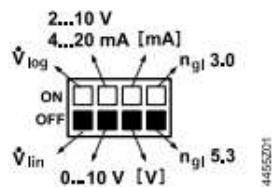
- 1 Connection terminals
- 2 Hand wheel
- 3 Opening for autocalibration
- 4 DIL switch for mode control



- 5 LED for indication of operating status



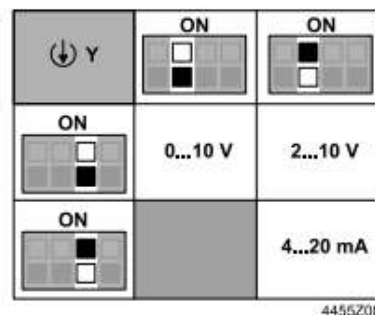
Configuration DIL switches



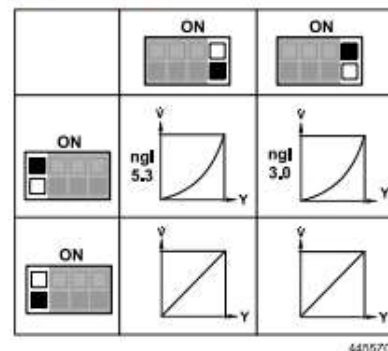
Switch	Function	ON / OFF	Description
 1	Valve characteristic	ON	\dot{V}_{log} (equal percentage)
		OFF	\dot{V}_{lin} (linear) ¹⁾
 2	Positioning signal Y	ON	DC 2...10 V, DC 4...20 mA
		OFF	DC 0...10 V ¹⁾
 3	[V] or [mA]	ON	[mA]
		OFF	[V] ¹⁾
 4	Valve characteristics	ON	ngl 3.0
		OFF	ngl 5.3 ¹⁾

¹⁾ Factory setting

Assignment positioning signal Y: Voltage or current



Selection of valve characteristic (Positioning signal against volumetric flow): Equal-percentage or linear



Forced control input YF

		YF – Function		
		no function	fully open	closed
Connections	Transfer			
Function		<ul style="list-style-type: none">• YF not connected• valve will follow the Y-signal	<ul style="list-style-type: none">• YF connected to G• valve will fully open control path A → AB	<ul style="list-style-type: none">• YF connected to G0• valve will close control path A → AB

Signal priority

1. Hand wheel position MANUAL (open) or OFF (close)
2. Forced control signal YF
3. Signal input Y

Calibration

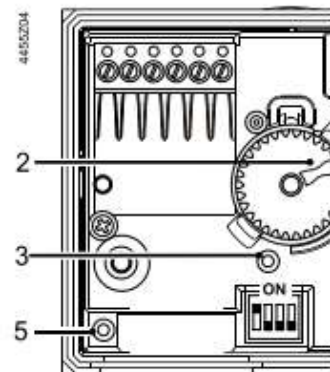
The MX..461.. and MX..461..P magnetic valves are factory-calibrated at 0 % and 100 % stroke.

When commissioning the valves, however, (especially under extreme conditions of use) there may still be some leakage via control path A → AB with a 0 % stroke control signal (DC 0 V, DC 2 V or DC 4 mA). In this case, the valve can be recalibrated simply and quickly:

1. Hand wheel [2] in AUTO-position
2. Use a pointed implement (ø 2 mm) to operate the button in the opening [3] once
3. While recalibration is in progress, the LED [5] is flashing green for approximately 10 seconds.






The valve will be briefly closed and fully opened.

If the electronics module is replaced, the valve's electronics must be recalibrated. For that, the hand wheel must be set to AUTO.



Indication of operating state

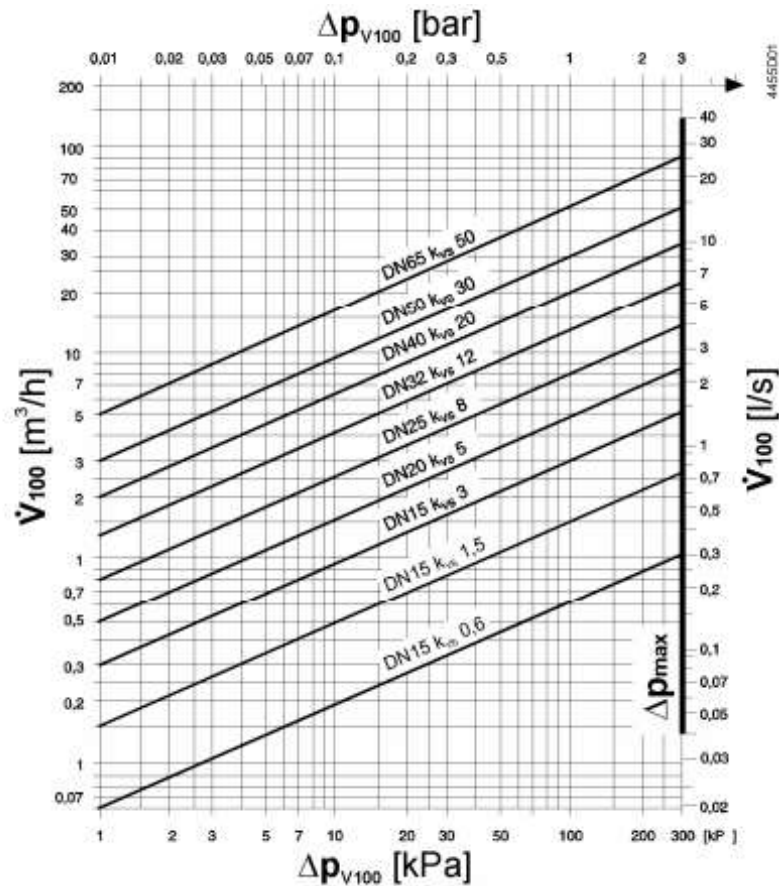
The two-color LED display indicating operating status can be viewed by opening the cover of the electronics module.

LED	Indication	Function	Remarks, troubleshooting
Green	Lit 	Control mode	Automatic operation; everything o.k.
	Flashing 	Calibration In manual control	Wait until calibration is finished (green or red LED will be lit) Hand wheel in MANUAL or OFF position
Red	Lit 	Calibration error Internal error	Recalibrate (operate button in opening 1x) Replace electronics module
	Flashing 	Mains fault	Check mains network (outside the frequency or voltage range) or valve blocked
Both	Dark 	No power supply Electronics faulty	Check mains network, check wiring Replace electronics module

As a general rule, the LED can assume only the states shown above (continuously red or green, flashing red or green, or off).

Sizing

Flow chart



Δp_{V100} = differential pressure across the fully open valve and the valve's control path A → AB 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 motorized valve

100 kPa = 1 bar ≈ 10 mWC

1 m³/h = 0.278 l/s water at 20 °C

Note for media other than water

When sizing valves for media other than water, note that the medium properties

- specific heat
- density
- kinematic viscosity

differ from water. All variables depend on temperature. The design temperature is the lowest medium temperature in the valve.

Note on viscosity

Viscosity may change considerably on temperature changes depending on the medium. Plant functionality may be impaired if the medium temperature does not guarantee viscosity values compatible with troublefree valve functioning.

Kinematic viscosity $\leq 10 \text{ mm}^2/\text{s}$

Kinematic viscosity ν [mm^2/s] in HVAC plants always is lower than $10 \text{ mm}^2/\text{s}$, i.e. its influence on volume flow is negligible.

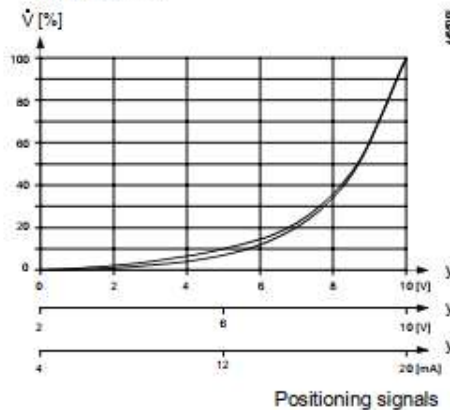
$> 10 \text{ mm}^2/\text{s}$

For details please contact your local Siemens branch office.

Valve characteristic

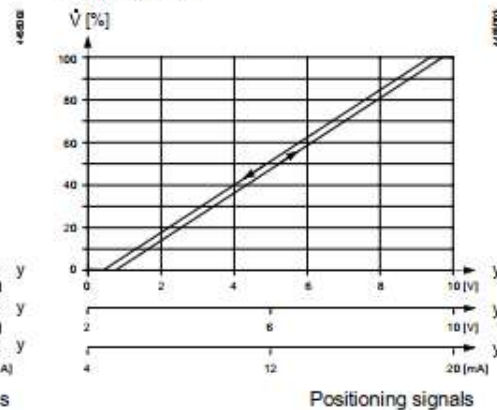
Equal percentage

Volumetric flow



Linear

Volumetric flow



Connection type ¹⁾

The 4-wire connection should always be given preference!

4-wire connection

	S _{NA}	P _{MED}	S _{TR}	P _{TR}	I _F	Cross-sectional area [mm²] 1.5 2.5 4.0 max. cable length L [m]						
Type reference	[VA]	[W]	[VA]	[W]	[A]							
MX..461.15-0.6	29	5	≥50	≥30	3.15	70	110	170				
MX..461.15-1.5												
MX..461.15-3.0												
MX..461.20-5.0												
MX..461.25-8.0												
MX..461.32-12	44	6	≥75	≥50	4	40	70	110				
MX..461.40-20												
MX..461.50-30	46					30	50	80				
MXF461.65-50												

S_{NA} = Nominal apparent power

P_{med} = Typical power consumption in the application (Valve characteristic: equal percentage)

S_{TR} = Minimal apparent transformer power





P_{TR} = Minimum DC supply power

I_F = Minimal required slow fuse



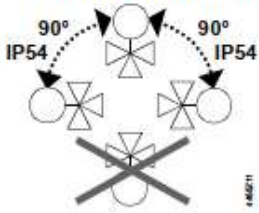

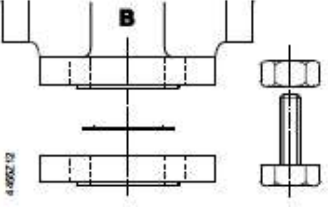
L = Max. cable length; with 4-wire connections, the max. permissible length of the separate 1.5 mm^2 copper positioning signal cable is 200 m

¹⁾ All information at AC 24 V or DC 24V

Engineering Notes

- Conduct electric connections in accordance with local regulations on electric installations as well as the internal or connection diagrams.
- Attention**  **Observe safety regulations and restrictions designed to ensure the safety of people and property at all times!**
-  **Fit a strainer upstream of the valve to increase reliability.**
-  **Do not touch hot surfaces.**
-  **Avoiding flow noise**
To reduce flow noise, abrupt reductions in pipe diameters, tight pipe bends, sharp edges or reductions in the vicinity of valves should be avoided. A settling path should be provided.
- Recommendation:**
- $L \geq 10 \times DN$, at least 0.4 m
- Also, the flow must be free from cavitation

Mounting Notes

- Mounting and operating instructions are printed on the actuator and on the electronics module.
- Caution**  **The valve may only be used as a mixing or throughport valve, not as a diverting valve. Observe the direction of flow!**
-  **A strainer should be fitted upstream of the valve. This increases reliability.**
- Orientation**
- 
- Degree of protection valid only with M20 cable gland supplied by the installer.
- Access for installation**
- It is essential to maintain the specified minimum clearance above and to the side of the actuator and/or electronics module! refer to "Dimensions"
- DN 15...32 = 100 mm
DN 40...65 = 150 mm
- Use as straight-through valves**
- Only three-way MX..461.. valves are supplied. They may be used as straight-through valves by closing off port "B".
- MXG461.. threaded valves in straight-through applications**
- Port "B" can be sealed with the accessories supplied (cover, gasket) and the union nut of the ALG..3 coupling.
- 
- MXF461.. flanged valves in straight-through applications**
- Port "B" can be sealed with part Z155/.. which must be ordered as a separate item.
The part comes complete with blank flange, seal, screws, spring washers and nuts.
- DN 15...32 blank flange (Z155/15F..Z155/32F)
DN 40...65 blank flange (Z155/40..Z155/65)
- 

Installation Notes

- The MXG..461.. valves are flat-faced allowing sealing with the gaskets provided with the ALG..3 set of 3 threaded fittings.
- Do not use hemp for sealing the valve body threads.
- The actuator may not be lagged.

For notes on electrical installation, see "Connection diagram".

Maintenance Notes

The valves and actuators 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

If the valve electronics prove faulty, the electronics module must be replaced by the ASE1 (DN 15...32) or ASE2 (DN 40...65) replacement electronics module. Mounting instructions no. 35678 are included.

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"

Caution  **Under operating conditions within the limits defined by the application data, the actuator will become hot, but this does not represent a burn risk. Always maintain the minimum clearance specified, refer to "Dimensions"**

Disposal



The valve 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 valve through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Observe all application-specific technical data.

If specified limits are not observed, Siemens will not assume any responsibility.

Technical Data
Functional actuator data

Power supply

Operating voltage	AC / DC 24 V $\pm 20\%$ (SELV, PELV) or AC / DC 24 V $\pm 20\%$ class 2 (US)
Frequency	45...65 Hz
Typical power consumption P_{med} Standby	Refer to table "Connection type", <2 W (valve closed)
Rated apparent power S_{NA}	Refer to table "Connection type",
Minimal required fuse I_F	Refer to table "Connection type"
External supply line protection (EU)	<ul style="list-style-type: none"> Fuse slow 6...10 A Circuit breaker max. 13 A, Characteristic B, C, D according to EN 60898 Power source with current limitation of max. 10 A

Input

Positioning signal Y Impedance	DC 0/2...10 V DC 4...20 mA	DC 0/2...10 V or DC 4...20 mA $\geq 100\text{ k}\Omega$ 100 Ω
Forced control YF Impedance		22 k Ω
Close valve (YF connected to G0)		<AC 1 V
Open valve (YF connected to G)		>AC 6 V
No function (YF not wired)		Positioning signal Y active

Output

Position feedback signal X Max. load	DC 0...10 V; load resistance >500 Ω 2 mA // 100 pF
Stroke measurement	Inductive
Nonlinearity	$\pm 3\%$ of end value

Positioning

Positioning time	<2 s
------------------	------

Electrical connection

Cable entry	2 x \varnothing 20.5 mm (for M20)
Connection terminals	Screw terminals 1.5...4 mm ²
Maximum cable length	Refer to "Connection type"

Functional valve data

PN class	PN 16 to EN 1333
Permissible operating pressure	1 MPa (10 bar)
Differential pressure $\Delta p_{max} / \Delta p_s$	Refer to table "Type summary"
Leakage rate at $\Delta p = 0.1\text{ MPa}$ (1 bar)	A \rightarrow AB max. 0.02 % k_{VS} B \rightarrow AB <0.2 % k_{VS} depending on operating conditions
Valve characteristic ¹⁾	linear or equal percentage, $n_{gl} = 3.0$ and 5.3 VDI / VDE 2173, optimized near the closing point
Permissible media	MX..461.. MX..461..P Chilled and low-temperature hot water, water with anti-freeze; Recommendation: water treatment to VDI 2035 Mineral oils SAE05 ... SAE50, mineral-oil-based diesel fuels, heat transfer oils
Medium temperature	1...130 °C
Stroke resolution $\Delta H / H_{100}$	1 : 1000 (H = stroke)
Hysteresis	typically 3 %
Position when deenergized	A \rightarrow AB closed
Mounting position	Upright to horizontal
Mode of operation	Modulating
Manual operation	Possible, max. 90 %

Materials	Valve body	Cast iron EN-GJL-250
	Plug	CrNi steel (X12CrNiS18 8)
	Seat	Brass (CuZn39Pb3)
	Valve stem seal	MX..461.. EPDM (O-ring) MX..461..P Fluororubber – FPM product (Viton)
Dimensions / weight	Bellows	Tombac (CuSn6), bronze (CuSn9), CrNi steel
	Dimensions	Refer to "Dimensions"
	Weight	Refer to "Dimensions"
Standards, directives and approvals	Product standard	EN 60730-x
	Electromagnetic compatibility (Applications)	Automatic electrical controls for household and similar use
	EU Conformity (CE)	For use in residential, commerce, light-industrial and industrial environments CA1T4455xx *)
	EAC conformity	Eurasia conformity for all MX.461..
	RCM Conformity	CA1T4455en_C1 *)
	UL, cUL	AC / DC 24 V UL 873 http://ul.com/database
	Pressure Equipment Directive	PED 2014/68/EU
	Pressure accessories	Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2:	DN 15...50 • without CE-marking as per article 4, section 3 (sound engineering practice) ³⁾ DN 65 • Category I, module A, with CE-marking as per article 14, section 2
Degree of protection	Protection class	Class III according to EN 60730-1
	Pollution degree	Class 2 according to EN 60730
	Protection degree of housing Upright to horizontal	IP54 according to EN 60529 (with M20 cable gland)
	Vibration ²⁾	IEC 60068-2-6 (1 g acceleration, 1...100 Hz, 10 min)
Environmental compatibility		The product environmental declarations contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal)
	MXF461..	
	DN 15...25	CA2E4455.1en *)
	DN 32...50	CA2E4455.2en *)
	DN 65	CA2E4455.3en *)
	MXG461	
	DN 15...25	CA2E4455.4en *)
	DN 32...50	CA2E4455.5en *)

^{*)} The documents can be downloaded from <http://siemens.com/bt/download>.

¹⁾ Can be selected via DIL switch

²⁾ In case of strong vibrations, use high-flex stranded wires for safety reasons.

³⁾ Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

General

environmental conditions

MX..461.., MX..461..P

	Operation EN 60721-3-3	Transport EN 60721-3-2	Storage EN 60721-3-1
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	EN 60721-3-6		
	Class 6M2		
	EN 60721-3-3	EN 60721-2	EN 60721-2
MX..461..P Mechanically active substances		Class 2M2	Class 2M2
Biological requirements	Class 3B2		
Chemically active substances	Class 3C1		
Mechanically active substances	Class 3M2		

Connection Terminals

	AC 24 / DC 24 V operating voltage	System neutral System potential
	Positioning signal	DC 0...10 V / 2...10 V / 4...20 mA
		Measuring neutral (= G0)
	Position feedback signal	DC 0...10 V
	Force control input	

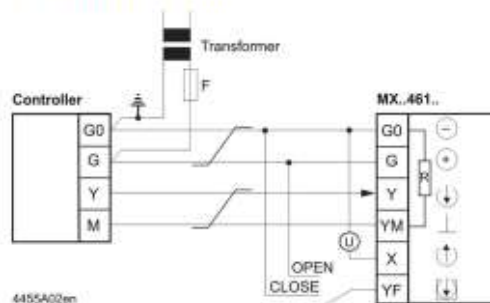
R = Inner resistance between G0 and YM, approx 10 kΩ

Connection Diagrams

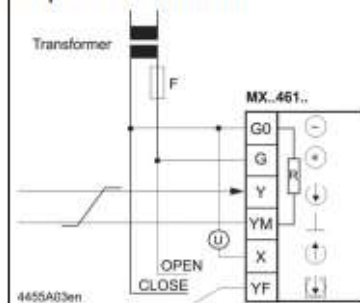
- Caution** If controller and valve receive their power from separate sources, only one transformer may be earthed on the secondary side.
- Caution** In case of DC power supply, a 4-wire connection is mandatory!

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

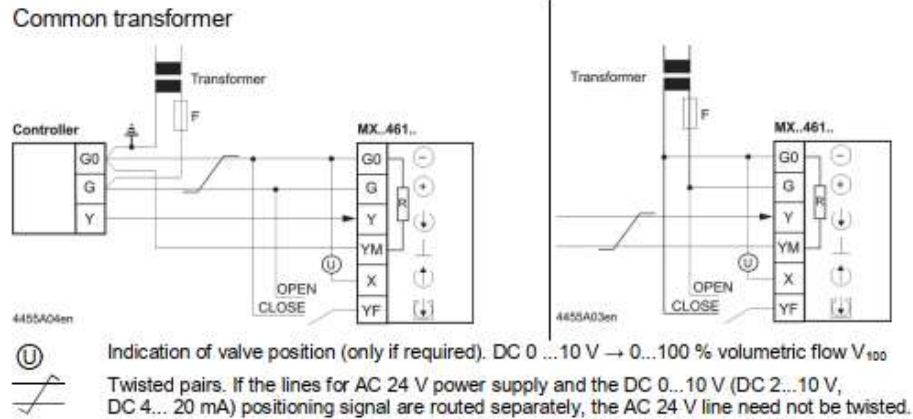
Common transformer



Separate transformer



Terminal assignment for controller with 3-wire connection



Warning

DIL switch

Piping must be connected to potential earth!

Factory setting: Valve characteristics equal-percentage, positioning signal DC 0...10 V.
Details see "Configuration DIL switches"

Calibration

See "Calibration"

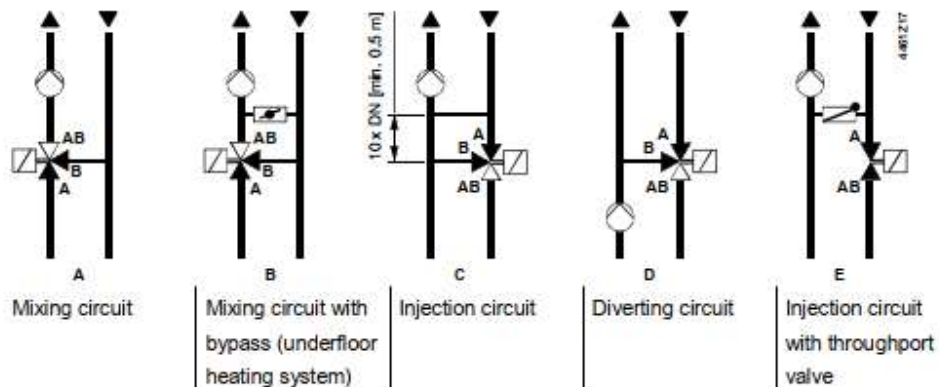
Application Examples

Hydraulic circuits

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

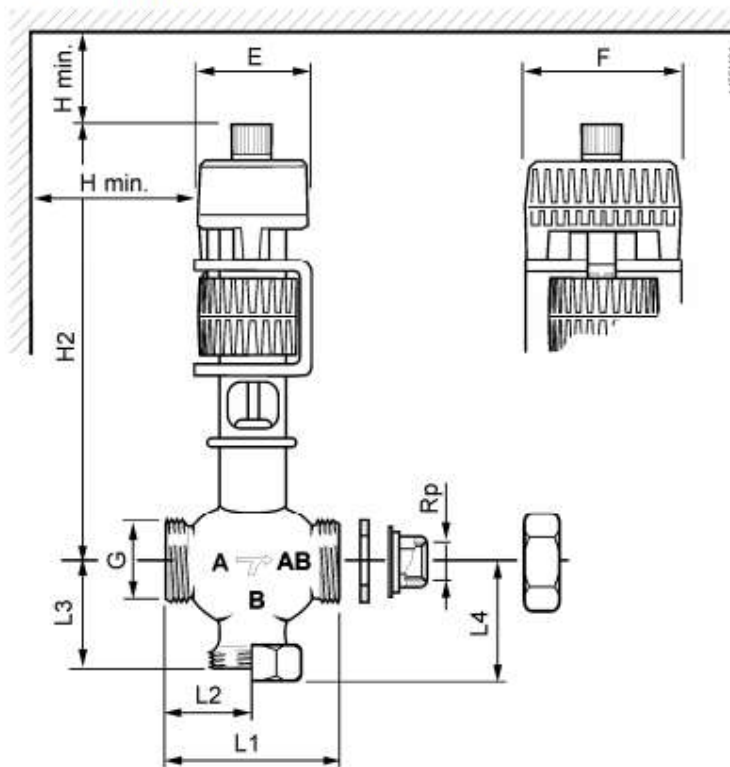


The valve may only be used as a mixing or through-port valve, not as a diverting valve. Observe the direction of flow!



Dimensions
**MXG461..
threaded valves**

Dimensions in mm

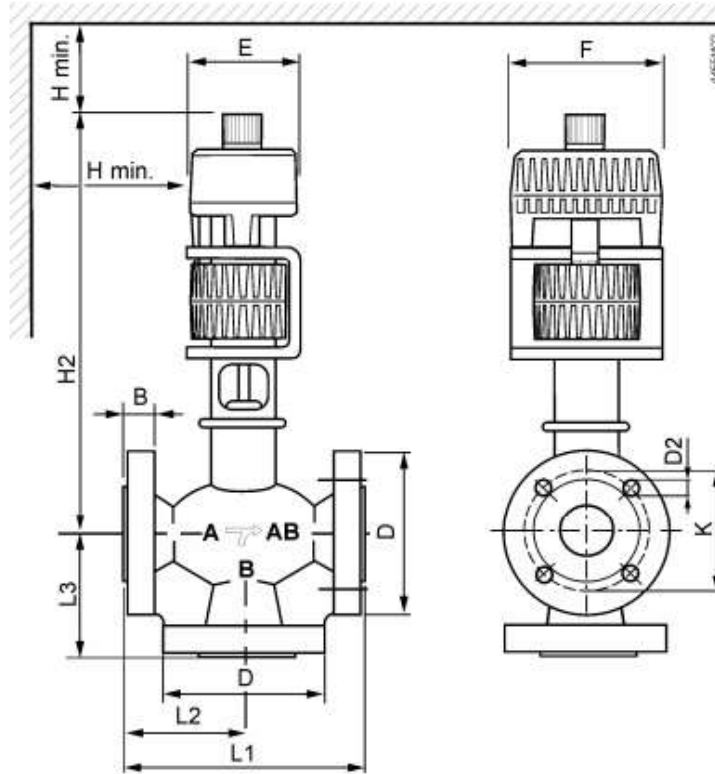


Type reference	DN	Rp [inch]	G [inch]	L1	L2	L3	L4	H2	H min.	E	F	Weight [kg]
MXG461.15-0.6	15	Rp ½	G1B	80	40	42.5	51	240	100	80	100	3.8
MXG461.15-1.5												4.2
MXG461.15-3.0												4.7
MXG461.20-5.0	20	Rp ¾	G 1¼B	95	47.5	52.5	61	260	150	80	100	5.6
MXG461.25-8.0	25	Rp 1	G 1½B	110	55	56.5	65	270				9.3
MXG461.32-12	32	Rp 1¼	G 2B	125	62.5	67.5	76	285				11.9
MXG461.40-20	40	Rp 1½	G 2¼B	140	70	80.5	94	320	150	80	100	
MXG461.50-30	50	Rp 2	G 2½B	170	85	93.5	109	340				

Remarks:

- L4: When used as a throughport valve
 - Internally threaded Rp... to ISO 7-1
 - Externally threaded G...B to ISO 228-1
 - Fittings to ISO 49 / DIN 2950
- Also valid for MXG461..P, MXG461..U

MXF461..
flanged valves



Type	DN	B	D Ø	D2 Ø	K	L1	L2	L3	H2	H min.	E	F	Weight [kg]
MXF461.15-0.6 ¹⁾	15	14	95	4x14	65	130	65	65	250	100	80	100	5.8
MXF461.15-1.5 ¹⁾													7.0
MXF461.15-3.0 ¹⁾													8.0
MXF461.20-5.0 ¹⁾	20	16	105	4x18	75	150	75	75	260	150	80	100	11.0
MXF461.25-8.0 ¹⁾	25		115		85	160	80	80	272				15.4
MXF461.32-12 ¹⁾	32	18	140		100	180	90	90	285				19.8
MXF461.40-20 ¹⁾	40		150		110	200	100	100	322				28.6
MXF461.50-30 ¹⁾	50		165		125	230	115	105	340				28.6
MXF461.65-50 ¹⁾	65	22	185	4x19.05	145	290	145	125	392	150	80	100	28.6
MXF461.65-50U	65		177.8		139.7	290	145	125	392				28.6

¹⁾ Also valid for MXF461..P

Remarks

- Counter-flanges must be supplied by the installer!
- Flange dimensions to ISO 7005-2



Revision Numbers

Type reference	Valid from manufact. date	Type reference	Valid from manufact. date	Type reference	Valid from manufact. date
MXG461.15-0.6	02/15 ¹⁾	MXG461.15-0.6P	02/15 ¹⁾	MXG461.15-0.6U	02/15 ¹⁾
MXG461.15-1.5	02/15 ¹⁾	MXG461.15-1.5P	02/15 ¹⁾	MXG461.15-1.5U	02/15 ¹⁾
MXG461.15-3.0	02/15 ¹⁾	MXG461.15-3.0P	02/15 ¹⁾	MXG461.15-3.0U	02/15 ¹⁾
MXG461.20-5.0	02/15 ¹⁾	MXG461.20-5.0P	02/15 ¹⁾	MXG461.20-5.0U	02/15 ¹⁾
MXG461.25-8.0	02/15 ¹⁾	MXG461.25-8.0P	02/15 ¹⁾	MXG461.25-8.0U	02/15 ¹⁾
MXG461.32-12	02/15 ¹⁾	MXG461.32-12P	02/15 ¹⁾	MXG461.32-12U	02/15 ¹⁾
MXG461.40-20	02/15 ¹⁾	MXG461.40-20P	02/15 ¹⁾	MXG461.40-20U	02/15 ¹⁾
MXG461.50-30	02/15 ¹⁾	MXG461.50-30P	02/15 ¹⁾	MXG461.50-30U	02/15 ¹⁾
MXF461.15-0.6	02/15 ¹⁾	MXF461.15-0.6P	02/15 ¹⁾		
MXF461.15-1.5	02/15 ¹⁾	MXF461.15-1.5P	02/15 ¹⁾		
MXF461.15-3.0	02/15 ¹⁾	MXF461.15-3.0P	02/15 ¹⁾		
MXF461.20-5.0	02/15 ¹⁾	MXF461.20-5.0P	02/15 ¹⁾		
MXF461.25-8.0	02/15 ¹⁾	MXF461.25-8.0P	02/15 ¹⁾		
MXF461.32-12	02/15 ¹⁾	MXF461.32-12P	02/15 ¹⁾		
MXF461.40-20	02/15 ¹⁾	MXF461.40-20P	02/15 ¹⁾		
MXF461.50-30	02/15 ¹⁾	MXF461.50-30P	02/15 ¹⁾		
MXF461.65-50	02/15 ¹⁾	MXF461.65-50P	02/15 ¹⁾	MXF461.65-50U	02/15 ¹⁾

¹⁾ MMYY = Month, Year of manufacturing

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Delivery and technical specifications subject to change

M3P Control Valve

SIEMENS

4₄₅₄



ACVATIX™

Modulating control valves with magnetic actuator, PN16

M3P..FY
M3P..FYP

for chilled and low-temperature hot water systems or for
systems with media containing mineral oils (M3P..FYP)

- Fast positioning time (1 s), high-resolution stroke (1 : 1000)
- Positioning signal: DC 0...10 V or DC 4... 20 mA
- Fail-safe feature: 1 ↓ 3 closed when de-energized
- Low friction, robust, no maintenance required
- Indication of operating state, position feedback and manual control

Use

	<p>The control valves are mixing or throughport valves with the ready fitted magnetic actuator for position control and position feedback. The short positioning time, high resolution and high rangeability make these valves ideal for modulating</p> <ul style="list-style-type: none"> • control of chilled and low-temperature hot water systems
M3P..FY	
M3P..FYP	<ul style="list-style-type: none"> • control or dosing control of fluids containing mineral oil (SAE05...SAE50), mineral-oil-based diesel fuels, heat transfer oils <p>in closed circuits.</p>
Application examples	
M3P..FYP	<ul style="list-style-type: none"> • Temperature control in mixing circuits for motor oil circulation, screw-compressors (compressed air) and fuel circuits for petrol and diesel oil • High pressure control for the calibration of components for electronic injection components • Control of cutting-oil emulsion for industrial grinding machines

Type Summary

Type reference	DN	k_{vs} [m ³ /h]	Δp_{max} [kPa]	Δp_s [kPa]	Operating voltage	Positioning signal	time	Spring return
M3P..FY	M3P..FYP ¹⁾							
M3P80FY	M3P80FYP	80	80	300	300	AC 24 V	DC 0...10 V or DC 4...20 mA	< 2 s
M3P100FY	M3P100FYP	100	130	200	200			

¹⁾ for media containing mineral oils, heat transfer oils

DN = Nominal size

Δp_{max} = max. permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve

Δp_s = max. permissible differential pressure (close off pressure) at which the motorized valve will close securely against the pressure (used as throughport valve)

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

Flanged valves MXF461..., MXF461..P	DN 15...65	datasheet N4455
Threaded valves MXG461..., MXG461..P	DN 15...50	

Accessories

Set of blank flanges

Type reference	Description
Z155/80	Blank flange kit for flanged valve with DN 80. Contains blank flange, seal, screws, spring washers and nuts
Z155/100	Blank flange kit for flanged valve with DN 100. Contains blank flange, seal, screws, spring washers and nuts
SEZ91.6	External interface for DC 0...20 V phase cut control signal, refer to data sheet N5143

Order

When ordering, please give quantity, product name and type reference.

Delivery

Product number	Order number	Description
M3P80FY	M3P80FY	Flanged valve with magnetic actuator
Z155/80	Z155/80	Set of blank flanges

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

The valve and blank flanges are packed and supplied separately.

Replacement

electronics module

ZM250

Should the valve electronics prove faulty, the electronics module must be replaced by the ZM250 replacement electronics module. Mounting Instructions no. 35731 are included.

Rev. no.

See overview

Technical and Mechanical Design

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

Control operation

The control signal is converted in the terminal housing into a phase cut 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 control disc, enabling fast changes in load to be corrected quickly and accurately.

The valve position is inductively measured continuously. Any disturbance in the system is rapidly corrected by the internal positioning controller, which ensures that the control signal and the valve stroke are exactly proportional, and also provides a feedback signal indicating the valve position.

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 4... 20 mA output signal.

To achieve optimum control performance, it is recommended to use a 4-wire connection.

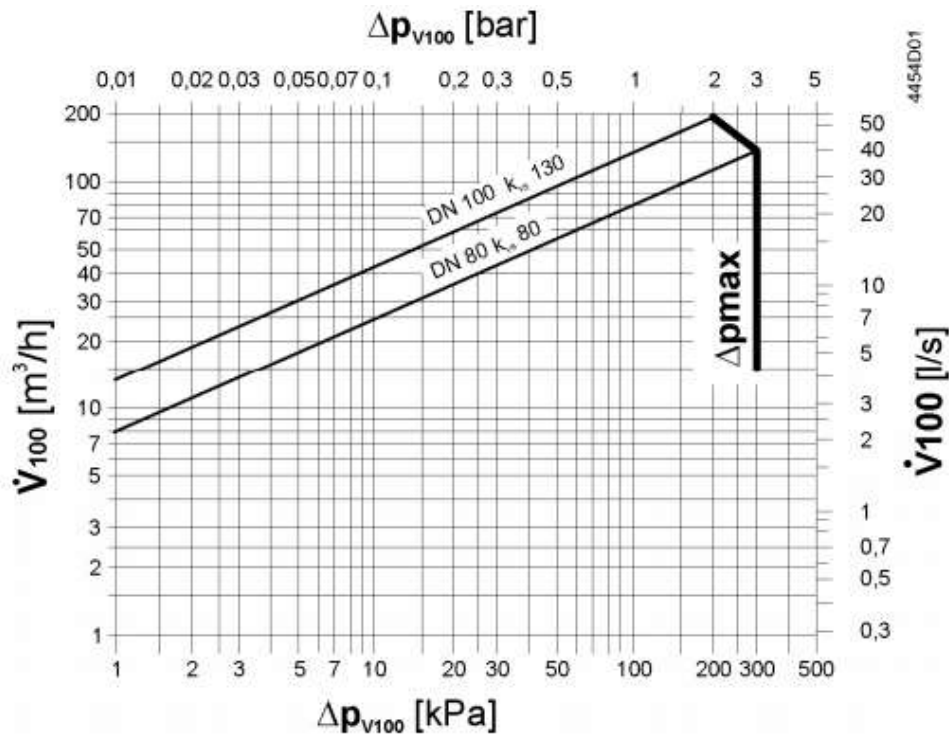
Spring return function

If the positioning signal is interrupted, or in the event of a power failure, the valve's return spring will automatically close control path 1 → 3.

Manual control

Control path ports 1 → 3 can be opened mechanically to between 0 and approximately 90 %, by turning the hand wheel clockwise.

The manual adjustment facility can also be used as a mechanical method of low limit control, i.e. the valve will exercise its normal control function between the manually-set position and the 100 % open position. For full-stroke automatic control, the hand wheel must be set to 0 (the counterclockwise end stop).

Sizing
Flow chart
Water


Δp_{V100} = differential pressure across the fully open valve and the valve's control path 1 → 3 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 (ports 1-3, 2-3) for the entire actuating range of the motorized valve

100 kPa = 1 bar = 10 mWC

1 m^3/h = 0.278 l/s water at 20 °C

Water with Antifreeze

For water with > 20 % antifreeze use following generic formula to calculate volumetric flow \dot{V}_{100} :

Generic formula

$$\dot{V}_{100} = \frac{Q_{100} \cdot 3600}{c \cdot \Delta T \cdot \rho} [m^3/h]$$

\dot{V}_{100} = Volumetric flow

[m^3/h]

Q_{100} = Design energy demand

[kW]

ΔT = Temperature difference between flow and return

[K]

c = specific heat capacity

[kJ/kgK]

ρ = specific density

[kg/ m^3]

When sizing valves for media other than water, note that the medium properties

- specific heat
- density
- kinematic viscosity

differ from water. All variables depend on temperature.

The design temperature is the lowest medium temperature in the valve.

Note on viscosity

Viscosity may change considerably on temperature changes depending on the medium. Plant functionality may be impaired if the medium temperature does not guarantee viscosity values compatible with troublefree valve functioning.

Kinematic viscosity
≤ 10 mm²/s

Kinematic viscosity ν [mm²/s] in HVAC plants always is lower than 10 mm²/s, i.e. its influence on volume flow is negligible.

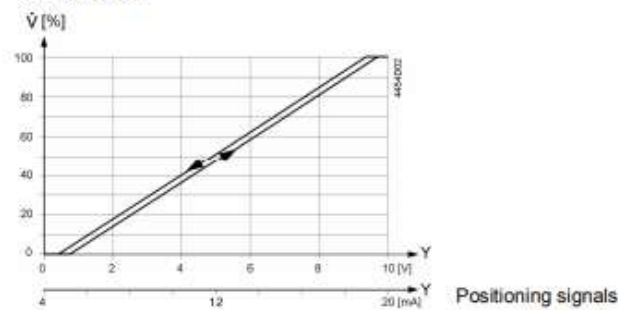
> 10 mm²/s

For details please contact your local Siemens branch office.

Valve characteristic

Linear

Volumetric flow



Connection type ¹⁾

The 4-wire connection to the valve should always be given preference!

4-wire connection

3-wire connection

Type reference	S_{NA} [VA]	P_{MED} [W]	S_{TR} [VA]	I_F [A]	Wire cross-section [mm ²]		
					1.5	2.5	4.0
M3P80FY	80	20	100	6.3	10	16	27
M3P100FY	120	30	150	10	6	10	17
M3P80FYP	80	20	100	6.3	10	16	27
M3P100FYP	120	30	150	10	6	10	17
M3P80FY	80	20	100	6.3	10	16	27
M3P100FY	120	30	150	10	6	10	17
M3P80FYP	80	20	100	6.3	10	16	27
M3P100FYP	120	30	150	10	6	10	17

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

P_{med} = typical power consumption

S_{TR} = Minimal required transformer power

I_N = required slow fuse

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

¹⁾ All information at AC 24 V

Engineering Notes

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

Attention 

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

Attention 

A strainer should be fitted upstream of the valve. This increases reliability.

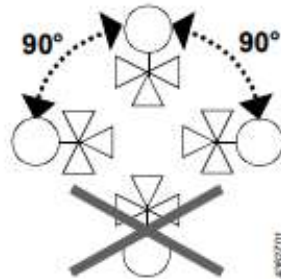
Mounting Notes

Two mounting instruction leaflets are enclosed with the valve: Ref. 35638 (valve) and reference 35731 (terminal housing).

Attention 

The valve may only be used as a mixing or throughport valve, not as a diverting valve. Observe the direction of flow 1 → 3!

Orientation



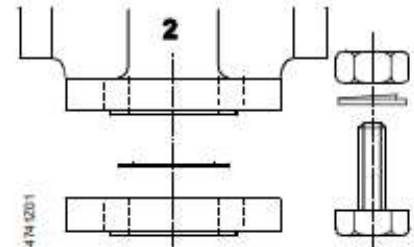
Access for installation

It is essential to maintain the specified minimum clearance above and to the side of the actuator and/or electronics module! refer to "Dimensions"

Use as straight-through valves

Close off port '2' with the type Z155/... accessories, which must be ordered separately.


The blank flange kit consists of a seal, screws, spring washers and nuts.



Installation Notes

- The actuator must not be lagged
- For notes on electrical installation, see "Connection terminals" respectively "Connection diagram"

Maintenance Notes

	<p>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.</p> <ul style="list-style-type: none"> • Dispose of the device through channels provided for this purpose. • Comply with all local and currently applicable laws and regulations.
---	--

Disposal


Repair


The valves and actuators 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.

Should the valve electronics prove faulty, the electronics module should be replaced with replacement part ZM250. Mounting instructions are enclosed (Ref. 35731).

Warning  **Always disconnect the power before fitting or removing the terminal housing. The terminal housing is calibrated and matched to the actuator, and should be replaced only by qualified personnel.**

Warning  **Under operating conditions within the limits defined by the application data, the actuator will become hot, but this does not represent a burn risk. Always maintain the minimum clearance specified, refer to "Dimensions"**

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		M3P80FY M3P80FYP	M3P100FY M3P100FYP
Power supply	Extra low-voltage only (SELV, PELV)		
	Operating voltage	AC 24 V $\pm 20\%$ (SELV) or AC 24 V class 2 (US)	
	Frequency	50...60 Hz	
	Typical power consumption P_{med} stand by (valve closed)	20 W < 2 W	30 W < 2 W
	Rated apparent power S_{NA}	80 VA	120 VA
	Minimal required transformer power S_{TR}	100 VA	150 VA
	Required fuse I_F	slow, see table «Connection type».	
	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	
Input	Positioning signal Y	DC 0...10 V or DC 4...20 mA	
	Impedance DC 0...10 V DC 4...20 mA	> 400 k Ω // 30 nF (load < 0.1 mA) 100...120 Ω // 30 nF	
Output	Position feedback signal	DC 0...10 V (max. 9.7 V \pm 0.2 V)	
	Max. load	max. 1.5 mA	
	Stroke measurement	Inductive	
	Nonlinearity	$\pm 3\%$ of end value	
Electrical wiring	Positioning time	< 2 s	
	Cable entry	2 x \varnothing 13.1 mm	
	Connection terminals	Screw terminals for max. 1 x 4 mm ² wire	
	Minimal wire cross-section	1.5 mm ²	
	Maximum cable length	refer to "Connection type"	
Functional valve data	PN class	PN 16 to EN 1333	
	Permissible operating pressure	1 MPa (10 bar)	
	Differential pressure $\Delta p_{max} / \Delta p_s$	refer to table "Type summary"	
	Valve characteristic	linear (to VDI / VDE 2173), optimized near the closing point	
	Leakage rate at $\Delta p = 100$ kPa (1 bar)	1 \rightarrow 3 max. 0.05 % k_{vs} 2 \rightarrow 3 ca. 2 % k_{vs} depending on operating conditions	

Materials	Permissible media	M3P..FY	chilled and low-temperature hot water, water with anti-freeze; recommendation: water treatment to VDI 2035
		M3P..FYP	Mineral oils SAE05 ... SAE50, mineral-oil-based diesel fuels, heat transfer oils
	Medium temperature		1...120 °C
	Stroke resolution $\Delta H / H100$		> 1 : 1000 (H = stroke)
	Hysteresis		typically 3 %
	Position when deenergized		Control path 1 → 3 closed
	Mode of operation		Modulating
	Mounting position		upright to horizontal
	Manual operation		possible, up to 90%
	Valve body		EN-GJL-HB215
	Plug		CrNi steel
	Seat		Rg5, low-lead to DIN 50430, part 6
	Valve stem seal	M3P..FY	EPDM (O-Ring)
		M3P..FYP	Fluororubber – FPM product (Viton)
	Bellows		CrNi steel
Dimensions / weight	Dimensions		refer to "Dimensions"
	Weight		refer to "Dimensions"
Degree of protection	Protection class		Class III to EN 60730
	Pollution degree		Class 2 to EN 60730
Standards, directives and approvals	Housing protection		
	Upright to horizontal		IP31 to EN 60529
	Product standard:	EN 60730-x	Automatic electrical controls for household and similar use
	Electromagnetic compatibility (Applications)		For use in residential, commerce, light-industrial and industrial environments
	EU conformity (CE)		CA1T4454xx *)
	EAC conformity		Eurasia conformity
	Pressure Equipment Directive		PED 2014/68/EU
	Pressure Accessories		Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2:	DN 80, DN 100	Category I, module A, with CE-marking as per article 14, section 2
	Environmental compatibility		The product environmental declaration E4454 *) contains data on RoHS compliance, materials composition, packaging, environmental benefit, disposal

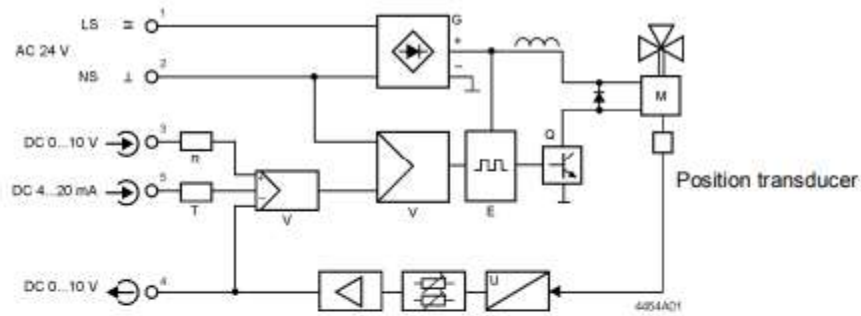
*) The documents can be downloaded from <http://siemens.com/bt/download>.

General environmental conditions

	Operation EN 60721-3-3	Transport EN 60721-3-2	Storage EN 60721-3-1
Climatic conditions	Class 3K5	Class 2K3	Class 1K3
Temperature	2...+50 °C	-25...+70 °C	-5...+45 °C
Humidity	5...95 % r.h.	5...95 % r.h.	5...95 % r.h.
Mechanical conditions	EN 60721-3-6 Class 6M2		

Diagrams

Block diagram of the signal converter



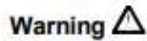
Position feedback electronics with base/span adjustment

E	Phase cut converter	R	Input resistor
G	Bridge rectifier	T	Voltage / current converter
M	Magnetic valve	U	Position / voltage converter
Q	Phase cut output	V	Differential amplifier
LS	System potential AC 24 V	→	Input
NS	System neutral	←	Output

Connection terminals

AC 24 V	LS	1	LS	System potential AC 24 V
	NS	2	NS	System neutral AC 24 V
DC 0...10 V	→	3	DC 0...10 V	Positioning signal Y
DC 0...10 V	←	4	DC 0...10 V	Position feedback signal
4...20 mA	→	5	4...20 mA	Positioning signal Y
4454A02 TE		6		Earthing

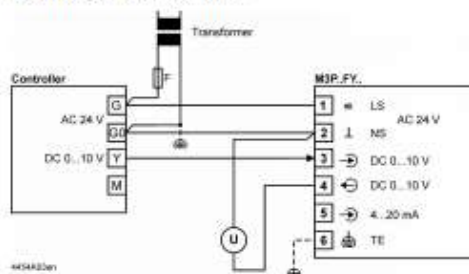
Connection Diagrams



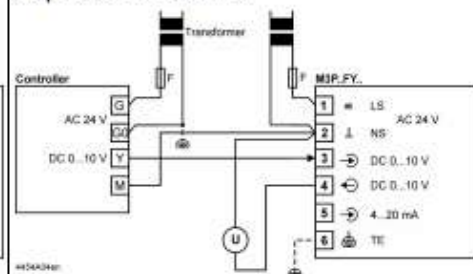
Warning If the controller and the valves receive their power supply from separate sources, the valve transformer must not be earthed on the secondary side.

Controllers with DC 0...10 V positioning signal

Common Transformer

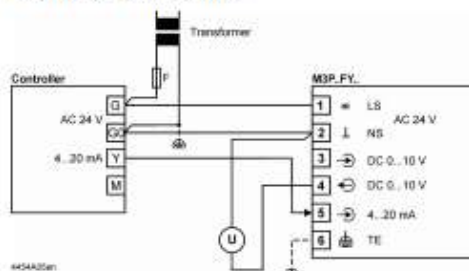


Separate Transformer

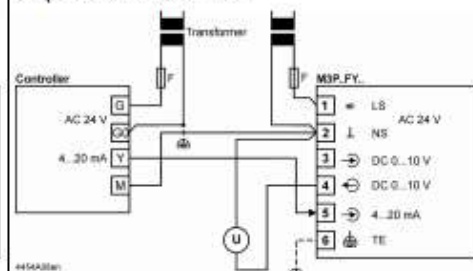


Controllers with DC 4...20 mA positioning signal

Common Transformer



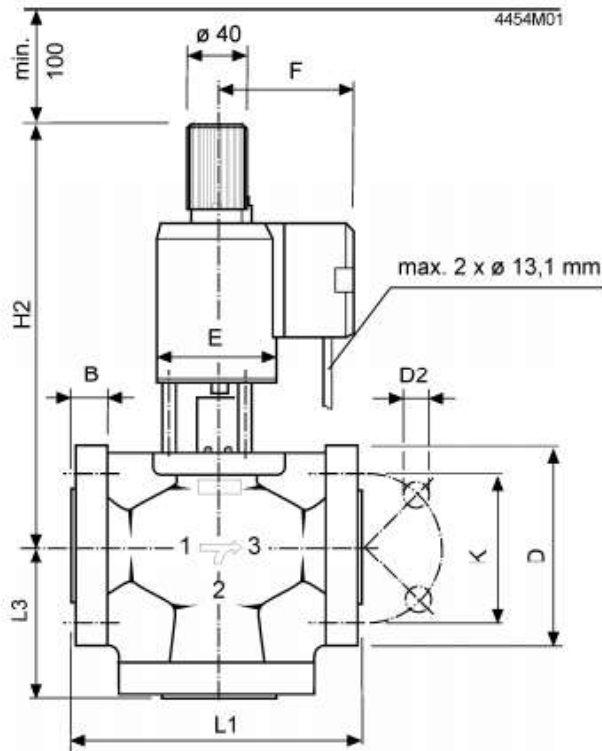
Separate Transformer



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

Dimensions

All dimensions in mm



Type reference	DN	B	D Ø	D2 Ø	K Ø	L1	L3	H2 min.	E Ø	F	Weight [kg]
M3P80FY	80	22	200	8x18	160	310	140	508	145	124	45.5
M3P100FY	100	24	220	8x18	180	350	160	570	145	124	59.0
M3P80FYP	80	22	200	8x18	160	310	140	508	145	124	45.5
M3P100FYP	100	24	220	8x18	180	350	160	570	145	124	59.0

Remarks:

- Counter-flanges must be supplied by the installer!
- Flange dimensions to ISO 7005-2

Revision Numbers

Type reference	Valid from manufacturing date	Type reference	Valid from manufacturing date
M380FY	12/09 ¹⁾	M380FYP	12/09 ¹⁾
M3P100FY	12/09 ¹⁾	M3P100FYP	12/09 ¹⁾

¹⁾ MMY = Month, Year of manufacturing

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