OEM Motoric Valve Drive 6: 24 V Proportional

The OEM Motoric Valve Drive: 24 V Proportional is an electromotive actuator of valves for heating and cooling systems. The predominant area of application is the energy-efficient control of water-bearing valves in the area of building services and automation.

The OEM Motoric Valve Drive 6: 24 V Proportional is controlled via a 0 – 10 V d.c. control signal output from a central DDC system or a room thermostat. The actuator is equipped with an LC display for displaying the current valve path, control voltage and direction of travel (open / close) as well as possible error codes. The actuator is supplied with a pluggable connecting cable and has a manual valve adjustment which can be used, for example, for maintenance or installation.
The optional feedback signal provides the DDC system with information about the current valve position and any errors that may have occurred.

The actuator has been specially developed for the customer-specific use in OEM businesses. The modular structure offers diverse differentiation possibilities for customer-specific designs.

1.1 Features

- OEM design
- Operating voltage 24 V, suitable for AC and DC
- Equipped with NFC chip, configurable via app (IOS or Android) (see chapter App functionality)
- Various operating modes can be selected: e.g. proportional, 3-point (M3P), fixed valve paths (MPR), EQP, variable control voltage areas, etc.
- Valve path 8.5 mm (2 mm to 8.5 mm fixed, adjustable, or variable by valve path recognition)
- Actuating force 100 N, 125 N, 150 N or 200 N
- Speeds: 15 s/mm, 30 s/mm
- Sensor system for automatic shutdown of the motor when reaching the valve end positions (valve path recognition)
- LC display for status indication
- Very fine resolution in valve positioning
- Very short response times
- Self-locking gear in all positions, de-energized
- Anti-theft function by removable locking latch
- Manual valve adjustment
- Very low power consumption
- Valve adapter system Simple plug-in installation without tools
- 100 % protection in case of leaky valves (IP 54)
- 360° installation position
- Plug-in connecting cable
- Low-noise and maintenance-free
- High functional safety and long expected service life
- Control input suitable for 0-10 V, pulse width modulation (PWM)
- Optional: preset, customer-specific variants
- Optional: customer-specific characteristic linearization

1.2 Variants

In its basic version, the OEM Motoric Valve Drive 6: 24 V Proportional is delivered without logo, with plugged connection cable. The following variants are available in the basic version.

Type	Actuation force	Actuation time	Control voltage range	Scope of supply
MPO 468x6-y0	x = 2: 125 N x = 0: 100 N x = 3: 150 N x = 4: 200 N	y = 3: 15 s/mm y = 2: 30 s/mm	0 – 10 V Active 0.5-10 V	• Motoric Valve Drive: MPx in individual packaging • 1 m connection line (plug-in), white, PVC 4 x 0.22 mm² • Installation instruction in 12 languages
MPV 468x6-y0 (1)				• 1 m connection line (plug-in), white, PVC 3 x 0.22 mm²
MPR 468x6-y0 (1)				
M3P 468x6-y0			2-/3-point operation	
M3V 468x6-y0			2-/3-point operation with preset valve path recognition	

Variation options: Preset variants and other valve adaptations on request
(1) No feedback due to 3-pole connection cable

1.3 Optional differentiations to the basic version

Differentiations		
Line lengths	standard	2 m, PVC in white – 3 or 4 x 0.22 mm² – special lengths <20 m, pluggable on request
	non-halogen	1 m, 2 m, Hal F LiYY 3 or 4 x 0,22 mm² / white Compliance with fire protection and environmental regulations.
Valve adapters		Available for almost all valves and distributors
Packaging		Packaging can be manufactured and printed individually according to requirements.
Imprint on casing		Imprint of the company logo and the individual type designation

Please contact us if you have further wishes.

1.4 Equipment

The OEM Motoric Valve Drive 6: 24 V Proportional is supplied fully equipped as standard. The function of the actuator can be changed at the factory or via the APP, so predecessor variants can be simulated. For this purpose, the product comes with a 4-pole cable.
Customized preset versions are available, which differ functionally:

	MPO 46846	MPR 468x6 Simulation	MPV 468x6 Simulation	M3x 468x6 Simulation
LCD	✓	✓	✓	**Without function**
Background illumination	**Switchable**	**Switchable**	**Switchable**	**Without function**
Function display via LED	✓	✓	✓	✓
Valve path recognition	✓	**On / off switchable**	✓	**On / off switchable**
Feedback signal	✓			
Manual setting	✓	✓	✓	✓
4-pole connection cable	✓			
3-pole connection cable, minimum version	**Not available**	✓ **Feedback not usable**	✓ **Feedback not usable**	✓

1.5 Valve adaptation

The OEM Motoric Valve Drive 6: 24 V Proportional can easily be connected to various valves.
The adapters cover a valve path of 8 mm each, measured from the minimum closed component.

Valve adapters	Minimum locking dimension with OEM Motoric Valve Drive 6: 24 V Proportional	Valve manufacturer
VA 80 – M30 x 1.5	8.5 mm	Danfoss ABQM, Flowcon, Frese, Herz, Honeywell, IVAR, JCI, Oventrop, Sauter, Siemens, TA, Watts
VA 33 – M28 x 1.5	8 mm	Herz, JCI
VA 64 – M28 x 1.5	15.8 mm	Pettinaroli
VA 67 – M30 x 1.5	11 mm	Controlli

2 Presets

The OEM Motoric Valve Drive 6: 24 V Proportional can be delivered with a custom setting. The properties can be changed subsequently via app. See chapter App functionality.

Function MPx	Default	Optional
Mode	MPx	M3P* | M3V* | MPR | MPV | MPO (* see table **Function M3x**)
Force Actuation force	125 N	100 N | 150 N | 200 N
Runtime Running time	15 s/mm	30 s/mm
Valve path recognition Valve path recognition	ON	OFF (OFF= MPR-Mode)

Failsafe position only for Failsafe variants	0 %	10 % … 100 % (steps of 10 %)
Drive path Stroke	8.5 mm	2 mm … 8.4 mm (steps of 0.1 mm)
Bypass minimum valve position	0 %	10 % … 50 % (steps of 10 %)
Display illumination Display lighting	ON	OFF
Display valve path Valve path display	%	mm
Valve curve Valve curve	Linear	EQP
Feedback range Functionality	1 – 9 V	1 – 5 V | 0 – 10 V
Control voltage – start Control voltage – start	0.5 V	0 V … 10 V (steps of 0.1 V)
Control voltage – end Control voltage – end	10 V	0 V … 9.9 V (steps of 0.1 V)
Actuator Mode	MPx	M3x

Example:
Control voltage – start: 10
Control voltage – end: 0 negates the path

Function M3x	Default	Optional
Mode	M3x	M3P | M3V | MPR* | MPV* | MPO* (* see table **Function MPx**)
Force Actuation force	125 N	100 N | 150 N | 200 N
Runtime Running time	15 s/mm	30 s/mm
Valve path recognition Valve path recognition	OFF (M3P) / ON (M3V)	ON
Display illumination Display lighting	ON	OFF
Actuator Mode	M3x	MPx

3 App functionality

The OEM Motoric Valve Drive 6: 24 V Proportional is equipped with an NFC chip (NFC: Near Field Communication).

App compatibility:
iOS 14.0 / Android 5.0
Language used in the app: English

Download:

iOS: https://apps.apple.com/de/app/motoric-drive/id1658744553

Android: https://play.google.com/store/apps/details?id=de.moehlenhoff.AM3

3.1 NFC operations

3.1.1 Preconditions for the use of NFC:

- Knowledge of the existence and position of the NFC interface in the mobile device: The position of the NFC interface varies depending on the model.
- Function **NFC** enabled
- Display lock deactivated

Remove protective covers before using NFC. Ensure a stable support in order to avoid disconnections. The distance required to establish an NFC connection depends on the mobile device used.
Further information on model-specific processes can be found in the instructions of the respective manufacturer.

3.1.2 Sequence

1. Establish connection between the app and the OEM Motoric Valve Drive 6: 24 V Proportional.
   To do this, position the device on which the app is installed directly on the transparent lid of the OEM Motoric Valve Drive: 24 V Proportional. The NFC antenna is located in the manual adjustment area.
2. Allow the device on which the app is installed to stay until a positive response is received from the app.
   Note: Operation is possible even without power supply of the OEM Motoric Valve Drive 6: 24 V Proportional.
3. Adjust the parameters within the specified limits.

Some functions require re-initialization of the OEM Motoric Valve Drive 6: 24 V Proportional. The app is self-explanatory. It is recommended to follow the instructions of the app.

3.2 App functions

Function	Description	Display
Device Operations		
Read		
Read from device	Reading out the settings of the OEM Motoric Valve Drive 6: 24 V Proportional	- Ready to scan: **Hold your smartphone near to the NFC tag** - Display: **Data was read successfully** or **Error message** → Repeat the process: The mobile device has been moved too early or must be aligned more precisely.
Read from file	**Prerequisite for use:** File stored on the mobile device. - Reading the settings from a file stored on the mobile device Ways to store a file on the mobile device: - Sending files as attachments via message or mail - Storage of file by **Write to file** command	Display of the file management of the mobile device
Write		
Write to device	Settings are written to the OEM Motoric Valve Drive 6: 24 V Proportional	- Ready to scan: **Hold your smartphone near to the NFC tag** - Display: **Data was read successfully** or **Error message** → Repeat the process: The mobile device has been moved too early or must be aligned more precisely.
Write to file	Scanned settings are stored as a file in the memory of the mobile device. The file can be used for - the dispatch by message or mail - the setup of further OEM Motoric Valve Drive 6: 24 V Proportional devices	Display of the file management of the mobile device
Verify		

Verify device	Comparison of the settings displayed in the **Settings** menu and the settings in the OEM Motoric Valve Drive 6: 24 V Proportional	- Ready to scan: **Hold your smartphone near to the NFC tag** - Display: **Data was read successfully** or **Error message** → Repeat the process: The mobile device has been moved too early or must be aligned more precisely. The result: **Validation successful**: identical settings or **Verification failed**: different settings
Active operations		
Start initialization	Initialization of the OEM Motoric Valve Drive 6: 24 V Proportional The actuator travels along the actuator path and the valve path. The opening and closing point of the valve are stored.	**Your device will now begin with the initialization process.**
Go to position	Setting the actuator position	Sequence 1. **Go to position** 2. **Confirm** 3. Ready to scan: **Hold your smartphone near to the NFC tag.** 4. **Your Device will now go to the specified position.** or **Error message** → Repeat the process: The mobile device has been moved too early or must be aligned more precisely.
Factory reset	Adjusts the parameters of the OEM Motoric Valve Drive 6: 24 V Proportional to the delivery state.	Sequence 1. Warning message Scan process
Settings		
Force	Setting the force in the levels: 100 N, 125 N, 150 N, 200 N	
Runtime	15 s/mm, 30 s/mm	
Valve path recognition (VPR)	ON | OFF	
Display illumination	ON | OFF	Turns the LCD backlight on or off.
Drive path	2-8.5 mm²	Limitation of the actuator path when the VPR is switched off. Use as a “limiter”.
Bypass	0 ... 50 %	Limitation of the actuator travel in the other direction. **Application** Ensure minimum flow to protect against frost. **Note:** Both the rubber diaphragm in the valve and the backlash in the adapter and the gear unit can influence the position. Please check the position!
Valve position	mm | %	Sets the preferred display on the LC display.
Failsafe position	0 %	0...100 %, steps of 10% (only for MPxF)
Valve curve Valve curve	Linear	Linear | EQP
Feedback range Functionality	1 – 9 V	1 **–** 9 V | 1 **–** 5 V | 0 **–** 10 V
Control voltage – start Control voltage – start	0.5 V	0 V… 10 V (steps of 0.1 V)
Control voltage – end Control voltage – end	10 V	0 V… 10 V (steps of 0.1 V)

Device Operations		
Mode	**MPx**	MPx | M3x

Note
All modifications must only be carried out with the appropriate expertise. Incorrect settings can lead to malfunctions of the actuator, malfunctions of the control system and consequential costs. The manufacturer does not accept any responsibility for incorrect settings and their consequences.

Changes are accepted after the actuator is switched on again.

3.2.1 Adjustable modes

	Function	Valve path	Description
MPR	Proportional	preset, fixed	- Valve path recognition switched off, path fixed
MPV	Proportional	Valve path recognition	- 3-pole connection cable without feedback - The feedback signal can be tapped in all proportional modes with 4-wire connection cable
By changing the mode, the OEM Motoric Valve Drive 6: 24 V Proportional can also behave like a 2-/3-point actuator:			
M3P	2- and 3-point operation	Valve path recognition **deactivated**	The motor switches off when the valve pressure plate has reached the inner, mechanical stop
M3V	2- and 3-point operation	Valve path recognition **activated**	The motor shuts down when the valve pressure plate lifts off the plunger **Caution:** Without back pressure from the valve, the valve pressure plate only extends!

4 Functions, operation and initialization

The OEM Motoric Valve Drive 6: 24 V Proportional is equipped with a stepper motor, a microcontroller and a self-locking gear unit.

4.1 Initialization: only in proportional mode

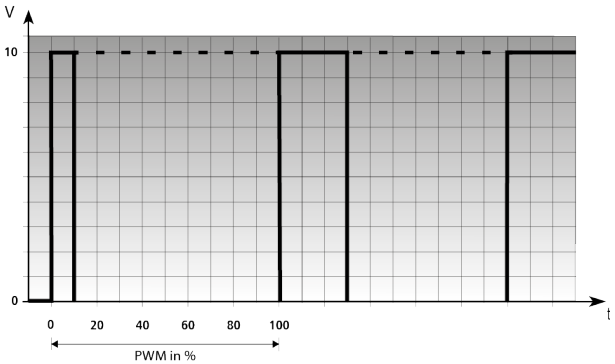
After switching on the power supply, the OEM Motoric Valve Drive 6: 24 V Proportional performs an initialization. In the initialization phase, the actuator determines the travel and displays “In” (for initialization). At the same time, the green LED1 flashes.

First, the valve pressure plate is completely retracted, determining the inner end stop of the actuator. Subsequently, the valve pressure plate extends and first determines, during the travel, the position of contact with the plunger and the second end stop when the end of the valve path is reached and the actuator has come to a standstill.
The end of initialization is indicated by the green LED1 going out, “In” going out in the display and the alternating display of the applied control voltage and the current position.

Note
The OEM Motoric Valve Drive 6: 24 V Proportional requires max. 7 min for its initialization phase.
During the initialization, the actuator does not respond to the control voltage applied.

4.2 Operation

The control of the OEM Motoric Valve Drive 6: 24 V Proportional is done via a 0 – 10 VDC control signal from a room thermostat or a building management system. The control signal allows a precise activation and positioning of the actuator. Alternatively, a PWM signal can be applied to the control voltage input, see diagram:

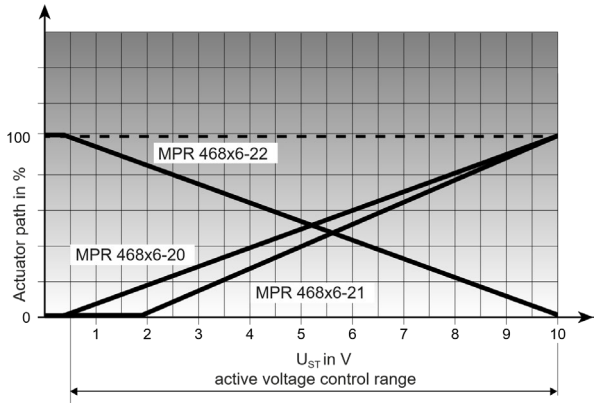


Pulse width frequency 100 Hz to 1000 Hz

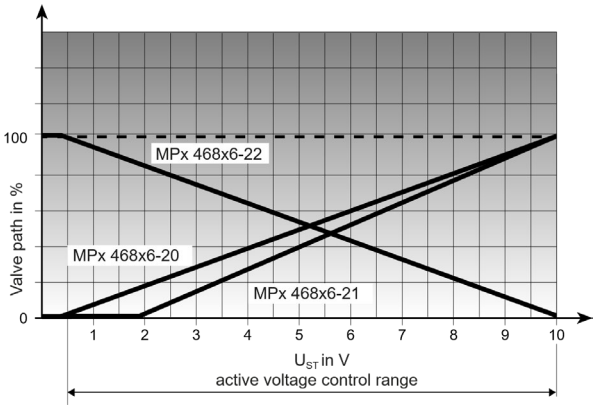
After initialization, the applied control voltage is converted proportionally into a setting position. The actuator calculates the setting position to be approached from the control voltage, the set valve path or the measured travel (depending on the mode) and approaches it precisely.

Note
1. For poppet valves with a soft rubber seal, the compression of the rubber seal is detected as the valve path.
2. The following diagrams only apply when the appropriate valve adapter ring is used:

Functional diagram Mode MPR,
without valve path recognition, fixed valve path



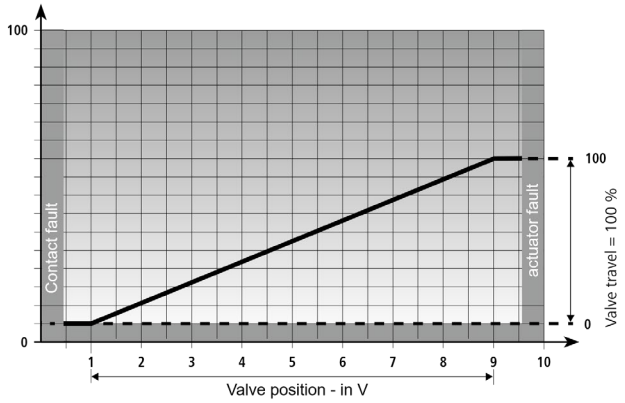
Functional diagram Mode MPV/MPO,
with valve path recognition



Note
The mechanical backlash between the actuator and the valve adapter, as well as backlash in the gear unit of the actuator, are detected as valve path. This has an effect on the position display and the control bandwidth is minimally reduced. Deviating from the actual valve lift, an approx. 1 mm higher valve path is shown in the display.

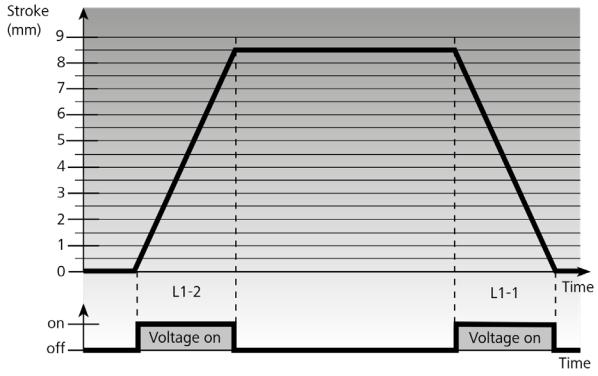
4.3 Feedback signal

The feedback signal of the OEM Motoric Valve Drive 6: 24 V Proportional provides direct feedback of the current operating status to the DDC system via a 0 to 10 V signal. Voltages of 1 to 9 volts supply information about the actuator position, voltages <0.5 V and >9.5 V point to possible errors occurred. The connection of the feedback signal is voltage resistant up to 24 V.



Note
The bandwidth of the output voltage can be changed to 0-10 V In the settings. This eliminates the need for error evaluation.

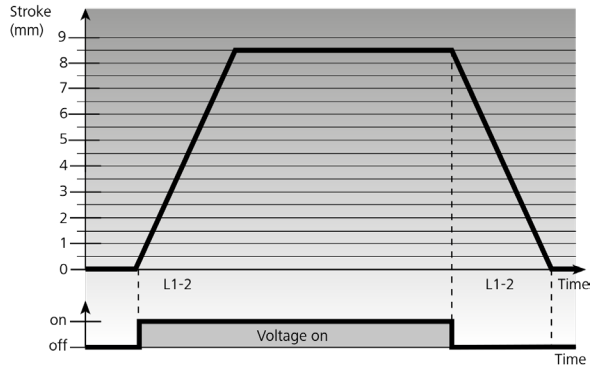
4.4 3-point mode (M3P)



The OEM Motoric Valve Drive 6: 24 V Proportional in 3-point mode is controlled via the two electrical connections L1-1 and L1-2. The desired moving direction is selected via a 24 V signal at one of the connections, extracting or retracting the valve pressure plate. A 24 V signal at L1-2 retracts the valve pressure plate, a signal at L1-1 extends it. The minimum pulse length is 2 seconds.

4.5 2-point mode

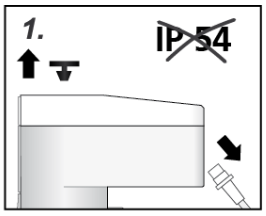
The OEM Motoric Valve Drive 6: 24 V Proportional in 3-point mode can also be used for a 2-point control. For this, a continuous voltage of 24 V must be applied to the electric connection L1-1. The activation is done via the connection L1-2. A 24 V signal at L1-2 retracts the valve pressure plate. The valve pressure plate remains retracted until the 24 V signal at L1-2 is switched off. If the voltage at L1-2 is switched off, the valve pressure plate extends to the end position.



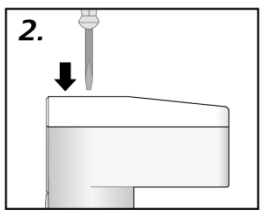
Note (valid for 2- and 3-point modes)
When **valve path recognition is activated**, the motor switches off when the plunger no longer makes contact with the valve pressure plate of the actuator.
When **valve path recognition is deactivated**, the actuator retracts the valve pressure plate to the internal stop. Only then the motor switches off. The actuator travels uselessly, the control reacts sluggishly.

4.6 Manual valve adjustment

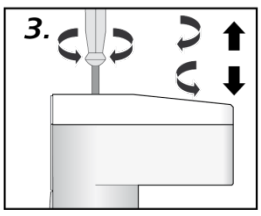
The manual valve setting allows to bring the valve pressure plate of the actuator in de-energised status to the desired position. This facilitates e. g. maintenance and installation. **Necessary tools: Slotted screwdriver 0.3 x 2 to 0.5 x 3**



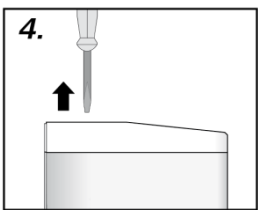
Remove the protective plug and the connection line, or switch off the voltage supply.



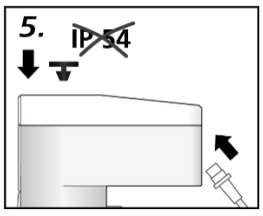
Insert the screwdriver into the manual valve adjustment.



When turning to the right, the valve pressure plate is retracted; turning to the left extracts it.
Note: Turn the screwdriver back by a quarter turn when the stop is reached.



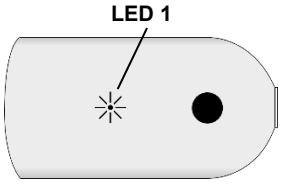
Remove the screwdriver after reaching the desired position.



Install the protective plug and connect the connection line.

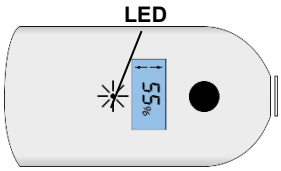
4.7 Function display via LED 2-/3-point operation modes

The OEM Motoric Valve Drive 6: 24 V Proportional is equipped with a multi-coloured LED for the signaling of operating statuses in 2-/3-point mode (M3P). Green, orange and red are used as signal colours. Signaling is only performed if the actuator is supplied with operating voltage.
The LED lights up approx. 3 seconds after switching on to prevent flashing when pulse control is active.
If the actuator makes contact to the upper or lower stop, the motor switches off after a time overflow, as does the LED.



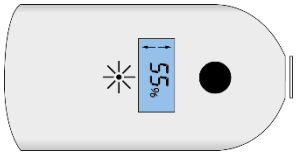
LED 1 - Signal	Meaning
Red	Failure
Green	The valve pressure plate retracts
Orange	The valve pressure plate extracts

4.8 Function display via LED: Proportional operation



For function signaling in Proportional (MPx) mode, the OEM Motoric Valve Drive 6: 24 V Proportional uses the signal colors green and red.
Proportional: Green flashing = initialization, red continuous light = error case

4.9 LC display



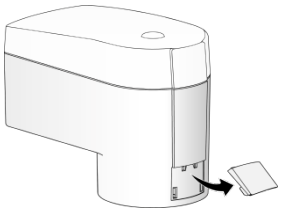
The LC display of the OEM Motoric Valve Drive 6: 24 V Proportional alternately shows the setting position and the applied control voltage. In case of a control requirement, the current driving direction is shown in the LC display by means of an arrow. In case of an error, the corresponding error code is shown and the error is indicated by a steadily lighted LED.

4.10 Error codes

Errors are indicated by an error code. The subsequent table explains the different error codes and error corrections.

Error code	Description	Error correction
E7	Blockage during initialization run at non-permitted position	1. Disconnect actuator from voltage supply 2. Move the actuator shaft with the manual adjuster out of the end position 3. Re-initialization after switching on the voltage supply again In case of repeated occurrence of the fault, the customer service must be consulted.
E8	Motor current too low	1. Re-initialization by switching the actuator off and on again If the fault cannot be rectified automatically after a maximum of three attempts, contact the customer service.
E9	Driving too long in one direction	1. Re-initialization by switching the actuator off and on again If the fault cannot be rectified automatically after a maximum of three attempts, contact the customer service.

4.11 Anti-theft device



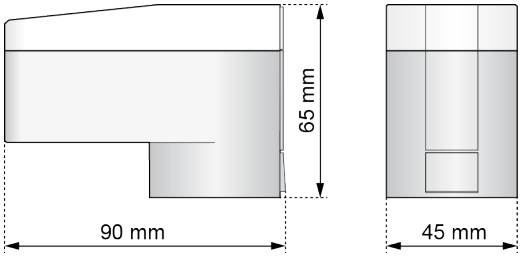
The OEM Motoric Valve Drive 6: 24 V Proportional can be secured against disassembly by unauthorized persons by simply removing the locking button.

5 Technical data

Type		Mode MPR/V/O 46846	M3P mode
Operating voltage		24 VAC, -10 %... +20 %, 50 - 60 Hz 24 VDC, -20 %... +20 %	
Operating power		2.0 VA/ 1.0 W	
Max. current consumption (AC/DC)		95 mA / 45 mA	
Power consumption standby (AC/DC)		30 mA / 10 mA	30 mA / 10 mA (2-point mode or at the end stop)
Resistance of control voltage input		100 kΩ	
Feedback Signal	Voltage range	0 V… 10 V	
	Output current	1 mA	
	Load impedance	10-1000 kΩ	
	Resolution	0.1 V	
Stroke	Standard	Max. 8.5 mm (default)	
	adjustable	2 – 8.5 mm²	
Actuation force	Standard	125 N -20/+40% (default)	
	depending on variant	100, 150, 200 N -20/+40%	
Actuation time	Standard	15 s/mm (default)	
	depending on variant	30 s/mm	
LCD (H × W)		10 × 20 mm Background illumination blue, adjustable	No relevant function
LED		multicolor	
Fluid temperature		0 °C … +100 °C	
Storage temperature		-20 °C – +70 °C	
Ambient temperature		0 °C … +50 °C	
Degree of protection		IP 54 [1)]	
Protection class		III	
CE conformity according to		EN 60730	
Casing	Material	Polyamide	
	Color	Signal white (RAL 9003)	
Casing cover	Material	(polycarbonate)	
	Color	transparent	
Cable	Type	4 x 0.22 mm² PVC Optional: 3 x 0.22 mm² PVC	3 x 0.22 mm² PVC
	Color	white	
	Length	1 m	
Dimensions (H × W × D)		65 × 45 × 90 mm	
Weight with connection cable (1 m)		155 g	
Surge strength according to EN 60730-1		1 kV	

1) in all installation positions

5.1 Dimensions

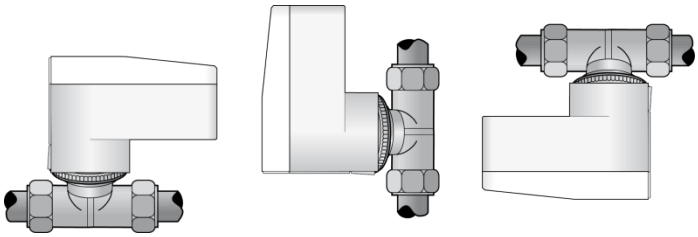


5.2 Certificates

The OEM Motoric Valve Drive 6: 24 V Proportional is NRTL approved by TÜV Süd.

6 Installation notes

6.1 Installation position



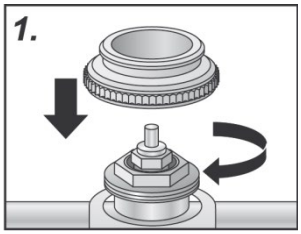
vertical horizontal “overhead”

The OEM Motoric Valve Drive 6: 24 V Proportional can be operated in any mounting position.

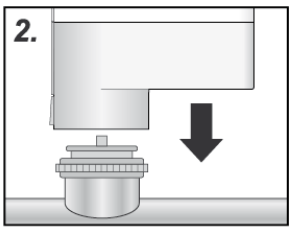
6.2 Installation with valve adapter

ATTENTION!
Mounting with the valve pressure plate extended will cause damage to the actuator.
- Mount the actuator only with the valve pressure plate fully retracted
- Retract an extended valve pressure plate completely by manual valve adjustment or electrically.

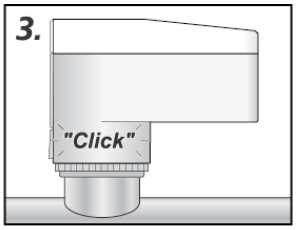
The OEM Motoric Valve Drive 6: 24 V Proportional must be mounted on the valve with a valve adapter. An extensive range of valve adapters ensures perfect mechanical adaptation of the actuator to almost all valves on the market.
The OEM Motoric Valve Drive 6: 24 V Proportional is simply plugged onto the manually pre-installed valve adapter. The fact that the valve pressure plate is retracted in factory, allows for easy installation.



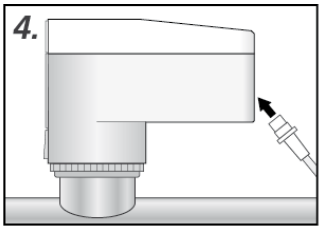
Screw the valve adapter manually onto the valve.



Position the OEM Actuator manually in vertical position to the valve adapter.

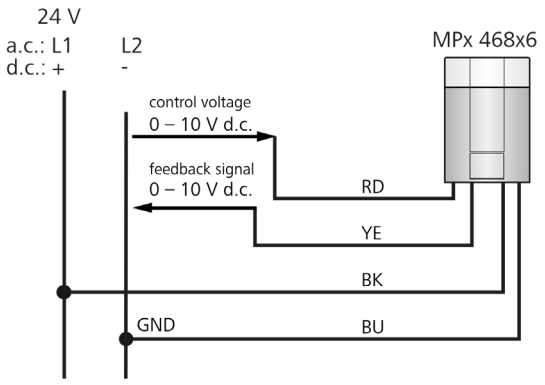


Simply latch the OEM Actuator to the valve adapter manually by applying vertical pressure; a clicking sound can be heard.



Connect the connection line to the OEM Actuator.

6.3 Electrical connection 24 V a.c./d.c. L1 (+) L2 (-)



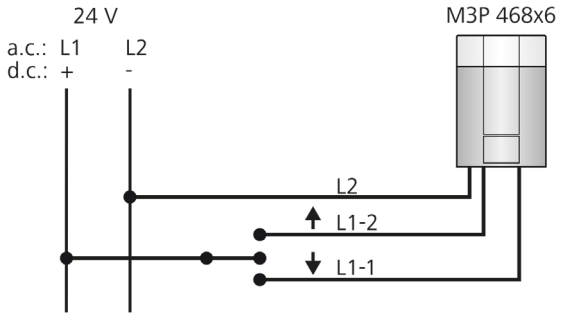
Connection line
We recommend the following maximum cable lengths for installing a 24 V system:

Cable	Section / Diameter	Length
Standard DDC line	0.22 mm²	20 m
J-Y(ST)Y	0.8 mm	45 m
NYM / NYIF	1.5 mm²	136 m

Transformer/power supply unit:
A safety isolating transformer according to EN 61558-2-6 or a switching power supply according to EN 61558-2-16 must always be used.

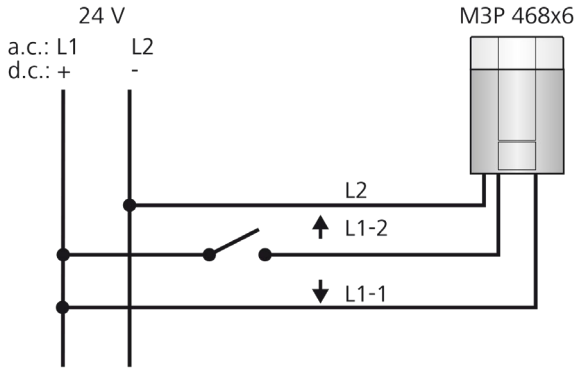
The dimensioning of the transformer or the switching power supply results from the maximum making capacity of the OEM Actuators.

3-point control



Function	Description
Blue (L2)	Ground
Voltage to red (L1-2)	The valve pressure plate retracts
Voltage to black (L1-1)	The valve pressure plate extracts
No voltage to red/black	The valve pressure plate remains in its current position

2 point control



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