

MVE522 – globe valves actuators

MODULATING / 3-POINT CONTROL



The appearance of the product may differ from the illustration. Technical specifications are subject to change.

MVE522 SERIES C E

Model	Force [N]	Power supply	Description
MVE522	2200	24 V _{AC/DC}	long yoke, modulating/3-point control
MVE522S	2200	24 V _{AC/DC}	short yoke, modulating/3-point control

APPLICATION AND USE

The New MVE is a flexible electro-mechanical actuator for the control of two and three way globe valves in:

- heating and cooling systems,
- air handling units,
- district heating plants,
- industrial temperature control systems.

The actuator can be controlled either by a proportional (modulating) signal or by an increase/decrease (Floating) signal.

It is easy to mount and connect the actuator. Direct mounting is possible to any CONTROLLOI flanged valve. Linkage kits are available for CONTROLLOI threaded valves as well as for valves of other manufacturers (table p. 3). The actuator has a fine resolution (500 steps on the full stroke range) for exacting fluid control and it is able to self-calibrate on a different stroke without the need of any user action (this function is DIP switch selectable on the field).

MVE has intelligent behaviour and alarm functionality in case of unexpected operation, feedback of alarms to the user is provided by LEDs (GREEN and RED) on the control board.

Note: Do not use the actuator if not coupled with its relating valve.

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OPERATIONS

The actuator translates the control signal (modulating or 3-point floating) from the controller into a valve position. A modern brushless DC motor in the actuator drive a gear train and a worm gear – screw jack mechanism convert the motor revolutions into accurate and repeatable linear movements.

Controls signal

MVE actuator can be controlled by one of 2 main control types:

- 3-point floating ;
- Modulating (or proportional) signal with filed selectable range (0..10 V_{DC}, 2..10 V_{DC}, 0..5, 2..6 V_{DC}/5..10, 6..10 V_{DC}, and 4-20 mA).

Manual override

There is a manual operation handle on the actuator. When it is lowered (manual override ON), the power supply to the motor power stage circuitry is cut and the motor stops. The actuator can be operated manually and the valve positioned accordingly.

The manual override lever stays in position until it is raised again, then board and motor will be powered again. At the end of this operation the actuator moves to initial position (on the basis of DIP no. 1 setting) then it follows the control signal.

When the manual override is engaged the GREEN and the RED LED are ON.

Manual operation handle can also be used to modify any DIP switch setting or as re-set function after any alarm occurrence.

The actuator is supplied with the manual override lowered (ON). It is not necessary to remove power supply to modify DIP switches setting.

Position Feedback

The actuator utilizes a 2-10Vdc position feedback (look at DIP nr. 1 setting).

Calibration

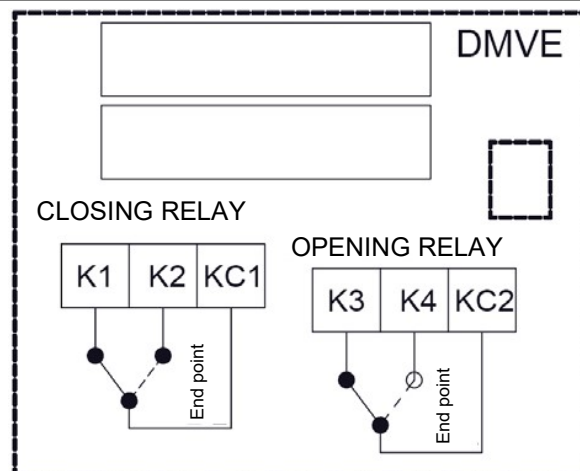
The actuator has both auto and manual stroke calibration, DIP no. 7. In factory delivery the auto stroke calibration is enabled – manual calibration is not necessary unless maintenance is required on the valve or certain alarm functions are desired.

End point auxiliary switches (with optional DMVE contacts)

End point switches change over when the valve is fully open or closed. They are free contacts with 24 V_{AC/DC}, 4A max voltage on terminals. End point switches can be utilized to indicate valve stroke end positions and for relay control of additional plant equipment.

When the actuators are controlled individually or in sequence, it is possible to use the end switches to toggle when the valve is fully open or fully closed. The auxiliary switch position according to control signal (Y) is shown in the table below.

Control signal (Y)	Relay KC1	Relay KC2
0÷ 0.5 V	KC1 to K1	KC2 to K3
0.5÷ 9.5 V	KC1 to K2	KC2 to K3
9.5÷ 10 V	KC1 to K2	KC2 to K4



Diagnostic

The actuator is provided with a self diagnostic algorithm able to detect faulty conditions:

- stroke calibration out of range 5-60 mm;
- unexpected stall condition (e.g. valve stuck or extra stroke due to actuator link loose);
- voltage supply out of range.

These faulty conditions are signaled through the GREEN and RED LED on the electronic board blinking accordingly (see Diagnostic – Alarm Function Table).

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TECHNICAL SPECIFICATION

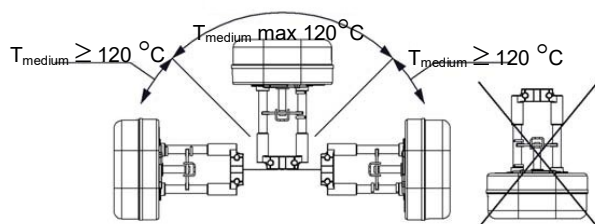
	MVE522/ MVE522S
Supply voltage L1 Ln	AC: 24 V _{AC} ±20% 50-60Hz DC: 22-30 V _{DC} (Reference Ln)
Power consumption (running)	25VA / 10W
Power consumption (holding)	10VA / 4W
Running time	
Modulating 5-15mm	60 s
Modulating 15-25mm	
Modulating 25-60mm	
3-point	
Transformer Size [VA]	50
Stroke	5-60mm (limited to 30mm for MVE.S)
Force [N]	2200
Duty cycle	max 50%/60 minutes
Analogue input Y M	voltage 0-10V _{DC} - impedance > 100kΩ (range: 0-10V _{DC} , 2-10V _{DC} , 0-5/2-6V _{DC} , 5-10/6-10V _{DC}) 500Ω (range 4-20mA)
Digital inputs Y1 Y2	connection to L1 or Ln when powered in AC connection to Ln only when powered in DC
Output V+	voltage 16Vdc ± 0,5Vdc max load 25 mA
Output U	voltage 2-10Vdc (0-100%) max load 2mA
Number of cycles of manual action	6000
Number of cycles of automatic action	100,000
Type of action	type 1
Type of movement	Linear
Room temperature	operation -10 to 50°C; storage -20 to 50°C
Room humidity	max 90% r.h.
Insulation class	III
Protection degree	NEMA 2 (*) / IP54 (**)
Printed circuit board	FR4 (material) PLC (Performance Level Categories) = 3 PTI (Proof Tracking Index) = 175 - 249V CTI (Comparative Tracking Index) = PTI Pollution Degree = 2
Standard	Emission/Immunity EMC 2004/108/CE according to EN 61326-1:2006 standard
Materials	housing: aluminum - cover: ABS
Color	aluminium / white
Weight [kg]	1.7 (MVE5xx); 1.6 (MVE5xxS)
Dimensions [mm]	See picture on the page 7.
Date code	yy/ww

*To guarantee IP54 protection

- Insert the actuator cable in the PG13,5 cable gland (not supplied)

INSTALLATION:

The actuator can be mounted with any orientation but never up-side down. When the fluid temperature exceed 120°C the actuator shall be mounted leaning 45°.

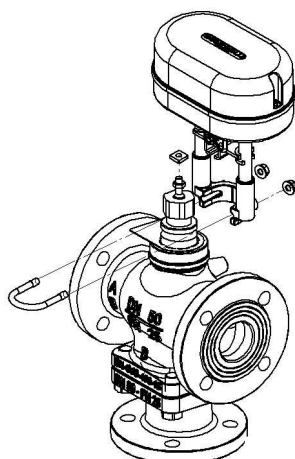


To mount the actuator on to a valve, position the valve stem to the bottom of its travel, slide the actuator onto the valve neck, adjusting with the manual override the screw jack position so the square nut on

the valve spindle fits into the groove on the cross bar. Then slide the brace into the groove on the valve neck and secure the nuts.

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See mounting instructions for full details (MVE_DIM223).

MAINTENANCE

The actuator is maintenance-free.

ACCESSORIES

DMVE	End point auxiliary switches
248	Yoke heater 24V, 50W (suggested when the fluid temperature is below 0°C)
GMVE	Thermal insulation for MVE actuators
GMVE.S	Thermal insulation for MVE.S actuators

Assembly kit	MVE	MVES
Current Controlli valves (except for 2TGB.F/3TGB.F PN16)	(not required)	/
2TGB.F/3TGB.F PN16	/	(not required)
Controlli valves with threaded M40 connections (except for VMB/VSB/VSBF/VMBF PN16)	AG51	/
VSB/VMB/ VSBF/VMBF PN 16	AG52	AG63
Other manufacturers		
Landis *	AG70-10 AG 70-14	/
Danfoss (VR/VF (S) models)	AG60-07	/
TAC DN15-V298	AG 60-08	/
TAC DN15-V2XX/V3XX	AG 60-09	/
Honeywell**	AG 60-10	/
Airtek	AG 60-1 1/ AG60-12	/
Johnson Controls code VB7816-2111	AG 66	/
Johnson Controls code BM-3018-3300	AG 67	/
Tac Venta	(not required)	/

(/) this model can not be assembled

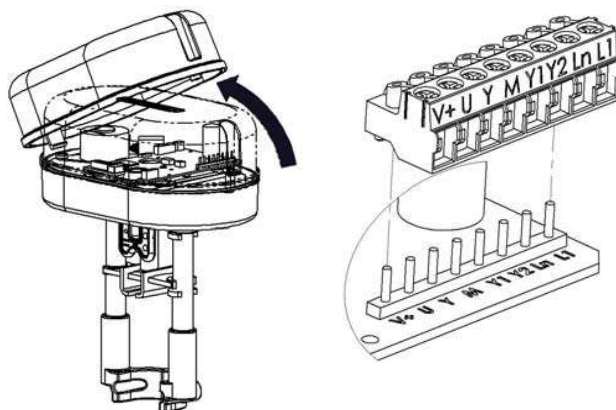
(*) valid for following models: VVF31... DN 25-80/VVF45... DN 50/VVG41... DN 15-50/VXG41... DN 15-50/VVF51... DN 15-40/VVF52... DN 15-40/VXF31... DN 25-80/VXF61... DN 15-50/VVF61... DN 15-50/VXG11... DN 25-40/VVG11... DN 25-40/VFG34... DN 25-40

(**) valid for the following models: M6: V176A. B, V538C 1/4": V5011A

ELECTRIC CONNECTIONS

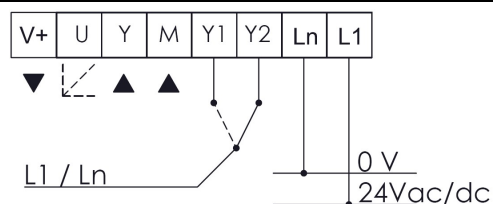
Remove the cover screw with a screwdriver and then remove the cover as shown in the picture beside.

An 8-pole terminal block is included within the actuator. Each pole of the plug is clearly marked and the same labels are located on the electronic board. Before powering up the actuator make sure the plug is properly connected to the board and the labels on the plugs and on the board match.



Use cable gland PG13,5 model (not supplied).

TERMINAL BLOCK



Designation	Description	Function	Min. Wire Size	Max. wire length
L1	24 V _{AC/DC}	Zasilanie	AWG 16 (min. 1 mm ² – max. 1.5mm ²)	75 m
Ln	0 V			
Y	0...10 V _{DC}	Modulating control input	AWG 20 (min. 0.5mm ² – max. 1.5mm ²)	200 m
M	0 V (common)			
Y1	Open	Floating (3-point) control input	AWG 20 (min. 0.5mm ² – max. 1.5mm ²)	200 m
Y2	Close			
V+	16 V _{DC}	Voltage Output max 25mA	AWG 20 (min. 0.5mm ² – max. 1.5mm ²)	200 m
M	0 V (common)			
U	2÷10 V _{DC}	Feedback signal output	AWG 20 (min. 0.5mm ² – max. 1.5mm ²)	200 m
M	0 V (common)			

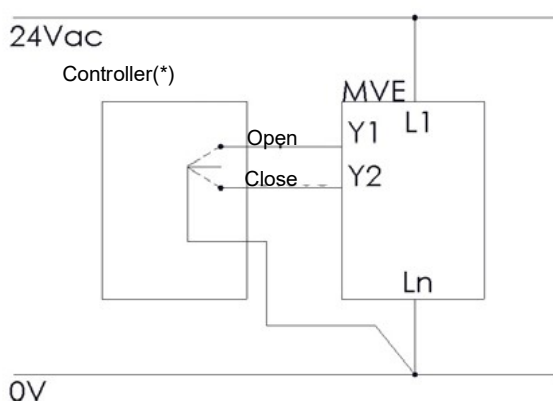
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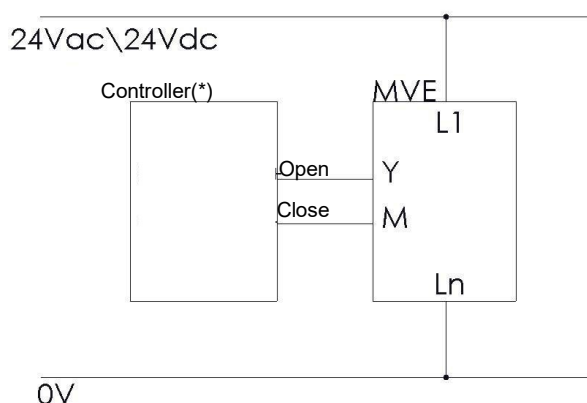
Matching between MVE terminal block and others Controlli actuators

1	2	3	4	5	SH500
L1	L2	M	V+	Y	MVB5-MVL5-MDL5
G	G0	MX	G1	X1	MVF-MVH5-MVL5-F
L1	LN	M	V+	Y	MVE

3-point floating control (*sink connection*)



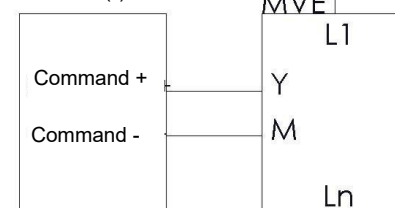
3-point floating control (*source connection*)



Modulating control (0-10 V_{CC})

24Vac\24Vdc

Controller(*)



0V

Note: M and Ln signals are internally connected.

(*) MVE actuators contain a single half-wave rectifier power supply. They must not be powered with transformers that are used to power other devices using not isolated double half-wave rectifier power supply.

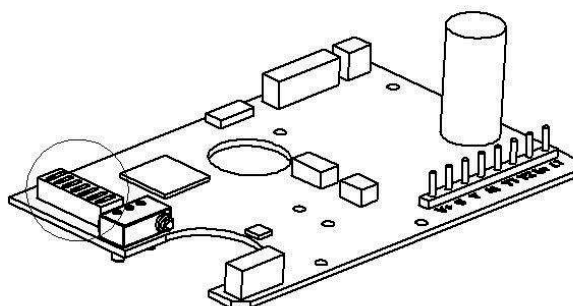
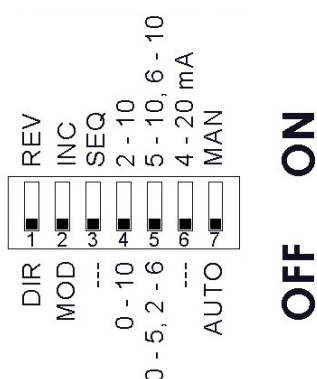
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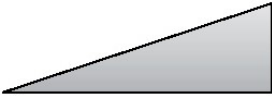
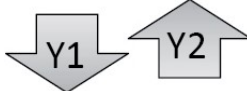
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DIP SWITCHES SETTINGS

Set the DIP switches according to the tables below. Power down and power up again the actuator or act on the manual override to be sure that settings will be recognized.

FACTORY SETTING



DIP switch	OFF	ON
1	<p>Direct operation (FS)</p> <p> U = 2 V</p> <p> U = 10 V</p> <p>U= feedback</p>	<p>Reverse Action</p> <p> U = 10 V</p> <p> U = 2 V</p> <p>U= feedback</p>
2	<p>Modulating Control (MOD) (Input between Y [+] and M [-])</p> <p></p>	<p>3 point floating (INC) (Y1 open-extend , Y2 close-retract connected L1 or Ln if powered in Vac; if powered in Vdc connected necessarily to Ln)</p> <p></p>
3	–	Selection of sequence mode, control range defined by DIP n. 5
4	Modulating Control 0-10Vdc (DIP n. 2 OFF only)	Modulating Control 2-10Vdc (DIP n. 2 OFF only)
5	Sequence Control 0-5 V _{DC} with DIP no. 4 OFF only. Sequence Control 2-6V _{DC} with DIP no. 4 ON only (with DIP no. 3 ON only).	Sequence Control 5-10 V _{DC} with DIP no. 4 OFF only. Sequence Control 6-10V _{DC} with DIP no. 4 ON only (with DIP no. 3 ON only).
6	Voltage Input Signal (input between Y [+] and M [-])	Current Input Signal 4-20mA (input between Y [+] and M [-]). In this case DIP no. 4 must be set to ON.
7	Automatic Calibration: the actuator updates the stroke range every time an unexpected mechanical stop is detected for at least 10 s.	Manual calibration: the actuator calibration is started moving the DIP from OFF to ON or vice versa. With DIP in ON in case of extra stroke or if an unexpected endpoint is detected, the actuator will never update the stroke

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DIAGNOSTIC - ALARM FUNCTIONS

No.	LED behaviour	Error	When	Actuator behaviour		Typical trouble shooting condition	Solution
				Automatic Calibration SW7 OFF	Manual Calibration SW7 ON		
1	RED on.	Valve stroke less than 5mm	Calibration/first installation	The actuator pushes/pulls 2 times (unexpected stall) trying to remove the possible obstacle. After 2 tries an alarm is signalled and the actuator moves to initial position and does not respond to control signal. Stroke value is not updated because out of range.	The actuator pushes/pulls 2 times against endpoint during calibration and the actuator moves to the initial position and then it does not respond to the control signal. The actuator keeps the previous stroke	Valve with a stroke length lower than 5mm.	Remove power and power up again
2	RED quick blinking + GREEN on	Stroke longer than 60mm	Calibration/first installation	The actuator exits the 60mm stroke range and it moves toward the new stroke limit signalling an anomaly. The actuator pushes/pulls 2 times against the new stroke limit, then it goes back to the initial position still signalling the anomaly until it is not within 60mm. The actuator does not calibrate the stroke after 10s (wrong range)	The actuator exits the 60mm stroke range and it moves toward the new stroke limit signalling an anomaly. The actuator pushes/pulls 2 times against the new stroke limit, then it goes back to the initial position still signalling the anomaly until it is not within 60mm. The actuator does not calibrate the stroke after 10s (wrong range).	Valve with a stroke length longer than 60mm	Remove power and power up again.
3	RED Quick Blinking	Unexpected stall within the calibrated stroke range	Normalna praca	The actuator tries 5 times against the new stall condition and then after 10s the actuator updates the new stroke length.	The actuator tries 5 times against the new stall condition. At the end of the attempts the fault will be signalled. The actuator does not update the new stroke length, but after 60s makes other attempts to verify the stall condition.	Valve stuck	Inverted control signal
4	RED Quick Blinking	Stroke longer than expected	Normal operation	The actuator moves toward the new stall condition with a lower speed; after 10s the actuator updates the new stroke value.	The actuator moves toward the new stall condition with a lower speed; after 10s the actuator does not update the new stroke value.	Stem connection loose or valve damaged	Inverted control signal
5	RED slow Blinking	Low Power Voltage	Normal operation	The actuator is still working but performance cannot be guaranteed	The actuator is still working but performance cannot be guaranteed	1. Wrong transformer size 2. Unstable power	Correct Voltage Power
6	RED slow Blinking	High Power Voltage	Normal operation	The actuator is still working but performance cannot be guaranteed	The actuator is still working but performance cannot be guaranteed	1. Wrong transformer size 2. Unstable power	Correct Voltage Power

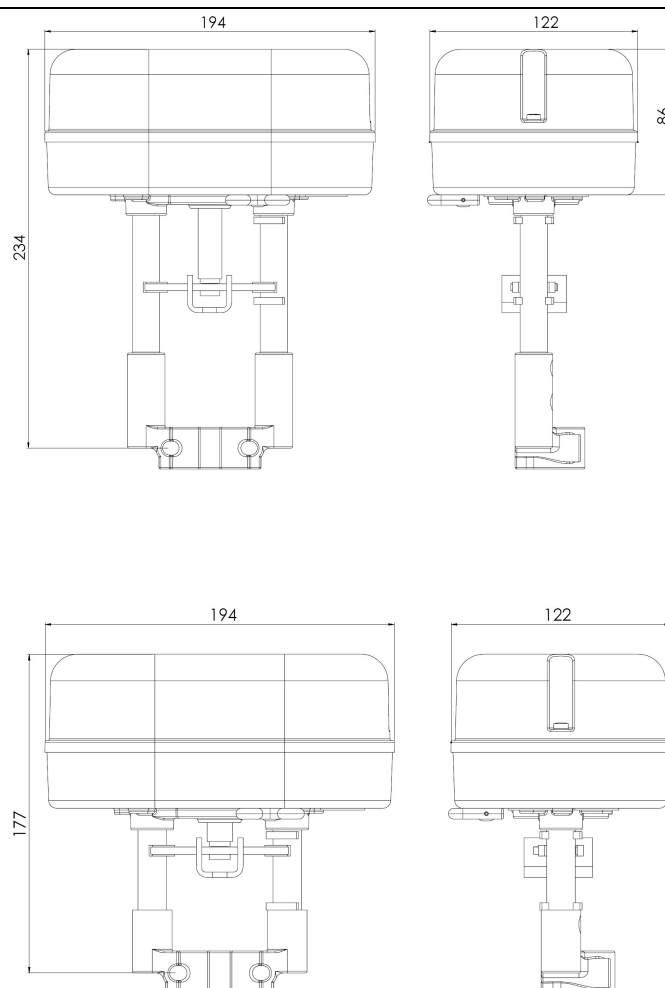
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STANDARD LEDs BEHAVIOUR

No.	LED	ACTUATOR STATUS
1	GREEN ON	The actuator arrived at the extreme point of the stroke read
2	GREEN BLINKING	The actuator arrived at the intermediate point of the stroke read
3	RED GREEN BLINKING	The actuator is reading the stroke or it is going to initial position
4	RED & GREEN on	Manual control ON, the actuators ignores the control signal. NOTE! The electronic board is electrically supplied.

DIMENSIONS [mm]



Due to continuous product improvement, specifications are subject to change without notice.

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