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INNOVATIVE MEMBER OF SWISTEC

MVE5xx – globe valves actuators

MODULATING / 3-POINT CONTROL

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

MVE5xx SERIES CE

Model	Force [N]	Power supply	Description
MVE506	600	24 $V_{AC/DC}$	long yoke, modulating/3-point control
MVE510	1000	24 $V_{AC/DC}$	long yoke, modulating/3-point control
MVE515	1500	24 $V_{AC/DC}$	long yoke, modulating/3-point control
MVE506S	600	24 $V_{AC/DC}$	short yoke, modulating/3-point control
MVE510S	1000	24 $V_{AC/DC}$	short yoke, modulating/3-point control
MVE515S	1500	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.

MVE can be controlled either by a proportional (modulating) signal or by an increase/decrease (3-point/floating) signal.

It is easy to mount and connect the actuator. Direct mounting is possible to any CONTROLLI flanged valve. Linkage kits are available for CONTROLLI threaded valves as well as for valves of other manufacturers.

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.

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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 MVE utilizes a 2-10V position feedback, where 2V (look at DIP 1 setting).

Calibration

The MVE has both Auto and Manual Stroke Calibration, Sw.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. 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);
- missing expected stall condition (e.g. link loose);
- voltage supply out of range.

These faulty conditions are signaled via the Green and Red LED on the PCBA blinking accordingly (see Diagnostic – Alarm Function Table).

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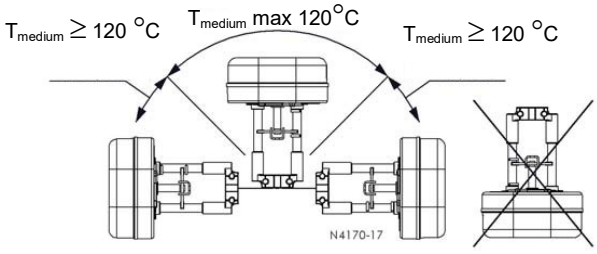
TECHNICAL SPECIFICATION

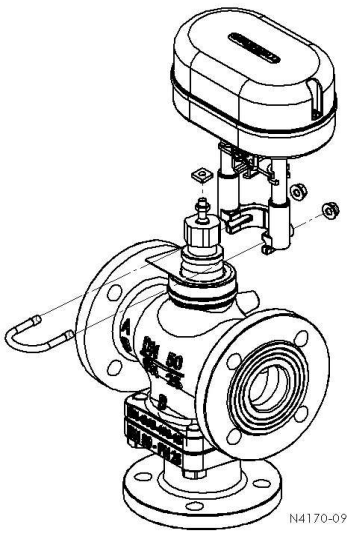
	MVE506/S	MVE510/S	MVE515/S
Supply voltage L1 Ln	AC: 24Vac ±20% 50-60 Hz DC: 22-30 V_{DC} (Reference Ln)		
Power consumption (running)	13 VA/6 W	18 VA/8 W	21 VA/11 W
Power consumption (holding)	11 VA/5 W	11 VA/5 W	13 VA/7 W
Running time			
Modulating 5-15 mm	15 s		
Modulating 15-25mm	20 s		
Modulating 25-60 mm	30 s		
Increase/decrease (s)	60 s		
Transformer power	20 VA	30 VA	50 VA
Stroke	5 - 60 mm		
Force	600 N	1 000 N	1500 N
Duty cycle	max 50%/60 minutes		
Analogue input Y M	Voltage 0-10 V - impedance > 100 kΩ (range: 0-10/2/10 0-5/2-6 5-10/6-10 V), 500 Ω (range 4-20 mA)		
Digital inputs Y1-Y2	connection to L1 or Ln when powered in AC connection to Ln only when powered in DC		
Output V+	Voltage 16 V_{DC} ± 0.5 V		
	Max. load 25 mA		
Output U	Voltage 2-10 V_{DC} (0-100%)		
	Max. load 2 mA		
Ambient temperature	Operation and storage: -10/+50°C		
Humidity	max. 90% r.h.		
Protection degree	IP54		
Standard	Emission/Immunity EMC 2004/108/CE according to EN 61326-1:2006 standard		
Material	Housing: aluminum – Cover: ABS		
Color	Aluminum / White		
Weight	1.5 kg		
Dimensions	See dimensional drawing.		

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.



See mounting instructions for full details (MVE_DIM196).

MAINTENEACE

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The actuator is maintenance-free.

ACCESORIES

DMVE Endpoint Auxiliary Switches

248 Yoke heater (suggested when the fluid temperature is below 0°C)

Assembly kit	MVE	MVES
Current Controlli valves (except for 2TGB.F/3TGB.F PN16)	(not required)	/
2TGB.F/3TGB.F PN16	/	(not required)
Zawory Controlli z przyłączem gwintowanym M40 (except for VMB/VSB/VSBF/VMBF PN16)	AG51	/
VMB/VSB/ VSBF/VMBF PN16	AG 52	AG63
Other manufacturers		
Landis *	AG 60-03	/
Danfoss (VRA/F (S) models)	AG60-07	/
TAC DN15-V298	AG 60-08	/
TAC DN15-V2XX/V3XX	AG 60-09	/
Honeywell**	AG 60-10	/
Airtek	AG 60-11/AG60-12	/
Johnson Controls code VB7816-2111	AG 66	/
Johnson Controls code BM-3018-3300	AG 67	/
Tac Venta	(not required)	/

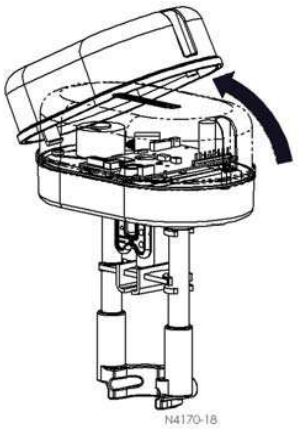
(/) this model can not be assembled
(*) valid for following models: VVF31... DN 25–80/VVF45... DN 50/VVG41... DN 15-50/VXG41... DN 15-50/VVF51... DN 15-40/VVF52... DN 15-40/VXF31... DN 25–80/VXF61... DN 15–50/VVF61... DN 15–50/VXG11... DN 25–40/VVG11... DN 25–40/VFG34... DN 25–40
(**) valid for the following models: M6: V176A. B, V538C 1/4": V5011A

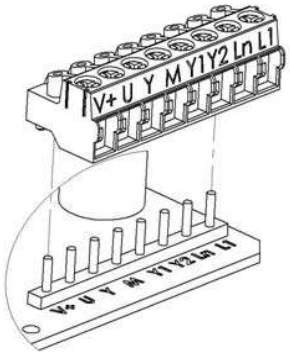
ELECTRIC CONNECTIONS

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

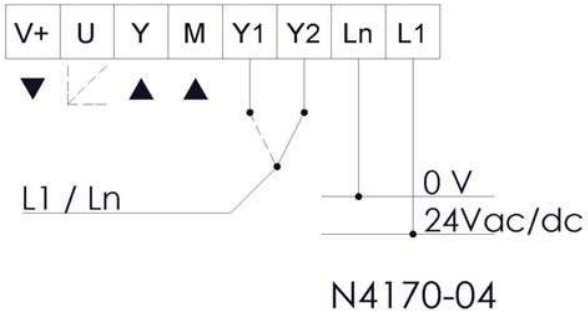
An 8-pole terminal block is included within the actuator. Each pole of the plug is clearly marked and the same labels are located on the electronic board. Before powering up the actuator make sure the plug is properly connected to the board and the labels on the plugs and on the board match.

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





TERMINAL BLOCK



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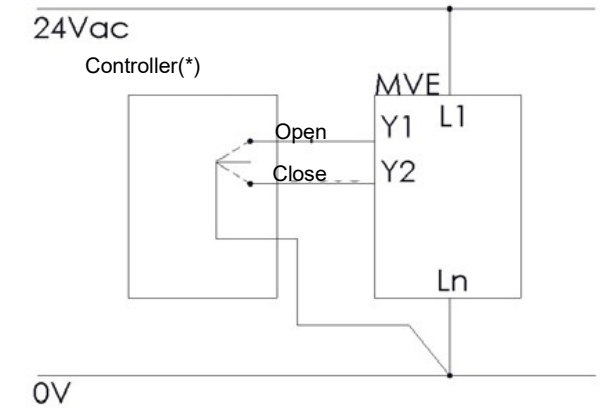
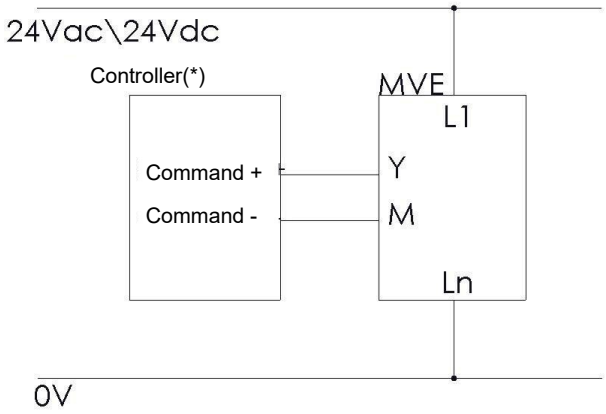
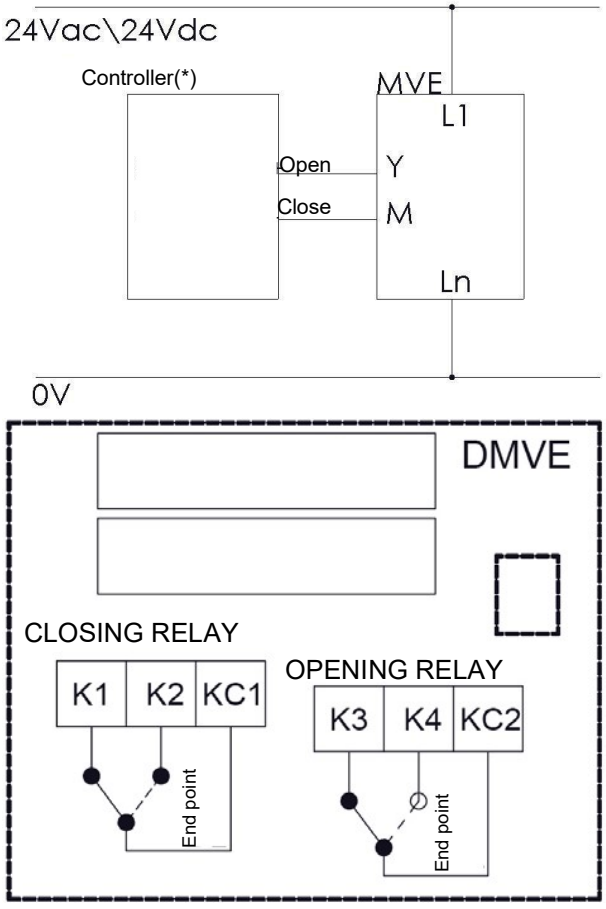
3-point floating control (*sink* connection)





3-point floating control (*source* connection)



(*) MVE contain a 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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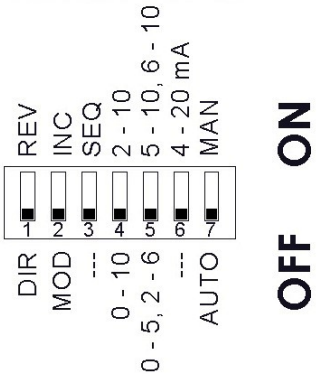
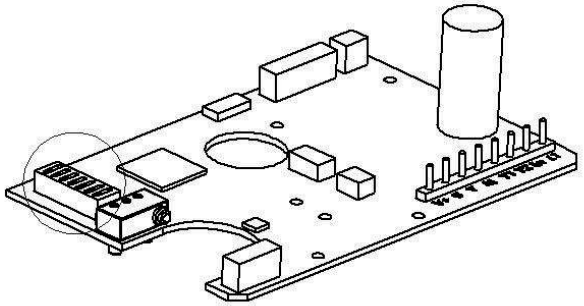
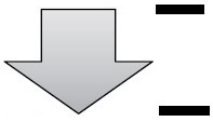
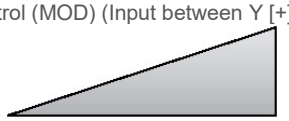
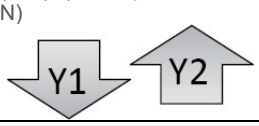
DIP SWITCHES SETTINGS

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	Direct operation (FS)  U = 2 V U = 10 V U= feedback	Reverse action  U = 10 V U = 2 V U= feedback
2	Modulating Control (MOD) (Input between Y [+] and M [-]) 	3 point floating (INC) (Y1 open-extend , Y2 close-retract connected LI or LN) 
3	–	Selection of sequence mode, control range defined by SW 5
4	Modulating control 0-10 V_{DC} (dip switch 2 OFF only)	Modulating control 2-10 V_{DC} (dip switch 2 OFF only)
5	Sequence Control 0-5 V_{DC} with DIP no. 4 OFF only. Sequence Control 2-6 V_{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 6-10 V_{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 update the stroke range if an unexpected mechanical stop is detected for at least 10 s.	Manual Calibration: the actutor calibration is started moving the switch from OFF to ON; if the switch is left in ON the actuator will never update the calibrated stroke value even when an unexpected endpoint is detected.

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DIAGNOSTIC - ALARM FUNCTIONS

No.	LED	Error	When	Actuator behaviour		Typical trouble shooting condition	Solution
				Automatic Calibration SW7 OFF	Manual Calibration SW7 ON		
1	**RED ON**	Calibrated stroke valve less than 5 mm	Calibration/first installation	The actuator pushes/pulls 5 times (unexpected stall) trying to remove the possible obstacle. After 5 tries alarm is signalled (RED Led ON) 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. Alarm is signalled (RED led On) and the actuator moves to the initial position and then it does not reposnd to the control signal.	Valve with a stroke length lower than 5 mm.	Remove power and power up again
2	**RED ON**	Stroke longer than 60 mm	Calibration/first installation	The actuator exits the 60 mm stroke range and it moves toward the new stroke limit signalling an anomaly (RED led on). Tha actuator does not calibrate the stroke	The actuator pushes/pulls 2 times against endpoint during calibration. Alarm is signalled (RED led On) and the actuator moves to the initial position and then it does not reposnd to the control signal.	Valve with a stroke length longer than 60 mm	Remove power and power up again
3	**RED Quick Blinking + GREEN ON**	Unexpected stall within the calibrated stroke range	Normalna praca	The actuator tries 5 times against the new stall condition and then after 10 second the actuator updates the new stroke lenght; During these 10 sec. RED led is ON The actuator tries 5 times against the new stall condition and then after 10 second the actuator does not update the new stroke lenght		Valve stuck	Inverted control signal
4	**RED Quick Blinking + GREEN ON**	Stroke longer than expected	Normal operation	The actuator moves toward the new stall condition with a lower speed; after 10 second the actuator updates the new stroke value; During these 10 sec. RED led is ON	The actuator moves toward the new stall condition with a lower speed; after 10 second 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	Normalna praca	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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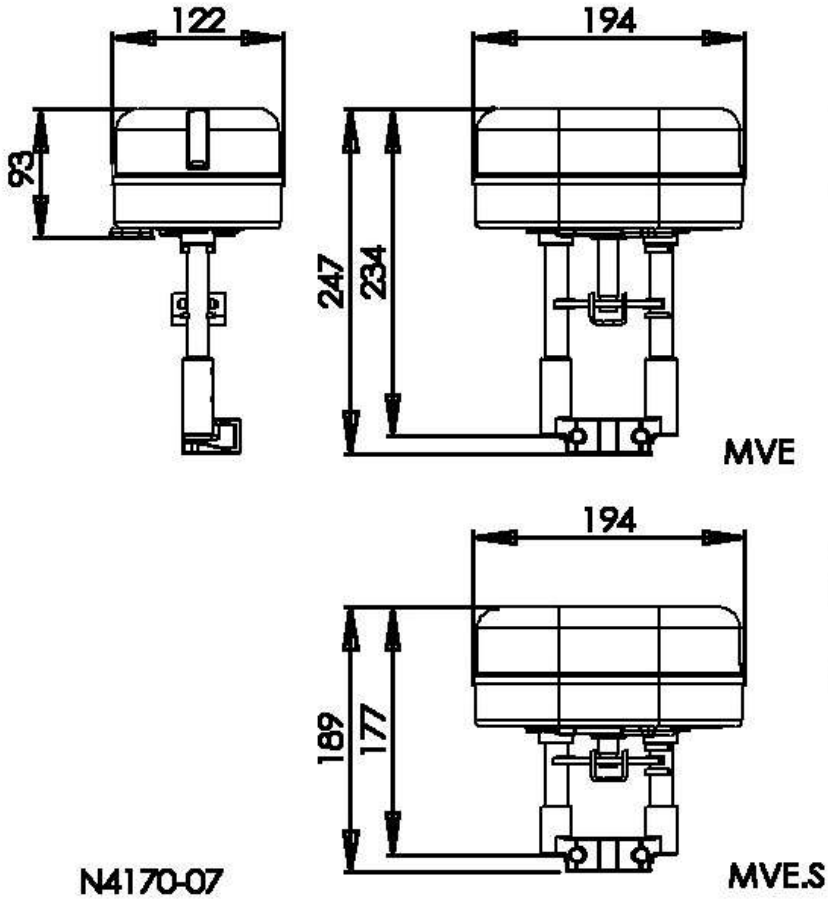
STANDARD LEDs BEHAVIOUR

Nr	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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