

Data sheet

Actuator for modulating control

AME 445 - for industrial applications

Description



AME 445 actuator is used for industrial applications with two and three-way valves type VRB, VRG, VF and VL up to DN 80 diameter.

The actuator has some special features:

- it automatically adapts its stroke to the valve end positions which reduces commissioning time (self stroking)

- valve flow adjustment feature; flow can be variably-adjusted from linear to logarithmic or opposite.
- the advanced design incorporates load related 'switch-off' to ensure that actuators and valves are not exposed to overload

Combinations with other valves could be seen under Accessories.



Not appropriate for domestic applications, for hot water service with heat exchangers and for applications where higher noise level is not acceptable.

Main data:

- Nominal voltage (AC or DC):
 - 24 V, 50/60 Hz
- Control input signal:
 - 0(4)-20 mA
 - 0(2)-10 V
- Force: 400 N
- Stroke: 20 mm
- Speed: 3 s/mm
- Max. medium temperature: 130 °C
- Self stroking
- LED signalling
- External RESET button with lock option
- Output signal
- Manual operation

Ordering

Actuator

Type	Power supply (V)	Code No.
AME 445	24 AC/DC	082H0053

Accessories - Stem heater

Type	DN	Code No.
Stem heater	15-80	065Z0315

Accessories - Adapter

Valves	DN	max. Δp (bar)	Code No.
Adapter for old VRB, VRG, VF, VL valves	15	9	065Z0313
	20	4	
	25	2	
	32	1	
	40	0.8	
	50	0.5	

Technical data

Power supply	V	24 AC/DC; $\pm 10\%$
Power consumption	VA	7.6
Frequency	Hz	50/60
Control input Y	V	0-10 (2-10); [Ri = 95 k Ω]
	mA	0-20 (4-20); [Ri = 500 Ω]
Output signal X	V	0-10 (2-10); [RL = 650 Ω] (maximal load)
Close of force	N	400
Max. stroke	mm	20
Speed	s/mm	3
Max. medium temperature	$^{\circ}\text{C}$	130
Ambient temperature		0 ... 55
Storage and transport temperature		-40 ... 70
Protection class	II	
Grade of enclosure	IP 54	
Weight	kg	0.45
CE - marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3

Installation

Mechanical

No tool is required to mount actuator on the valve. Installation of the valve with the actuator is allowed in horizontal position or upwards. Installation downwards is not allowed.

The actuator must not be installed in an explosive atmosphere, at ambient temperature lower than 0 $^{\circ}\text{C}$ or at ambient temperature higher than 55 $^{\circ}\text{C}$. It must not be subject to steam jets, water jets or dripping liquid as well.

Note:

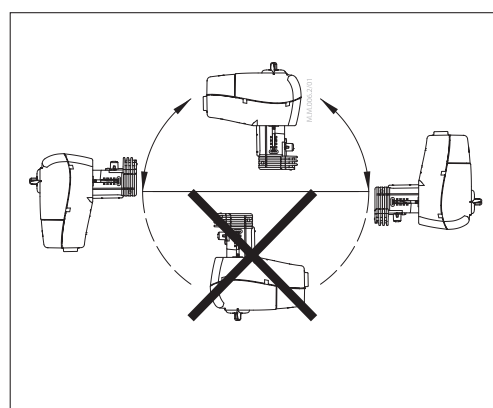
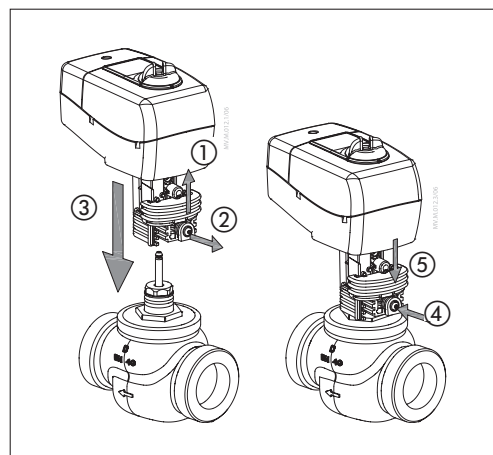
The actuator may be rotated up to 360 $^{\circ}$ with respect to the valve stem by loosening the retaining fixture. Once the actuator is placed, retighten the fixture.

Electrical

Electrical connections can be accessed by removing the actuator cover. Two cable gland entries without thread ($\varnothing 16$ and combined $\varnothing 16/\varnothing 20$) are prepared for cable glands. From factory one entry is provided by rubber cable gland and the other entry is prepared for opening.

Note:

Cable and cable gland used must not compromise the actuator's IP rating, and must ensure the connectors are fully strain relieved. Rubber cable gland delivered from factory does not compromise IP rating but it does not provide fully strain relieve according to LVD directive. Please observe local rules and regulations as well.



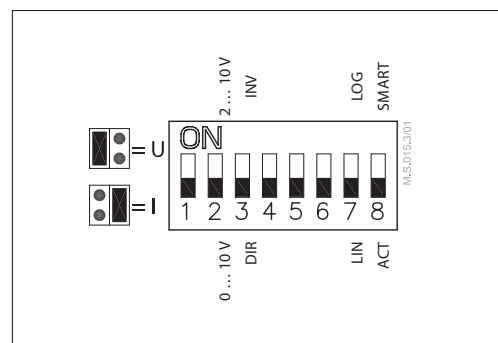
Jumper/DIP switch setting

Jumper

- **U/I** - Input signal type selector
 - *U position*; voltage input is selected
 - *I position*; current input is selected

DIP switches

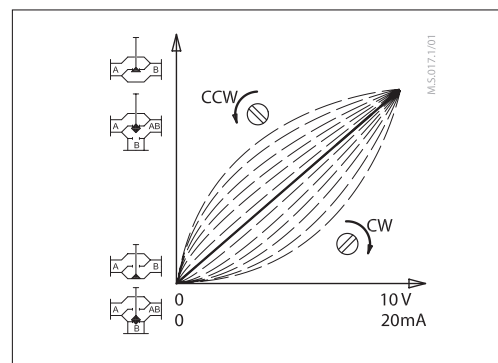
- **SW 1**: Not used
- **SW 2**: Input signal range selector
 - *OFF position*; the input signal is in the range from 0-10 V (voltage input) or from 0-20 mA (current input)
 - *ON position*; the input signal is in the range from 2-10 V (voltage input) or from 4-20 mA (current input)
- **SW 3**: Direct or inverse acting selector
 - *OFF position*; the actuator is in direct acting mode (stem extend as voltage increases)
 - *ON position*; the actuator is in inverse acting mode (stem retracts as voltage increases)
- **SW 4**: Not used
- **SW 5**: Not used
- **SW 6**: Not used



- **SW 7**: Linear or equal-percentage flow through valve selector
 - *OFF position*; the valve position is linear acc. to the control signal
 - *ON position*; the valve position is equal-percentage acc. to the control signal. This relation is adjustable - see *Equal-percentage valve-flow adjustment section*
- **SW 8**: Smart function selector
 - *OFF position*; the actuator does not try to detect oscillations in the system
 - *ON position*; the actuator enables special anti oscillations algorithm - see *Anti oscillations algorithm section*

Equal-percentage valve-flow adjustment (SW 7 in position ON)

The actuator has a special valve-flow adjustment feature. Flow can be, by turning the potentiometer clock wise (CW) or counter clockwise (CCW), variably adjusted from linear to logarithmic or opposite. For details see Instructions.



Jumper/DIP switch setting (continued)

Anti oscillations algorithm (SW 8 in position ON)

The actuator has special anti oscillations algorithm. In case control signal Y on certain point oscillates (Fig. 1) - looking from time perspective, algorithm starts to lower the amplification of the output to the valve. Instead of having static characteristics actuator changes to dynamic characteristics (Fig. 2) - certain output stroke area changes to new slope (decrease amplification).

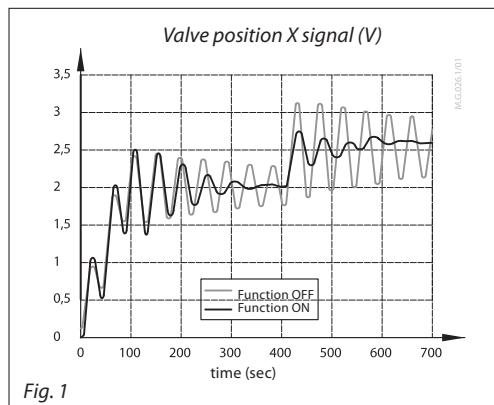


Fig. 1

After control signal does not oscillate anymore output to the valve slowly returns back to static characteristics.

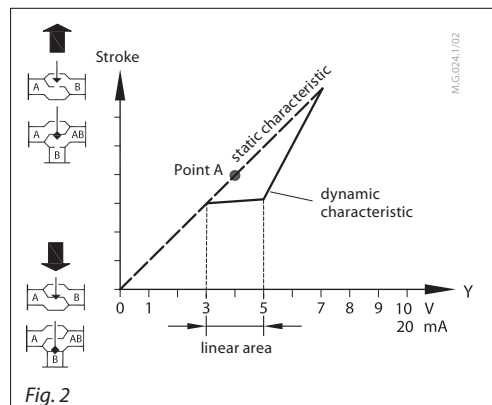


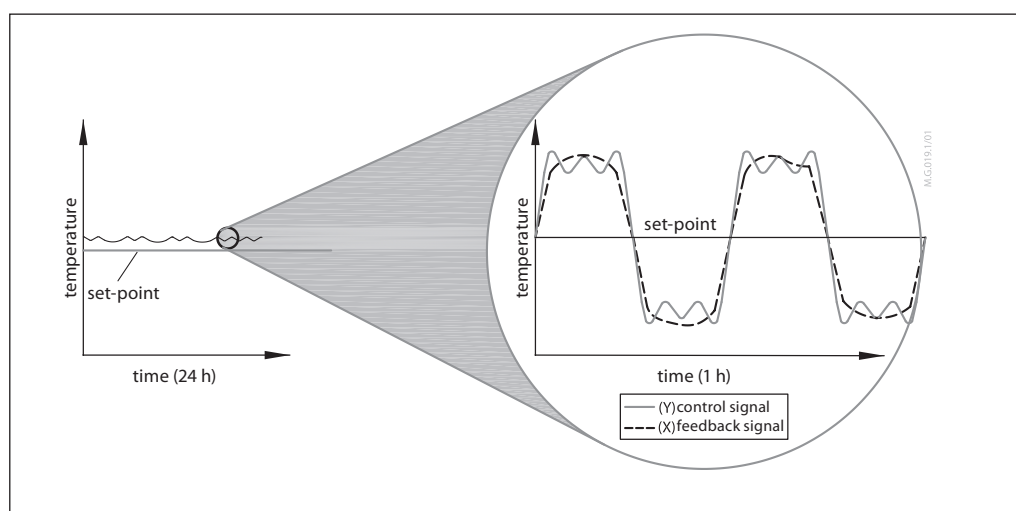
Fig. 2

iMCV 2nd generation

Harmonic oscillations are high frequency oscillations with low amplitude that vary around its own equilibrium value and not around set-point temperature. They can appear in up to 70 % of control time, even though the system is properly commissioned. Harmonic oscillations have negative influence on control stability, and lifetime of the valve and actuator.

Smoothering function

Smoothering function implemented in New 2nd generation of anti-oscillation function reduces harmonic oscillations; consequently room temperature is closer to the set-point (desired) temperature. Smoother operation of the MCV increases lifetime of the valve and actuator and saves energy and reduces costs in general.



Commissioning

Complete the mechanical and electrical installation, set jumper and DIP-switches, then perform the necessary checks and tests:

- Apply power
Note that the actuator will now perform automatic self stroking function
- Apply the appropriate control signal and check:
 - if the valve stem direction is correct for the application and
 - the actuator drives the valve over the entire stroke length

The unit is now fully commissioned.

Automatic self stroking feature

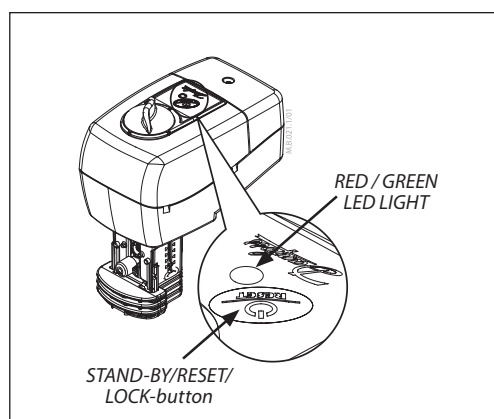
The actuator automatically adapts its stroke to the valve end positions:

- when power is applied for the first time or
- afterwards by pressing the STAND-BY/RESET/LOCK-button for 6-9 seconds. The function gets active with releasing the button after 2× green LED blinks. If LOCK MODE is activated (indicated by 1× red LED blink after 3 sec. and 2× after 6 sec.) please first unlock the button-functions by pressing the button for 9-12 sec. and releasing it after 3× green LED blinks. The button-functions are unlocked now and RESET MODE can be activated as mentioned before.

Testing entire valve stroke length

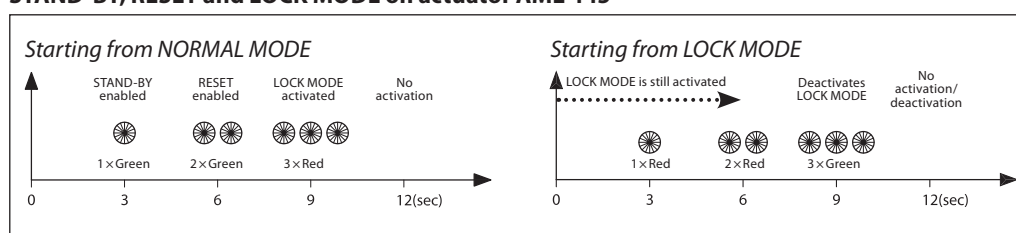
The actuator can be driven to the fully-open or closed positions (depending on valve type) by connecting SN to terminals 1 or 3.

LED signalling/ Actuator operating modes



Flashing green LED: Self stroking mode = RESET MODE (period is every second)	
Constant green LED: POSITIONING MODE	
Flashing green LED: Setpoint is reached (period is every 6 seconds)	
Flashing red LED: STAND-BY MODE (period is every two seconds)	

STAND-BY, RESET and LOCK MODE on actuator AME 445



LED function indicator

The bicolour (green/red) LED function indicator is located on the actuator cover. It indicates the operating modes.

External button

Actuator has external STAND-BY/RESET/ LOCK-button which is located next to LED indicator.

By pressing, holding and releasing this button for/after specified time periods, different operating modes are initiated:

- **Self stroking mode = RESET MODE**
Pressing the STAND-BY/RESET/LOCK-button for 6-9 sec. and releasing it after 2x green LED blinks causes the actuator to start *self stroking procedure*:
The bicolor LED flashes green at 1 sec. intervals during calibration procedure, which begins by extending the stem. When the maximum force is detected (at the valve end position), the actuator then retracts the stem, until the maximum force is once again detected (on the other valve end position). The actuator will then enter to NORMAL MODE and respond to the control signal.
- **POSITIONING MODE**
The bicolour LED is green and stays on during positioning of the actuator according to the control signal
- **NORMAL MODE**
When the positioning of the actuator is finished the LED flashes green every 6 seconds.

STAND-BY MODE

Pressing the STAND-BY/RESET/LOCK-button for 3-6 sec. and releasing it after 1x green LED blink causes the actuator to activate STAND-BY MODE. The actuator will not react on any change of the control signal until it is switched back again to NORMAL MODE by pressing the button as mentioned before. During STAND-BY MODE, the actuator can be moved manually or can be switched to RESET MODE or LOCK MODE by pressing the button as described in the according operating modes.

LOCK MODE

Pressing the STAND-BY/RESET/LOCK-button for 9-12 sec. and releasing it after 3x red LED blinks causes the actuator to activate LOCK MODE. The actuator can not be brought to STAND-BY MODE or RESET MODE until it was switched back again to NORMAL MODE by pressing the button as mentioned before (releasing the button now after 3x green LED blinks). During LOCK MODE, the actuator works just as described in NORMAL or POSITIONING MODE, but with partly locked button-functions (shown with 1x or 2x red LED blinks).

REMARK

Pressing the STAND-BY/RESET/LOCK-button for more than 12 sec., no activation/deactivation occurs.

Manual override

Manual override is done by means of control knob on actuator housing:

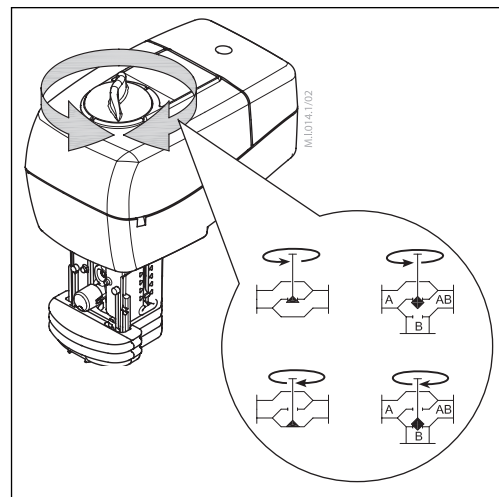
- Disconnect power supply or activate STAND-BY MODE
- Adjust valve position using the control knob (observe the rotation direction)

After manual override is not needed:

- Restore power supply or go to NORMAL MODE again

Remark:

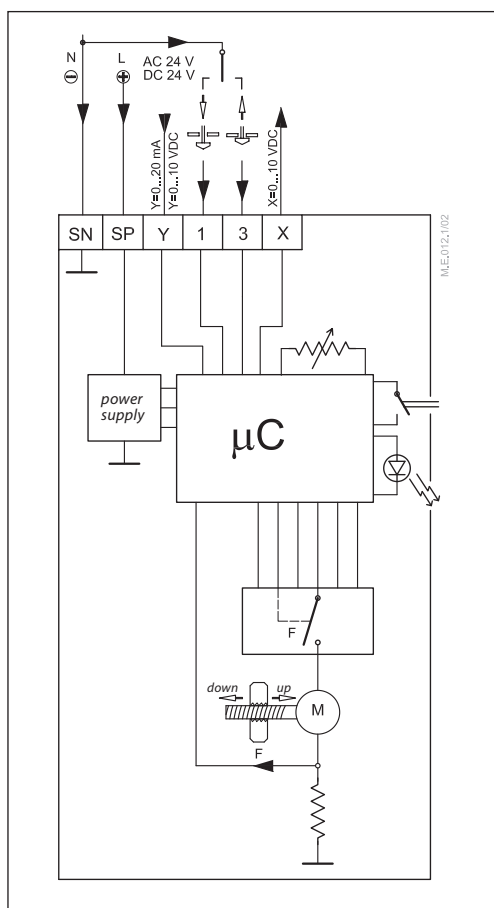
When the manual override has been used, the output signal (X) is not correct until the actuator reaches its end position.



Wiring



24 V AC/DC only



- SP** 24 V AC/DC Power supply
- SN** 0 V Common
- Y** 0(2)-10 V Input signal
0(4)-20 mA
- X** 0(2)-10 V Output signal
- 1, 3** Override input signal
(can not be used for 3-point control)

Wiring length	Recommended cross-sectional area of the wiring
0-50 m	0.75 mm ²
> 50 m	1.5 mm ²

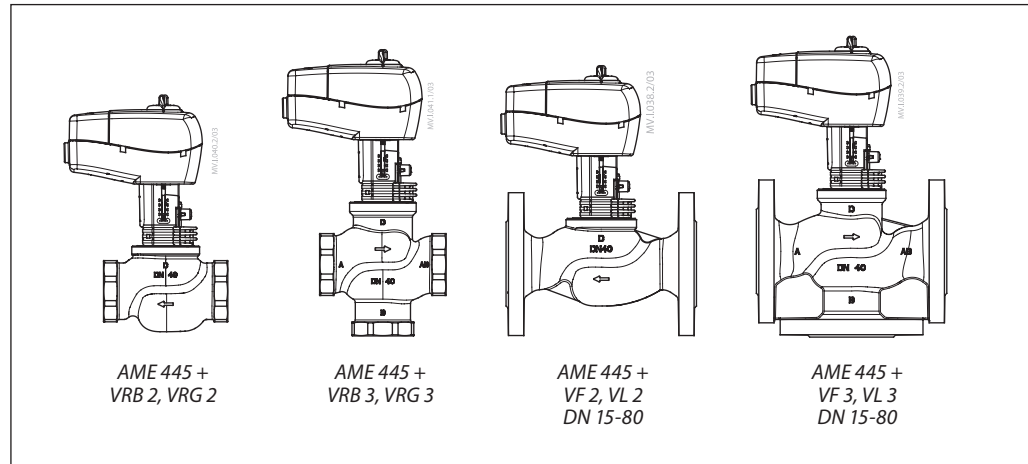
Disposal

The actuator must be dismantled and the elements sorted into various material groups before disposal.

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Actuator - valve combinations



Dimensions

