Data sheet

Actuators for modulating control

AME 655 – without safety function
AME 658 SU, AME 658 SD – with safety function (spring up/down)
AME 659 SD – with EN certified safety function (spring down)

Description

Actuators are primarily designed to regulate valve in the respond to the demand of a controller in District Heating/cooling, Heating, Ventilating and Air conditioning systems.

Actuators AME 655, 658 and 659 can be controlled by electronic controllers with modulating or 3-point control output.

Please check power supply and power consumption prior connection!

Actuators can be used in combination with:
- Valve types VFM, VFS (DN 65-100), VFG(S), VFU, VF (DN 100-150) and VL (DN 100).
- Self-acting flow controller AHQM (DN 125-150), AFQM 6 and AFQM PN 25.

Features:
- Manual operation either mechanical and/or electrical
- Position indication
- LED signalling
- Selectable speed
- Inverse function
- Automatic adaptation of stroke to valve’s end positions that reduces commissioning time (self stroking)
- Integrated external switch
- Characteristic optimization
- Stroke limitation
- Pulse or continuous output signal (4, 5)
- Voltage or current input signal Y
- Voltage or current output signal X
- External reset button
- Auto detection of Y signal
- 3-point or modulating control selection
- X and Y galvanic insulation
- Thermical and overload protection
- Precise regulation and fast response on 3-point signal (0,04s)

Main data:
- Nominal voltage (AC or DC):
  - 24 V, 50 Hz/60 Hz
  - 230 V, 50 Hz/60 Hz
- Control input signal: modulating or 3-point
- Force: 2000 N
- Stroke: 50 mm
- Speed (selectable): 3 (4) or 6 s/mm
- Max. medium temperature: 200 °C

Ordering

<table>
<thead>
<tr>
<th>Actuators</th>
<th>Power supply (V)</th>
<th>Code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AME 655</td>
<td>24</td>
<td>082G3442</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>082G3443</td>
</tr>
<tr>
<td>AME 658 SU</td>
<td>24</td>
<td>082G3450*</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>082G3451*</td>
</tr>
<tr>
<td>AME 658 SD</td>
<td>24</td>
<td>082G3448</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>082G3449</td>
</tr>
<tr>
<td>AME 659 SD</td>
<td>24</td>
<td>082G3454*</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td>082G3455*</td>
</tr>
</tbody>
</table>

*Not available yet

Accessories - Stem heater

<table>
<thead>
<tr>
<th>Type</th>
<th>DN</th>
<th>Code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem heater for VFM valves</td>
<td>65-125</td>
<td>065Z7020</td>
</tr>
<tr>
<td></td>
<td>150-250</td>
<td>065Z7022</td>
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</tbody>
</table>

Accessories - Adapter

<table>
<thead>
<tr>
<th>Type</th>
<th>Code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter 1 VFG(S), VFU</td>
<td>065B3525</td>
</tr>
<tr>
<td>Adapter 2 VFG(S), VFU</td>
<td>065B3526</td>
</tr>
<tr>
<td>Adapter 3 VFG(S), AFQM 6, AFQM PN 25</td>
<td>065B3527</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>Actuator type</th>
<th>AME 655</th>
<th>AME 658 SD</th>
<th>AME 658 SU</th>
<th>AME 659 SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>V</td>
<td>24 or 230; +10 ... -15 %; AC or DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>VA</td>
<td>14.4 (24 V)</td>
<td>19.2 (24 V)</td>
<td>19.2 (24 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.1 (230 V)</td>
<td>35.7 (230 V)</td>
<td>35.7 (230 V)</td>
</tr>
<tr>
<td>Frequency</td>
<td>Hz</td>
<td>50/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control input Y</td>
<td>V</td>
<td>0-10 (2-10) [RI = 40 kΩ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control output X</td>
<td>mA</td>
<td>0-20 (4-20) [RI = 500 Ω]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closing force</td>
<td>N</td>
<td>2000</td>
<td>2000</td>
<td>2000</td>
</tr>
<tr>
<td>Max. stroke</td>
<td>mm</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed (selectable)</td>
<td>s/mm</td>
<td>3 or 6</td>
<td>4 or 6</td>
<td>4 or 6</td>
</tr>
<tr>
<td>Max. medium temperature</td>
<td>°C</td>
<td>200 (350 with extension piece for VFGS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>°C</td>
<td>0 ... + 55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage and transport temperature</td>
<td>°C</td>
<td>-40 ... +70 (storing for 3 days)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>%</td>
<td>5-95%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection class</td>
<td></td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade of enclosure</td>
<td></td>
<td>IP 54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>5.3</td>
<td>8.6</td>
<td>8.6</td>
</tr>
<tr>
<td>Safety function</td>
<td></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Spring return runtime</td>
<td>s</td>
<td>-</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Manual operation</td>
<td></td>
<td>Electrical and mechanical</td>
<td>Electrical and mechanical</td>
<td>Electrical</td>
</tr>
<tr>
<td>Power failure response</td>
<td></td>
<td>Stem remains in last position</td>
<td>Safety return function extracts the stem</td>
<td>Safety return function extracts the stem</td>
</tr>
</tbody>
</table>

* marking in accordance with the standards

Low Voltage Directive 2006/95/EEC

* Data not available yet

## Disposal

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

Before disassembly please contact Danfoss support for disassembly instructions.

## Commissioning

Complete the mechanical and electrical installation (see instructions) and perform the necessary checks and tests:
- Turn on the power
- Set the appropriate control signal and check that the valve stem direction is correct for the application.

The unit is now fully commissioned.
Data sheet

Actuators for three point control AME 655/658/659

Design

1. Manual operation knob
2. Function buttons
3. Service cover
4. Removable gland support
5. Position indication ring
6. Stem connector
7. Valve connector

Installation

Mechanical
Please check what are allowed installation positions for the valve in combination. The actuator can be installed in all positions. Use M8/SW13 key (not supplied) to fit the actuator to the valve body. Allow for necessary clearance for maintenance purposes. To link valve and actuator stems use a 4mm Allen key (not supplied). The actuator has position indication rings which should be pushed together before el. connection; after self-stroking they indicate end positions of the stroke.

Electrical
Electrical connections can be accessed by removing the service cover. Four cable entries on removable gland support are provided for M 16×1,5 or M 20×1,5 cable glands. Note that in order to maintain the enclosure IP rating, appropriate cable glands must be used.
Wiring

Do not touch anything on the PCB!
Do not remove the service cover before the power supply is fully switched off.
Max. allowed current output on terminals 4 and 5 is 4 A.

**Data sheet Actuators for three point control AME 655/658/659**

**SN**
- **0 V**: Neutral
- **SP**: 24, 230 V AC/DC
- **4, 5**: SP(AC)
- **GND**: 0 V
- **Y**: 0(2)-10 V, 0(4)-20 mA
- **X**: 0(2)-10 V, 0(4)-20 mA

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***Optional: AME 655 connected as 3-point version***

**SN**
- **0 V**: Neutral
- **1, 3**: 24, 230 V AC/DC
- **4, 5**: SP(AC)
- **GND**: 0 V
- **Y**: 0(2)-10 V, 0(4)-20 mA
- **X**: 0(2)-10 V, 0(4)-20 mA

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Recommended cross-sectional area of the wiring is 1.5 mm²
LED signalling / actuator operating modes

LED operating mode indicator
The three-colour (green/yellow/red) LED function indicators are located on the actuator cover. They indicate different operating modes.

RESET button
Actuators AME 655/658/659 have external RESET button which is located on top cover of the actuator next to LED indicators. With this button you can enter or exit Stand-By mode (press once) or Self stroking mode (press and hold for 5 seconds). See next paragraph for mode details.

Operating modes
• Self stroking mode
  Self stroking mode starts automatically the first time when power supply is applied to the actuator. To start self stroking procedure press and hold RESET button for 5 seconds until the green light starts flashing. End positions of the valve are automatically set and the actuator goes to stationary mode and starts responding to the control signal.

• Stand-By mode
  (versions AME 655/658/659)
  Press the RESET button to enter Stand-By mode. The actuator stops in current position and stops responding to any control signal. Red light is constantly lit. You can manually operate the actuator with mechanical handle (versions AME 655/658) or control buttons (versions AME 655/658/659). This mode can be very useful during the commissioning of other equipment, or for service purposes. In this mode you can also set positions of the additional switches. To exit Stand-By mode press the RESET button again.

• Positioning mode
  The actuator is operating automatically. The stem is extracting or retracting according to the control signal. When positioning is finished the actuator goes to stationary mode. If for one or another reason 3-point signal (terminaly 1 and 3) and Y signal would be present at the same time, 3-point signal would prevail.

• Stationary mode
  The actuator is operating without errors.

• Error mode
  Working temperature is too high - check the ambient temperature.
  Stroke is too short - check the connection with valve and valve operation, or check if valve is blocked.

<table>
<thead>
<tr>
<th>LED</th>
<th>Indication type</th>
<th>Operating mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positioning mode - Actuator is retracting the stem</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positioning mode - Actuator is extracting the stem</td>
</tr>
<tr>
<td></td>
<td>Flashing (1 s cycle)</td>
<td>Self stroking mode - Actuator is retracting the stem</td>
</tr>
<tr>
<td></td>
<td>Flashing (1 s cycle)</td>
<td>Self stroking mode - Actuator is extracting the stem</td>
</tr>
<tr>
<td>Yellow</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stationary mode - Actuator has reached upper end position (retracted stem)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stationary mode - Actuator has reached bottom end position (extracted stem)</td>
</tr>
<tr>
<td></td>
<td>Flashing</td>
<td>Stationary mode - Y present</td>
</tr>
<tr>
<td>Red</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stand-By mode</td>
</tr>
<tr>
<td></td>
<td>Flashing</td>
<td>Error Mode</td>
</tr>
<tr>
<td>Dark</td>
<td>No indication</td>
<td>No power supply</td>
</tr>
</tbody>
</table>
DIP switch setting

The actuator has a selection DIP switches (Fig. 1) under the service cover.

**DIP1: FAST/SLOW – Speed selection**
- FAST position; 3 (4) s/mm
- SLOW position; 6 s/mm

**DIP2: DIR/INV – Direct or inverse acting selector** (Fig. 2):
- DIR position; the actuator is direct acting to input signal
- INV position; the actuator is inverse acting to control signal

**DIP3: 2-10V/0-10V – Input/output**
- 2-10V position; the input signal is in the range from 2-10 V (voltage input) or from 4-20 mA (current input)
- 0-10V position; the input signal is in the range from 0-10 V (voltage input) or from 0-20 mA (current input)

Signal range selector sets Y and X signal.

**DIP4: LIN/MDF – Characteristic modification function** (Fig. 3):
- LIN position; Linear correlation between Y signal and stem position
- MDF position; Enables modified correlation between Y signal and stem position. Degree of modification depends on setting of potentiometer CM.

Function enables to change MCV (valve and actuator) characteristic (for example linear to logarithmic and logarithmic to linear) and works with all combinations of DIP switch settings.

**DIP5: 100%/95% – Stroke limitation:**
100% position; Full stroke
95% position; Stroke limited to 95%

**DIP6: C/P – Output signal mode selector** (Fig. 4.):
Output signal is present on terminal 4 when position of the actuator is equal or lower than setpoint of S4.
Output signal is present on terminal 5 when position of the actuator is equal or higher than setpoint of S5.
- position C; output signal is present on terminals 4 or 5 independent of the input signal
- position P; output terminals 4 and 5 are bridged with input terminals 1 and 3

**DIP7: Uy/Iy – Input signal type selector:**
- position Uy; input signal Y is set to voltage (V)
- position Iy; input signal Y is set to current (mA)

**DIP8: Ux/Ix – Output signal type selector:**
- position Ux; output signal X is set to voltage (V)
- position Iy; output signal X is set to current (mA)

**NOTE:**
If DIP7 is in ON position, Y detection is disabled.
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Actuators for three point control AME 655/658/659

Manual operation

⚠️ Mechanical and electrical operation are not allowed to be used at the same time!

Actuators AME 655/658 can be manually positioned when in Stand-By mode or when there is no power supply (mechanically).
Actuators AME 659 can be manually positioned only in Stand-By mode.

<table>
<thead>
<tr>
<th>Actuator type</th>
<th>Mechanical operation</th>
<th>Electrical operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AME 655</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AME 658</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AME 659</td>
<td>✗</td>
<td>✓</td>
</tr>
</tbody>
</table>

Mechanical manual operation
Actuators AME 655/658 have a manual operation knob on the top of the housing which enables hand positioning of the actuator.

Mechanical manual operation shall be only when no power supply.

Electrical manual operation
Actuators AME 655, 658/659 have two buttons on the top of the housing that are used for electrical manual positioning (up or down) if the actuator is in Stand-By mode. First press the RESET button until the actuator goes to Stand-By mode (red LED is lit). By pressing the upper button the stem will be extracted and by pressing the lower button the stem will be retracted.

Dimensions
Actuator – valves combinations

AME 65x + VFM 2
AME 65x + VF 2 (DN 100-150)
VL 2 (DN 100)
VF 2 (DN 65-100)
AME 65x + VF 3 (DN 100-150)
VL 3 (DN 100)
AME 65x + VFG(S) 2 +
adapter:
065B3525 (DN 15-65)
065B3526 (DN 80-125)
065B3527 (DN 150-250)
AME 65x + VFG 3 +
adapter:
065B3525 (DN 15-65)
065B3526 (DN 80-125)
065B3527 (DN 65-125)
AME 65x + AHQM (DN 125, 150)
AME 65x + AFQM 6 +
adapter 065B3527
AME 65x + AFQM PN 16 (DN 65-125)
AME 65x + AFQM PN 25 +
adapter 065B3527