Data sheet

# Pressure independent balancing and control valve AB-QM DN 10 - 150

*AB-QM valve equipped with an actuator is a control valve with full authority and automatic balancing function - flow limiter. Typical applications are: Temperature control and permanent automatic balancing on terminal units (chillers air-handling units, fan coils, induction units, chilled seilings, plate heat exchangers, ..).*

## Description

Benefits:

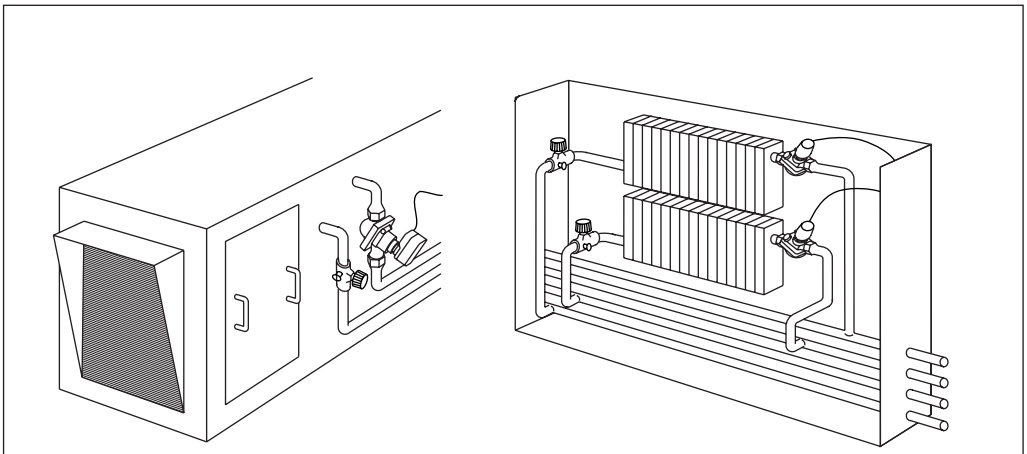
- Exact and pressure independent flow limitation allows no overflows at partial conditions to keep temperature difference over terminal unit as high as designed
- The AB-QM is able to control the temperature at low loads and is equally stable all through the range. All changes in the available differential pressure are corrected by the pressure controller. Therefore, less disturbances for temperature control and therefore less movements from actuator.
- AB-QM offers full flexibility of flow adjustment – AB-QM valves can be set to a precise design value even when the system is up and running so no need for draining the system or use of flow charts or calculations – they allow full control over the real conditions in the system.
- Due to the membrane design the valves are not susceptible to blockage.
- Always the right flow, so no complaints from end-users
- Exact flow limitation at any load condition prevents excessive energy consumption that occurs when static balancing method is used in variable flow system.
- Because the AB valve covers two functions – Balancing & Control - the installation costs are halved.
- Measuring nipples allow optimisation of the pump's energy consumption.
- 100% built in control valve authority allows lower pump head than traditional setup, thus minimizing energy consumption.
- Because of the automatic flow limiting function, commissioning costs are minimal. Easy adjustability allows late change of design flows without high costs.
- "Plug and Play" even when installation is not yet completely finished. For example when some floors are already occupied while construction is still going on at other floors, the occupied floors are already fully functional and balanced.

**Description**
*(continuous)*

**Simplifications**

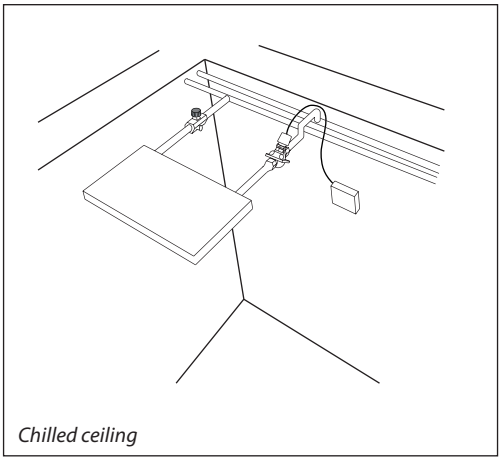
- Flow limitation is achieved by setting the valve to required flow - Set & Forget.
- Flow is the only parameter to be considered when designing, so easy and fast valve selection.
- Maximal flow setting of AB-QM corresponds with the maximal flow-speed through that pipe dimension according to international standards.
- Easy trouble shooting
- Linear to be converted to equalpercentage by selected actuators.
- No authority calculation. Commissioning is a matter of adjusting the valve without using specialised equipment or highly educated staff.
- Compact design allows instalment where only limited space is available, for example in stand alone fan-coil units.

**Applications** - variable flow systems



*Air handling unit (AHU) / fan coil (FCU)*

An AB-QM with an actuator can be used as a combined flow limiter and control valve with full authority for an AHU (Air Handling Unit). The AB-QM ensures the required flow on every AHU and simplifies the hydronic balancing of the system. Because of the integrated differential pressure controller the control valve always has 100% authority which means that partial load in the system has no influence on temperature regulation as it will have with normal control valves. By installing AB-QM the whole system is divided in independent control loop zones not influencing each other. The flow setting is very simple. Just set the required flow for the AHU direct at the AB-QM. There is no special method needed for balancing the whole systems. This means a lot of savings in working hours. Not to forget the combination of several functions in one valve body means less valves and installation work. For temperature control AB-QM can be equipped with different actuators (on/off, 3-point, 0 -10Volt) as required.

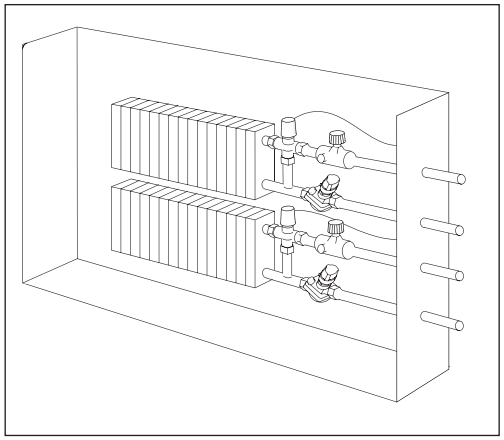


*Chilled ceiling*

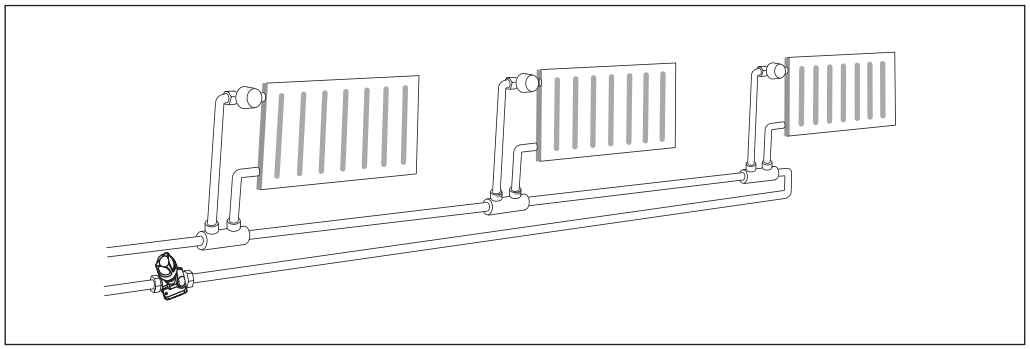
AB-QM in systems with chilled ceilings are used to achieve the required flow in the system and to control the temperature (prevent condensation). An AB-QM is installed at every chilled ceiling limiting the flow.

The integrated control valve is used for temperature control by mounting an actuator. Different types of actuators can be used.

**Applications**
- constant flow systems



The flow can be set directly at the AB-QM. Alternatively the system can be changed into a system with variable flow because AB-QM is also able to work as a control valve with full authority which means no problems with partial load.



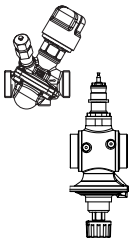
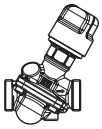
In a one pipe heating system the AB-QM can be installed as an automatic flow limiter in every riser. The AB-QM limits the flow to the set value, thus automatically achieving hydronic balance in the system.

*There are numerous applications in which AB-QM can be used. In principle every time you need an automatic flow limiter or a control valve with full authority it can be used. For example systems with heating/cooling with concrete core activation.*

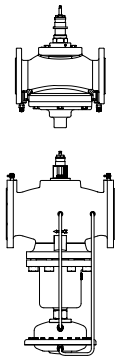
***Note: For more application examples please contact your local Danfoss organization.***

## Ordering

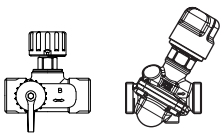
### *AB-QM threaded version*

| Picture | DN | $Q_{max.}$ (l/h) | Ext. thread (ISO 228/1) | Code No. | AB-QM | Ext. thread (ISO 228/1) | Code No. |
|---|---|---|---|---|---|---|---|
|  | 10 LF | 150 | G ½ | **003Z0261** |  | G ½ | **003Z0251** |
| | 10 | 275 | | **003Z0211** | | | **003Z0201** |
| | 15 LF | 275 | G ¾ | **003Z0262** | | G ¾ | **003Z0252** |
| | 15 | 450 | | **003Z0212** | | | **003Z0202** |
| | 20 | 900 | G 1 | **003Z0213** | | G 1 | **003Z0203** |
| | 25 | 1.700 | G 1 ¼ | **003Z0214** | | G 1 ¼ | **003Z0204** |
| | 32 | 3.200 | G 1 ½ | **003Z0215** | | G 1 ½ | **003Z0205** |
| | 40 | 7.500 | G 2 | **003Z0700** | *AB-QM (DN 10 - 32) can not be upgraded to AB-QM with nipples!* | | |
| | 50 | 12.500 | G 2 ½ | **003Z0710** | | | |

### *AB-QM flanged version*

| Picture | DN | $Q_{max.}$ (l/h) | Flange connection | Code No. |
|---|---|---|---|---|
|  | 50 | 12.500 | PN 16 | **003Z0711** |
| | 65 | 20.000 | | **003Z0702** |
| | 80 | 28.000 | | **003Z0703** |
| | 100 | 38.000 | | **003Z0704** |
| | 125 | 90.000 | | **003Z0705** |
| | 150 | 145.000 | | **003Z0706** |

***Set-pack*** *(one MSV-M and one AB-QM without nipples)*

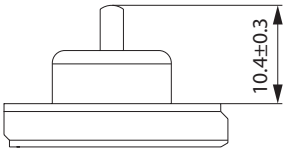
| Picture | DN | $Q_{max.}$ (l/h) | External thread (ISO 228/1) | Code No. |
|---|---|---|---|---|
|  | 10 | 275 | G ½ A | **003Z0241*** |
| | 15 | 450 | G ¾ A | **003Z0242** |
| | 20 | 900 | G 1 A | **003Z0243** |
| | 25 | 1.700 | G 1 ¼ A | **003Z0244** |
| | 32 | 3.200 | G 1 ½ A | **003Z0245** |

** Includes MSV-M DN15 with external thread G ¾A*

## Ordering *(continuous)*

### *Accessories & spare parts*

| Type | Comments | | Code No. |
|---|---|---|---|
| | To pipe | To valve | |
| Union connection (1 pcs.)  | R 3/8 | DN 10 | **003Z0231** |
| | R 1/2 | DN 15 | **003Z0232** |
| | R 3/4 | DN 20 | **003Z0233** |
| | R 1 | DN 25 | **003Z0234** |
| | R 1 1/4 | DN 32 | **003Z0235** |
| | R 1 1/2 | DN 40 | **003Z0279** |
| | R 2 | DN 50 | **003Z0278** |
| Tailpiece welding (1 pcs.)  | Weld. | DN 15 | **003Z0226** |
| | | DN 20 | **003Z0227** |
| | | DN 25 | **003Z0228** |
| | | DN 32 | **003Z0229** |
| | | DN 40 | **003Z0270** |
| | | DN 50 | **003Z0276** |
| Tailpieces for soldering (2 nuts, 2 gaskets, 2 soldering nipples | 12x1 mm | DN 10 | **065Z7016** |
| | 15x1 mm | DN 15 | **065Z7017** |
| Locking ring | | DN 10 - 32 | **003Z0236** |
| Shut-off & protection piece (max. closing pressure 16 bar) | | | **003Z0230** |
| Shut-off - plastic (max. closing pressure 1 bar) | | | **003Z0240** |
| Handle AB-QM (for details refer to instructions) | | DN 40 - 100 | **003Z0695** |
| | | DN 125-150 | **003Z0696** |




*Closing point (measure) for DN 10 - DN 32*

*Combinations AB-QM with electrical actuators*

| Valve type | Stroke (mm) | TWA-Z [2] | AMI 140 | ABNM-Z | AMV 110 NL AME 110 NL [3] | AME 15 QM | AME 55 QM |
|---|---|---|---|---|---|---|---|
| | | Recommended ordering code numbers (for details refer to data sheets for these actuators) | | | | | |
| | | **082F1226** NC, 230 V | **082H8048** AMI 140 24 V, 12 s/mm, 2-point control | **082F1094** Thermal actuator 24 V (0 - 10 V) **082F1072** Adapter for AB-QM (M30 × 1.5) | **082H8056** AMV 110 NL 24 V, 24 s/mm, 3-point control **082H8057** AME 110 NL 24 V, 24 s/mm, 0 - 10 V | **082H3075** AME 15 QM 24 V, 11 s/mm, 0 - 10 V | **082H3078** AME 55 QM 24 V, 8 s/mm, 0 - 10 V |
| DN 10-20 | 2.25 | ✓ | ✓ | ✓ | ✓ | - | - |
| DN 25, 32 | 4.50 | ✓ [1] | ✓ | ✓ [1] | ✓ | - | - |
| DN 40, 50 | 10 | - | - | - | - | ✓ | - |
| DN 65-100 | 15 | - | - | - | - | ✓ | - |
| DN 125 | 25 | - | - | - | - | - | ✓ |
| DN 150 | 25 | - | - | - | - | - | ✓ |

[1] *up to 60 % of $Q_{max}$*
[2] *Please be aware that only this type of TWA actuator is to be used with AB-QM*
[3] *Minimum recommended AB-QM setting is 20 %*

*Operational pressure for all AB-QM valves is 4 bar.*
*Closing pressure for all actuators is 6 bar.*

***Note: For all available actuators for AB-QM please contact your local Danfoss organization.***

## Technical data

***AB-QM*** *(thread version)*

| **Nominal diameter** | | **DN** | **10 Low Flow** | **10** | **15 Low Flow** | **15** | **20** | **25** | **32** | **40** | **50** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow range | $Q_{min}$ (20%) [3] | l/h | 30 | 55 | 55 | 90 | 180 | 340 | 640 | 1.500 | - |
| | $Q_{min}$ (40%) [3] | | - | - | - | - | - | - | - | - | 5.000 |
| | $Q_{max}$ (100%) | | 150 | 275 | 275 | 450 | 900 | 1.700 | 3.200 | 7.500 | 12.500 |
| Diff. pressure [1] | | kPa | 16-400 | | | | | 20-400 | | 30-400 | |
| Pressure stage | | PN | 16 | | | | | | | | |
| Control range | | | Acc. to standard IEC 534 control range goes to infinity as Cv characteristic is linear. | | | | | | | | |
| Control valve's characteristic | | | Linear (could be converted by actuator to equal percentage) | | | | | | | | |
| Leakage acc. to standard IEC 534 | | | No visible leakage (at 100N) | | | | | | | max.0.05% of $k_v$ at 500N | |
| For shut off function | | | Acc. to ISO 5208 class A - no visible leakage | | | | | | | | |
| Flow medium | | | Water and water mixtures with secondary coolants (like glycols) [2] for closed heating and cooling systems | | | | | | | | |
| Medium temperature | | °C | –10 ... +120 | | | | | | | | |
| Stroke | | mm | 2.25 | | | | | 4.5 | | 10 | |
| Connection | ext. thread (ISO 228/1) | | G ½" | G ½" | G ¾" | G ¾" | G 1" | G 1¼" | G 1½" | G 2" | G 2½" |
| | actuator | | M30 × 1.5 | | | | | | | Danfoss standard | |
| **Materials in the water** | | | | | | | | | | | |
| Valve bodies | | | Brass (CuZn40Pb2 - CW 617N) | | | | | | | Grey iron EN-GJL-250(GG25) | |
| Membranes and O - rings | | | EPDM | | | | | | | | |
| Springs | | | W.Nr. 1.4568, W.Nr. 1.4310 | | | | | | | | |
| Cone (Pc) | | | W.Nr. 1.4305 | | | | | | | CuZn40Pb3 - CW 614N, W.Nr. 1.4305 | |
| Seat (Pc) | | | EPDM | | | | | | | W.Nr. 1.4305 | |
| Cone (Cv) | | | CuZn40Pb3 - CW 614N | | | | | | | | |
| Seat (Cv) | | | CuZn40Pb2 - CW 617N | | | | | | | W.Nr. 1.4305 | |
| Screw | | | Stainless Steel (A2) | | | | | | | | |
| Flat gasket | | | NBR | | | | | | | | |
| Sealing agent (only for valves with measuring nipples) | | | Dimethacrylate Ester | | | | | | | | |
| **Materials out of the water** | | | | | | | | | | | |
| Plastic parts | | | POM | | | | | | | - | |
| Insert parts and outer screws | | | CuZn39Pb3 - CW 614N; W.Nr. 1.4310; W.Nr. 1.4401 | | | | | | | - | |

*[1] Δp = (P1-P3) min~max*
*[2] according suitability and usage especially in not oxygen tight systems please mind the instructions given by the coolant producer*
*[3] Flow limitations below $Q_{min}$ is possible. Regardless of the flow limitations valve can modulate till 0 % of the settings.*
*Pc - pressure controller part*
*Cv - Control valve part*

## Technical data *(continuous)*

***AB-QM** (flange version)*

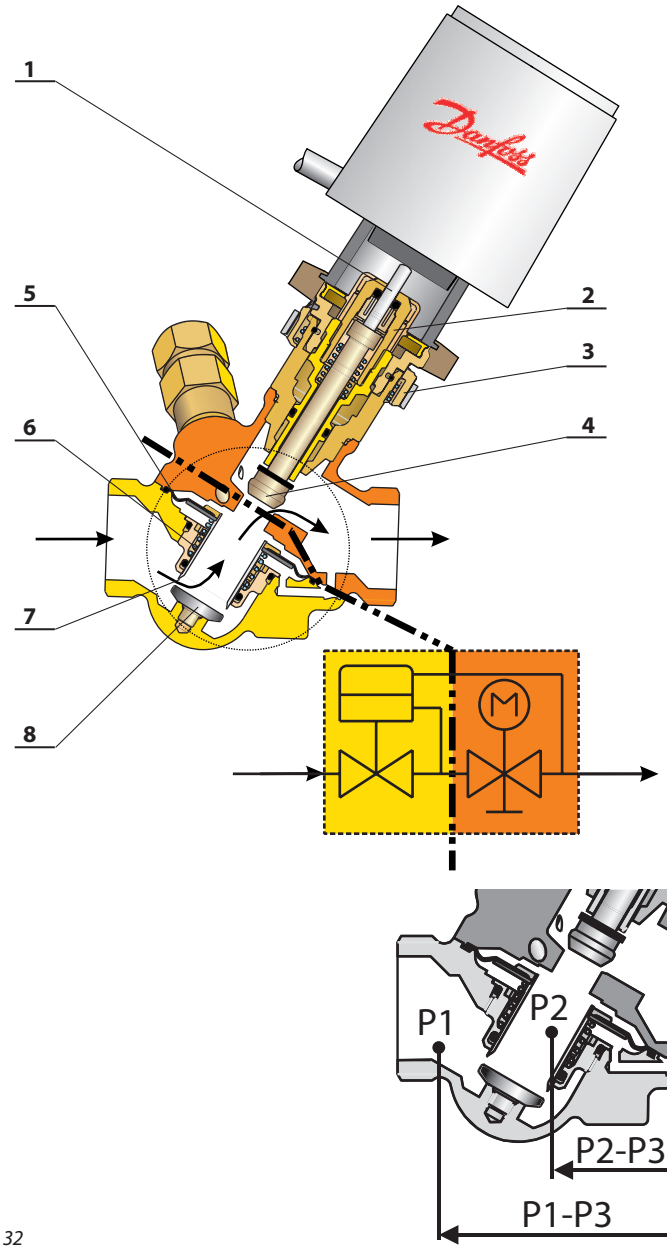
| **Nominal diameter** | | **DN** | **50** | **65** | **80** | **100** | **125** | **150** |
|---|---|---|---|---|---|---|---|---|
| Flow range | $Q_{min}$ (40%) [2] | l/h | 5.000 | 8.000 | 11.200 | 15.200 | 36.000 | 58.000 |
| | $Q_{max}$ (100%) | | 12.500 | 20.000 | 28.000 | 38.000 | 90.000 | 145.000 |
| Diff. pressure [1] | | kPa | 30 - 400 | | | | | |
| Pressure stage | | PN | 16 | | | | | |
| Control range | | | Acc. to standard IEC 534 control range goes to infinity as Cv characteristic is linear. | | | | | |
| Control valve's characteristic | | | Linear (could be converted by actuator to equal percentage) | | | | | |
| Leakage acc. to standard IEC 534 | | | max.0.05% of $k_v$ at 500N | | | | max.0.01% of $k_v$ at 650N | max. 0.01% of $k_v$ at 1000N |
| For shut off function | | | Acc. to ISO 5208 class A - no visible leakage | | | | - | |
| Flow medium | | | Water and water mixtures with secondary coolants (like glycols) [3] for closed heating and cooling systems | | | | | |
| Medium temperature | | °C | –10 ... +120 | | | | | |
| Stroke | | mm | 10 | 15 | | | 25 | 25 |
| Connection | flange | | PN 16 | | | | | |
| | actuator | | Danfoss standard | | | | | |
| **Materials in the water** | | | | | | | | |
| Valve bodies | | | Grey iron EN-GJL-250(GG25) | | | | | |
| Membranes/ Bellow | | | EPDM | | | | W.Nr.1.4571 | EPDM |
| O - rings | | | EPDM | | | | | |
| Springs | | | W.Nr. 1.4568, W.Nr. 1.4310 | | | | W.Nr.1.4401 | W.Nr.1.4310 |
| Cone (Pc) | | | CuZn40Pb3 - CW 614N, W.Nr. 1.4305 | | | | W.Nr.1.4404NC | W.Nr.1.4021 |
| Seat (Pc) | | | W.Nr. 1.4305 | | | | W.Nr.1.4027 | |
| Cone (Cv) | | | CuZn40Pb3 - CW 614N | | | | W.Nr.1.4404NC | W.Nr.1.4021 |
| Seat (Cv) | | | W.Nr. 1.4305 | | | | W.Nr.1.4027 | |
| Screw | | | Stainless Steel (A2) | | | | W.Nr.1.1181 | |
| Flat gasket | | | NBR | | | | Graphite gasket | Non asbestos |

*[1] Δp = (P1-P3) min~max*
*[2] Flow limitations below $Q_{min}$ is possible. Regardless of the flow limitations valve can modulate till 0 % of the settings.*
*[3] according suitability and usage especially in not oxygen tight systems please mind the instructions given by the coolant producer*

*Pc - pressure controller part*
*Cv - Control valve part*

## Design

**1** Spindle
**2** Stuffing box
**3** Plastic ring
**4** Control valve's cone
**5** Membrane
**6** Main spring
**7** Hollow cone (pressure controller)
**8** Vulcanized seat (pressure controller)




*AB-QM DN 10 - 32*

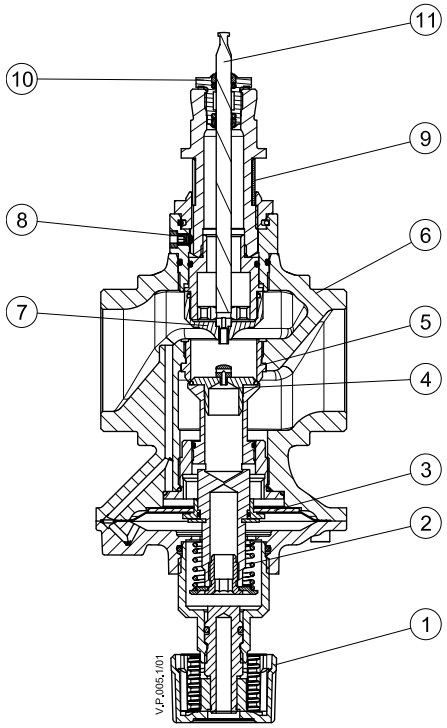
**Function:**
The AB-QM valve consists of two parts:
1. Differential pressure controller
2. Control valve

**1. Differential pressure controller DPC**
The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference $\Delta p_{Cv}$ (p2-p3) on the membrane is balanced with the force of the spring. Whenever the differential pressure across the control valve changes (due to a change in available pressure, or movement of the control valve) the hollow cone is displaced to a new position which brings a new equilibrium and therefore keeps the differential pressure at a constant level.

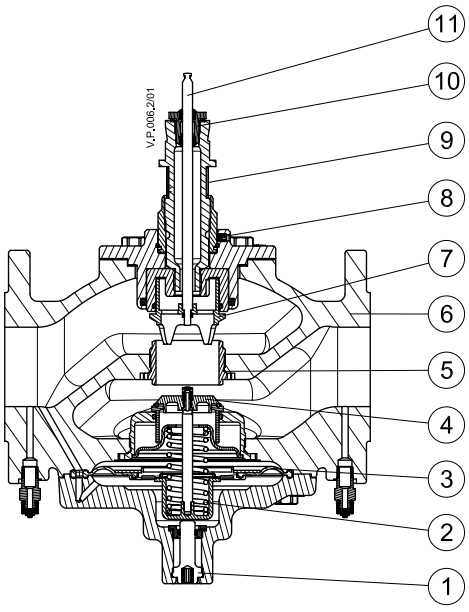
**2. Control valve Cv**
The control valve has a linear characteristic. It features a stroke limitation function that allows adjustment of the Kv value. The percentage marked on the scale equals the percentage of 100% flow marked on the pointer. Changing the stroke limitation is done by lifting the blocking mechanism and turning the top of the valve to the desired position, showed on the scale as a percentage. A blocking mechanism automatically prevents unwanted changing of the setting.

**Design** *(continuous)*

1. Shut off screw
2. Main spring
3. Membrane
4. DP cone
5. Seat
6. Valve body
7. Control valves cone
8. Locking screw
9. Scale
10. Stuffing box
11. Spindle



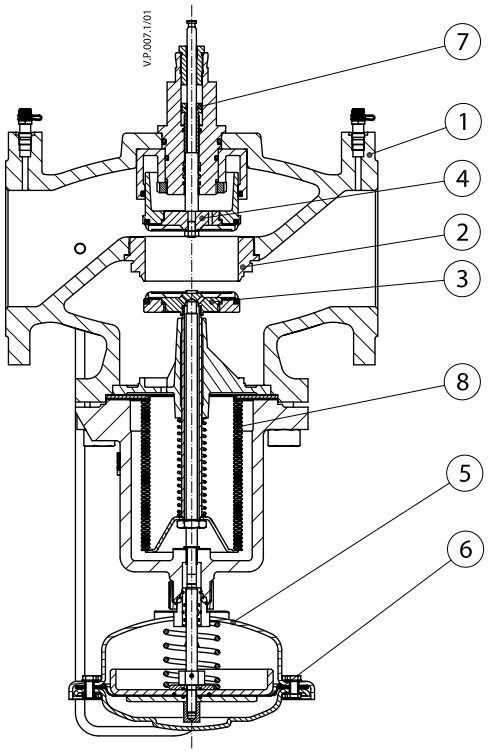

*AB-QM DN 40, 50*



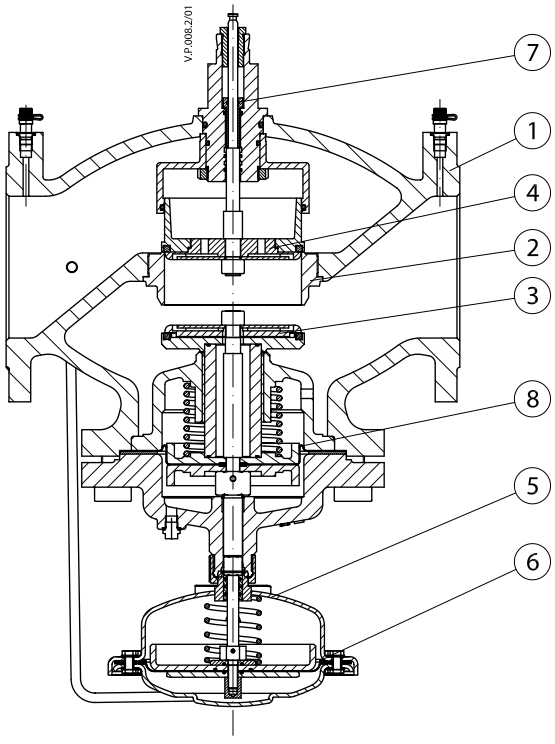

*AB-QM DN 50-100*

**Design** *(continuous)*

1. Valve body
2. Valve seat
3. DPC cone
4. CV cone
5. Controller casting
6. Rolling diaphragm
7. Adjusting screw
8. Bellow for pressure relief on DPC cone

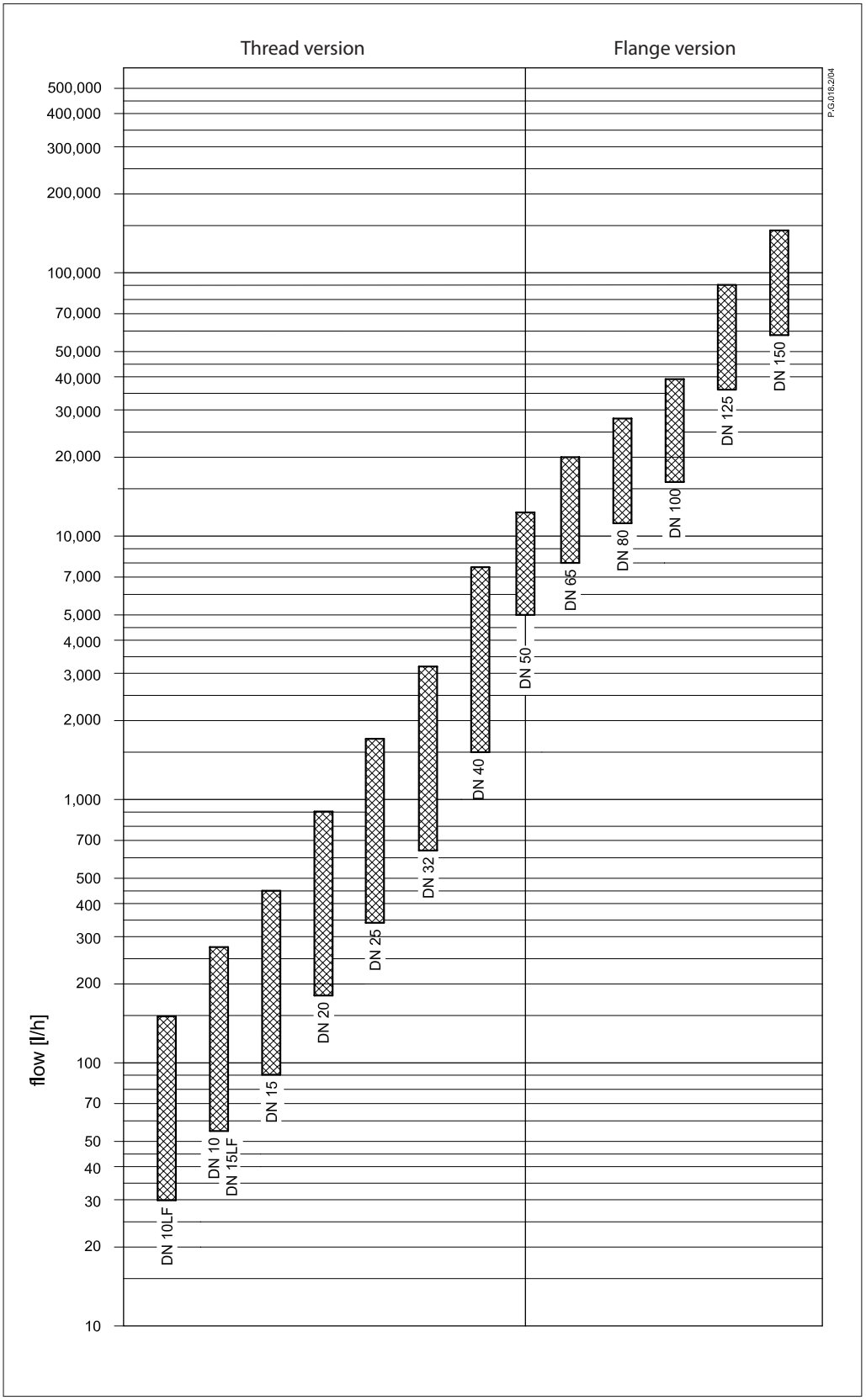



*AB-QM DN 125*




*AB-QM DN 150*

## Sizing


Thread version
Flange version
P-G.018.2/04
flow [l/h]
500,000
400,000
300,000
200,000
100,000
70,000
50,000
40,000
30,000
20,000
10,000
7,000
5,000
4,000
3,000
2,000
1,000
700
500
400
300
200
100
70
50
40
30
20
10
DN 10LF
DN 10
DN 15LF
DN 15
DN 20
DN 25
DN 32
DN 40
DN 50
DN 65
DN 80
DN 100
DN 125
DN 150

**Sizing** *(continuous)*

### Example 1: Variable flow system

*Given:*
Cool requirement per unit : 1000 W
Flow temperature in the system: 6 °C
Return temperature in the system: 12 °C

*Required -* ***control and balancing valves:***
AB-QM and actuators type for BMS system.
*Solution:*
Flow in the system: Q (l/h)
$Q = 0.86 \times 1000 / ( 12 - 6 ) = 143$ l/h

*Selected:*
AB-QM DN 10 mm with $Q_{max} = 275$ l/h
presetting on 143/275 = 0.52 = 52 % of maximum opening.
Actuators: AMV 110NL - 24 V
*Remarks:*
required minimum differential pressure across the AB-QM DN 10: 16 kPa.

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### Example 2: Constant flow system

*Given:*
Cool requirement per unit : 4000 W
Flow temperature in the system : 6 °C
Return temperature in the system : 12 °C

*Required -* ***automatic flow limiter:***
AB-QM and presetting.

*Solution:*
Flow in the system : Q (l/h)
$Q = 0.86 \times 4000 / ( 12 - 6 ) = 573$ l/h

*Selected:*
AB-QM DN 20 mm with $Q_{max} = 900$ l/h
presetting on 573/900 = 0.64 = 64 % of maximum opening.

*Remarks:*
required minimum differential pressure across the AB-QM DN 20: 16 kPa.

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### Example 3: Sizing AB-QM according pipe dimension

*Given:*
Flow in system 1.4 $m^3/h$ (1400 l/h = 0.38l/s), pipe dimension DN 25 mm

*Required -* ***automatic flow limiter:***
AB-QM and presetting.

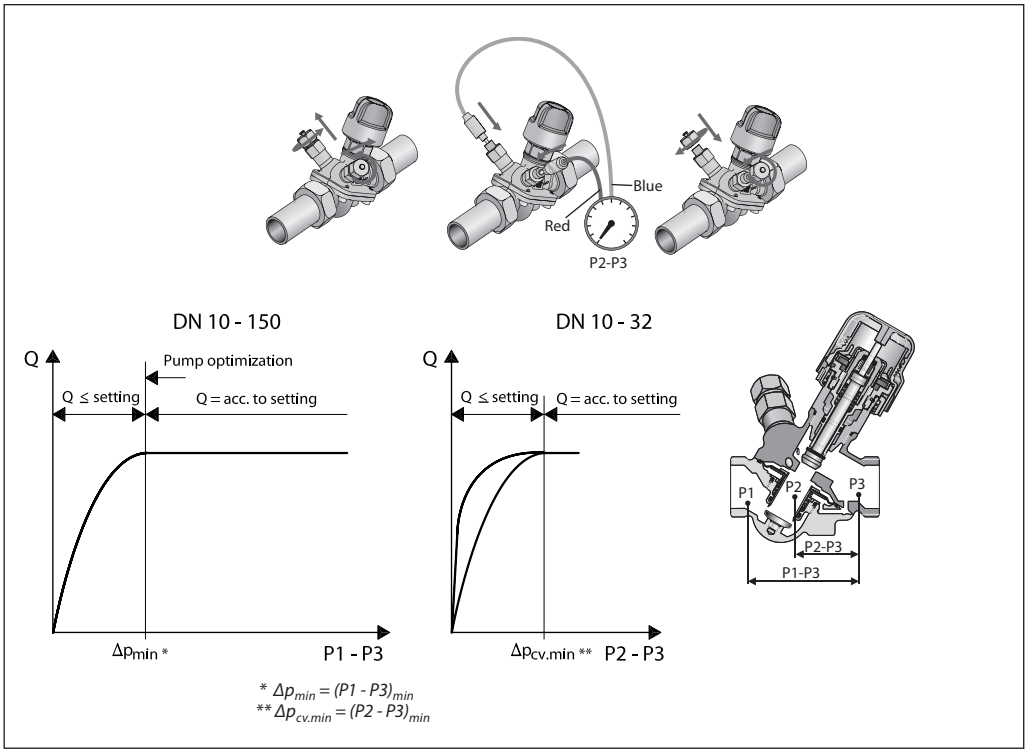
*Solution:*
In this case we can selected AB-QM DN 25 mm with $Q_{max} = 1700$ l/h

In this case it will be recommended to check the maximum velocity in the pipe. For this we calculate velocity in the pipe for condition:
DN 25 mm – Di 27.2 mm

Dimension and condition acceptable, veloscity below 1.0 m/s.

Preseting on the valve AB-QM DN 25 mm
1400/1700 = 0.82 = 82 % of maximum opening.
*Remarks:*
required minimum differential pressure across the AB-QM DN 25: 20 kPa.

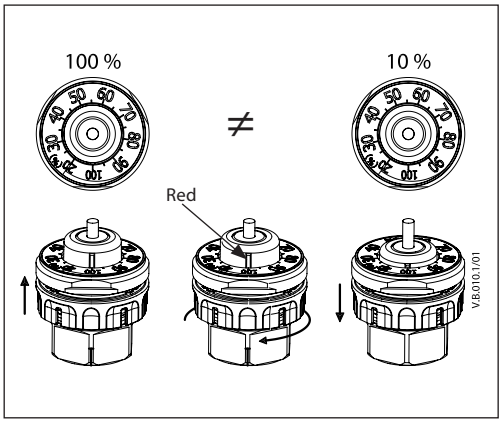
## Pump optimising / Trouble shooting




The AB-QM (DN 10-32) features measuring nipples that allow measuring of the pressure difference $\Delta p_{cv}$(p2-p3) across the control valve while AB-QM (DN 40-150) measuring is done between p1 to p3. If the pressure difference exceeds certain value it means the differential pressure controller is operational and the flow limitation is achieved. The measuring function can be used to verify if enough pressure difference is available and thus verify the flow.

It can also be used to optimize the pump head. The pump head can be decreased until no more than the minimal required pressure is available on the most critical valve (in terms of hydronic). This optimal point is to be found when proportionality between pump head and measured differential pressure cease to exist. Verifying the pressure can be done by using for example Danfoss PFM device (for more details please refer to AB-QM Tech Note).

## Presetting (DN 10-32)




The calculated flow can be adjusted easily without using special tools.
To change the presetting:

- Remove the blue protective cap or the mounted actuator.
- Raise the grey plastic ring and turn to the new presetting.
- Release the white plastic ring and the presetting is locked.

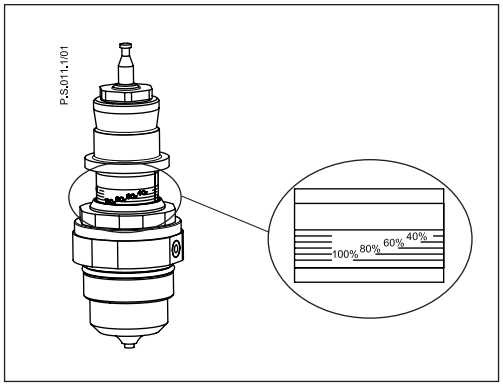
The presetting scale indicates a values from 100% flow to 0% closed.
Counter clock wise turning would increase the flow value while clock wise would decrease it.

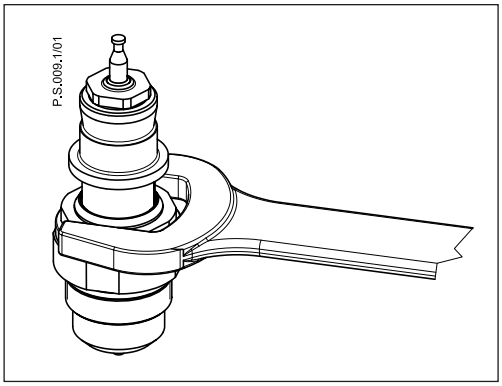
When valve is set to 80% or more the red ring (below "DN max flow " sign) becomes visible.

If the valve is a DN 15 then the max flow = 450 l/h =100% presetting. To set a flow of 270 l/h you have to set: 270/450 = 60%.

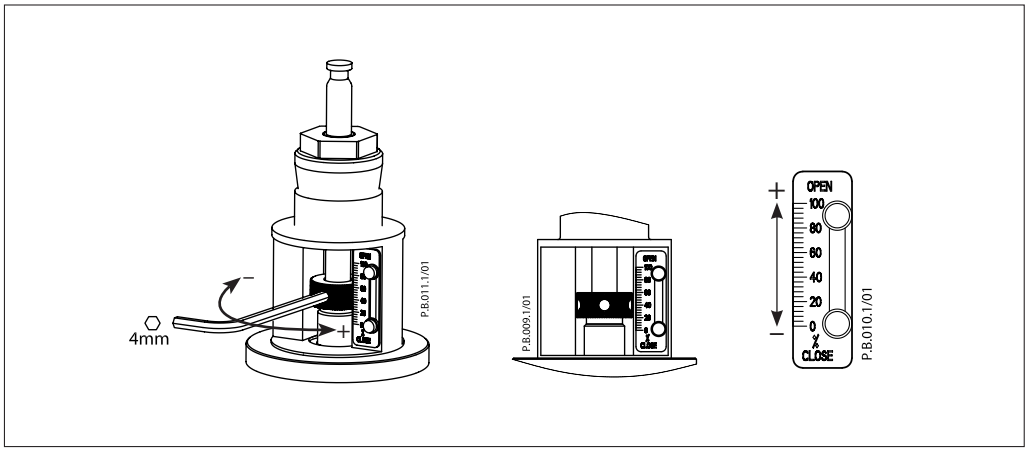
Danfoss recomends a presetting/flow from 20% to 100%. Factory presetting is 100%.

**Presetting** (continuous)
DN 40-100




DN 125-150



## Service

**DN 10-32**
For the service shut off function, it is recommended to install the valve in the supply water pipe.

The valve features a service function that allows changing of the "stuffing box (code 065F0006)" under water pressure.

Valves are equipped with plastic shut-off mechanism that is to be used for isolating function up to 1 bar differential pressure. When closing against higher differential pressure please use accessory - shut-off & protection piece (003Z0230) or set the value to 0%.

Unwanted change of the setting is provided by locking ring (code 003Z0236) which is inserted in the groove below the scale. The locking ring would not allow one to lift the grey plastic ring thus no change of the setting is possible.

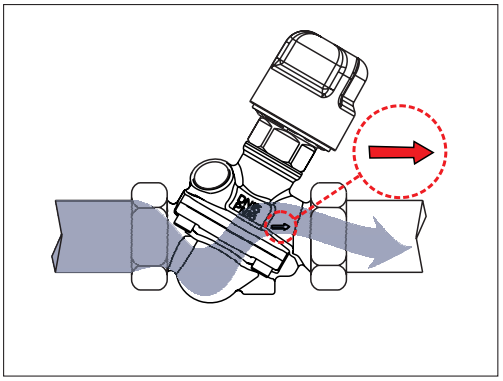
**DN 40-100**
For the service shut off function there is no pipe side installation recommendation.

Valves are equipped with manual shut-off for isolating function up to 16 bar.

## Installing

AB-QM valve is mono-directional meaning that the valve operates when arrow on the valve body is aligned with flow direction. When this rule is disobeyed the valve acts like variable orifice that cause water hammer at sudden closing when available pressure has increased or valve have been set to lower value.

In case when system condition allows backflows it is strongly recommended to use backflow preventer in order to avoid possible water hammer that can damage the valve as well as other elements in the system.



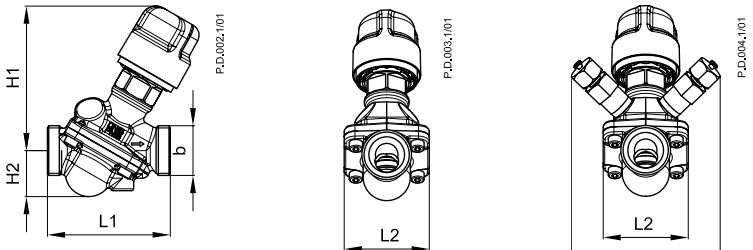
**Tender text**

1. The pressure independent balancing and control valve should be comprised of a linear control valve and an integrated membrane based pressure controller.
2. The pressure independent balancing and control valve should be available in the range from DN10 - 150.
3. The valve could be used as an automatic flow limiter.
4. The valve should have a mechanism to adjust the flow steeples from 100 to 0 % of the maximum flow.
5. Minimum possible setting for modulating actuator should be 30 l/h.
6. At minimum setting 30 l/h modulation till 0 % of the flow should be possible.
7. Shut off service function should be possible with setting mechanism.
8. The adjustment should be performed without a tool for dimensions up to DN 32 or a standard tool for valves bigger than DN 32.
9. The setting, which can be locked, should be visible from the top for valves DN 32 and from a side for DN 40 - 150.
10. The control valve stuffing box should be serviceable under pressure for valves up to DN 32.
11. The valves should have a shut-off function (positive), separate from the setting mechanism, for valves DN 40 - 100.
12. The leakage rate should be: no visible leakage at force of the thermal actuator (90 N) for valves up to DN 32, for valves up to DN 100 0.05 % $k_v$ at 500 N, for valve DN 125 0,01 % $k_v$ at 650N and 0,01 % $k_v$ for DN 150 at 1000 N. Maximum operating pressure should be 400 kPa, closing pressure ability for all actuators should be 600 kPa.
13. The authority of the pressure independent control valve should be 1 at all settings (control valve characteristic is not changed).
14. Control valve should have flow – control signal as linear characteristic at all settings. Control ratio of the pressure independent balancing and control valve should be higher than 1:300 **(Supplier of the valve should provide lab test results [1])**.
15. Control valve should have a possibility to change linear characteristic to equal percentage characteristic at all settings by actuator setting.
16. Minimum starting differential pressure for flow limitation should be 16 kPa for valves up to DN 20, 20 kPa valves up to DN 32 and 30 kPa for valves up to DN 150 **(Supplier of the valve should provide lab test results [1])**. Nominal pressure rating 16 bar (PN20 on request), maximal test pressure 25 bar.
17. Measuring points for pump optimization and flow verification should be available for DN 10 - 150.

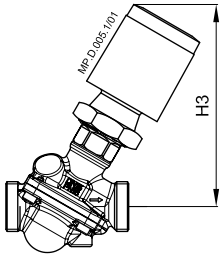
| | | |
|---|---|---|
| Nominal diameter: | _____ | |
| Connection: | _____ | |
| Adjustment range from - to | _____ | $m^3/h$ |
| Produced by: | Danfoss | |
| Type: | AB-QM | |
| Ordering no.: | 003Z ____ | |

[1] *Since there is no standard for testing procedure, Danfoss recommends verification by independent lab to compare control and flow limitation function of different PIBCVs at the same basis.*

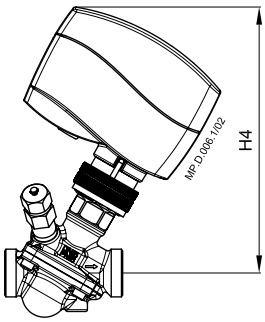
## Dimensions




*AB-QM DN 10 - 32*



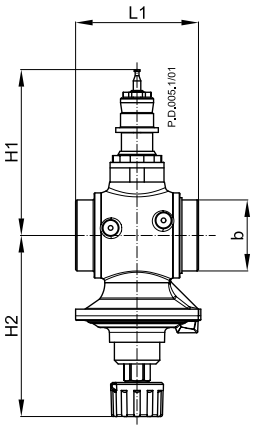

*TWA-Z + AB-QM*
*ABNM + AB-QM*



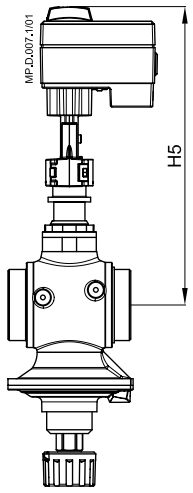

*AMV (E) 110 NL + AB-QM*
*AMI 140 + AB-QM*

| Type | L1 mm | L2 mm | L3 mm | H1 mm | H2 mm | H3 mm | H4 mm | b ISO 228/1 | Weight kg |
|---|---|---|---|---|---|---|---|---|---|
| AB-QM DN 10 | 53 | 36 | 79 | 73 | 20 | 105 | 140 | G ½ | 0.38 |
| AB-QM DN 15 | 65 | 45 | 79 | 75 | 25 | 110 | 145 | G ¾ | 0.48 |
| AB-QM DN 20 | 82 | 56 | 79 | 77 | 33 | 115 | 150 | G 1 | 0.65 |
| AB-QM DN 25 | 104 | 71 | 79 | 88 | 42 | 130 | 165 | G 1 ¼ | 1.45 |
| AB-QM DN 32 | 130 | 90 | 79 | 102 | 50 | 145 | 180 | G 1 ½ | 2.21 |

## Dimensions *(continuous)*

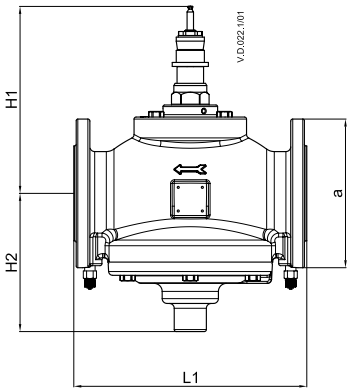



*AB-QM DN 40, DN 50*

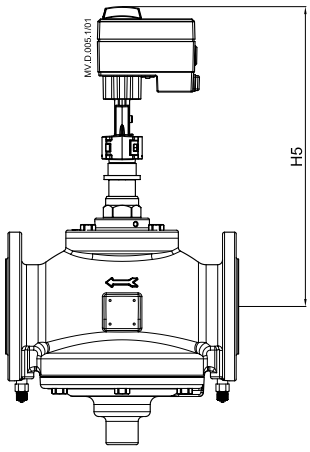



*AME 15 QM + AB-QM*

| Type | L1 mm | H1 mm | H2 mm | H5 mm | b ISO 228/1 | Weight kg |
|---|---|---|---|---|---|---|
| AB-QM DN 40 | 110 | 192 | 174 | 315 | G 2 | 6.9 |
| AB-QM DN 50 | 130 | 192 | 174 | 315 | G 2 ½ | 7.8 |



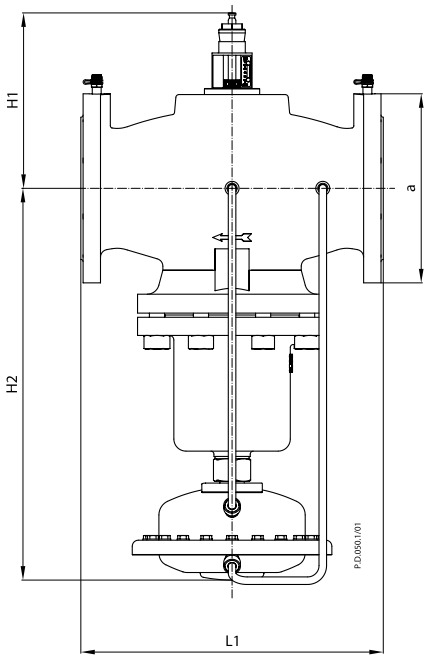

*AB-QM DN 50-100*



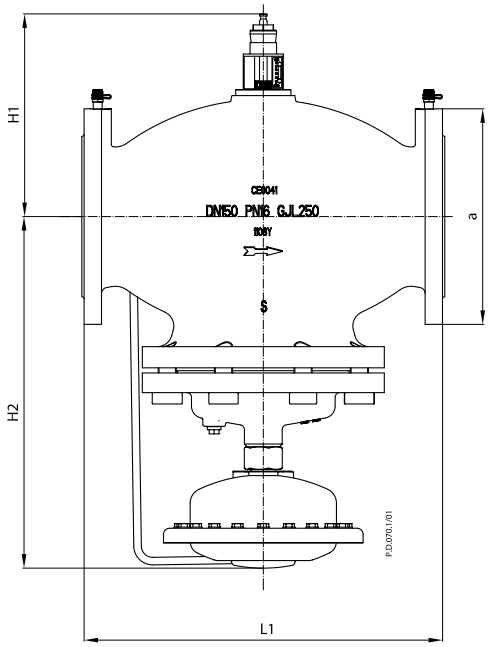

*AME 15 QM + AB-QM*

| Type | L1 mm | H1 mm | H2 mm | H5 mm | a (EN 1092-2) | Weight kg |
|---|---|---|---|---|---|---|
| AB-QM DN 50 | 230 | 192 | 174 | 315 | 165 | 14.2 |
| AB-QM DN 65 | 290 | 233 | 172 | 373 | 185 | 38.0 |
| AB-QM DN 80 | 310 | 236 | 177 | 376 | 200 | 45.0 |
| AB-QM DN 100 | 350 | 249 | 187 | 389 | 220 | 57.0 |

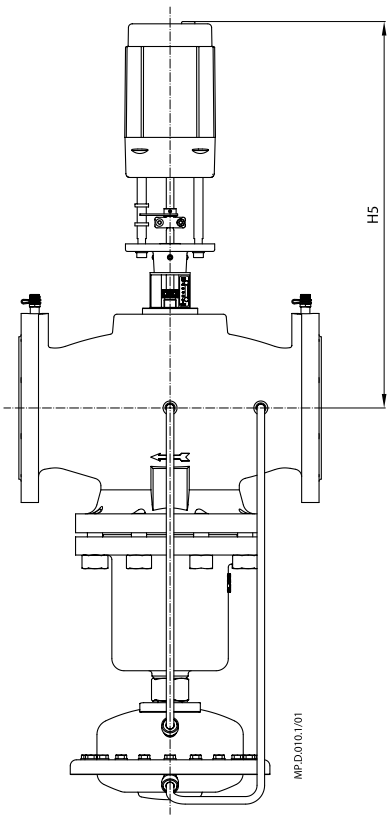
**Dimensions** *(continuous)*



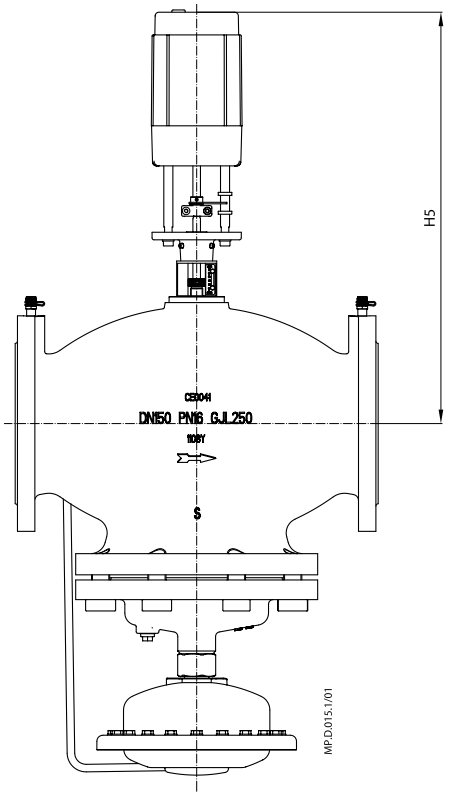

*AB-QM DN 125*




*AB-QM DN 150*




*AME 55 QM + AB-QM DN 125*




*AME 55 QM + AB-QM DN 150*

| Type | L1 mm | H1 mm | H2 mm | H5 mm | a (EN 1092-2) | Weight kg |
|---|---|---|---|---|---|---|
| AB-QM DN 125 | 400 | 232 | 518 | 507 | 250 | 85.3 |
| AB-QM DN 150 | 480 | 268 | 465 | 518 | 285 | 138 |

Data sheet

# Actuator for modulating control AME 435 QM

## Description

AME 435 QM actuator for modulating control is used with pressure independent balancing and control valve type AB-QM from DN 40 to DN 100.

The actuator has some special features:
- it automatically adapts its stroke to the valve end positions which reduces commissioning time
- 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

**Main data:**
- Nominal voltage (AC or DC):
  - 24 V, 50 Hz/60 Hz
- Control input signal:
  - 0(4)-20 mA
  - 0(2)-10 V
- Force: 400 N
- Stroke: 20 mm
- Speed (selectable):
  - 7.5 s/mm
  - 15 s/mm
- Max. medium temperature: 120 °C
- Self calibrating
- LED signalling
- External RESET button
- Output signal
- Manual operation

## Ordering

**Actuator**

| Type | Supply voltage | Code No. |
|---|---|---|
| AME 435 QM | 24 VAC/DC | **082H0171** |

Accessories-**Adapter**

| Type | for valve's DN | for Actuator | Code No. |
|---|---|---|---|
| AB-QM adapter (2st generation) | 40-100 | AME 15 QM | **003Z0694** |
| AB-QM adapter (1st generation) | | AME 435 QM | **065Z0313** |

## Technical data

| | | | |
|---|---|---|---|
| Power supply | | V | 24 AC/DC; ±10% |
| Power consumption | running | VA | 4,5 |
| | standby | | 1,2 |
| Frequency | | Hz | 50/60 |
| Control input Y | | V | 0-10 (2-10); Ri = 95 kΩ |
| | | mA | 0-20 (4-20); Ri = 500 Ω |
| Output signal X | | V | 0-10 (2-10); RL = 650 Ω (maximal load) |
| Closing force | | N | 400 |
| Max. stroke | | mm | 20 |
| Speed | | s/mm | 7,5 or 15 |
| Max. medium temperature | | °C | 120 |
| 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<br>EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3 |

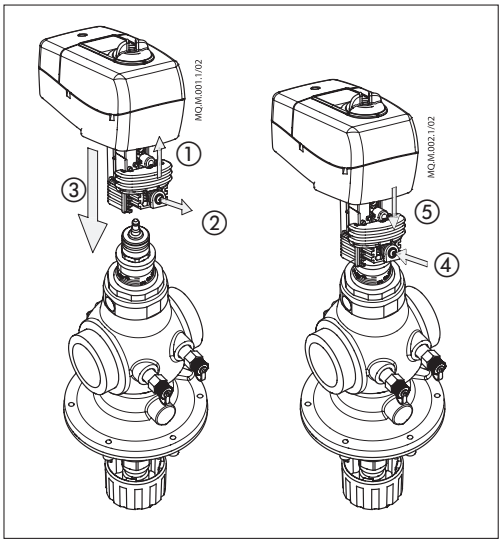
## Installation

### 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 °C or at ambient temperature higher than 55 °C. It must not be subject to steam jets, water jets or dripping liquid as well.

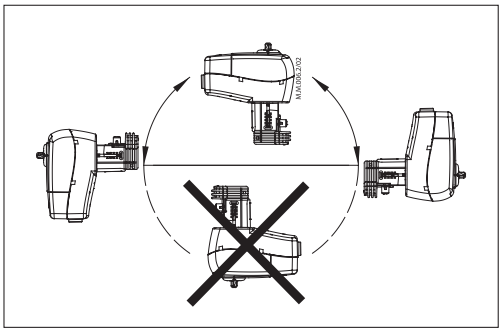
***Note:***
*The actuator may be rotated up to 360° with respect to the valve stem by loosening the retaining fixture. Once the actuator is placed, retighten the fixture.*




### Electrical

Electrical connections can be accessed by removing the actuator cover. Two cable gland entries without thread (Ø16 and combined Ø16/Ø20) 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.*




## 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 Calibrating function

- Apply the appropriate control signal and check:
  - SW7 setting
  - the actuator drives the valve over the entire stroke length

The unit is now fully commissioned.

### Automatic Calibrating 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 button for 5 seconds

### Testing entire valve stroke length

The actuator can be driven to the fully-open or closed positions by connecting SN to terminals 1 or 3.

## Disposal

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

## Jumper/DIP switch setting

### Jumper

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

*Factory setting:* jumper is in U position.

### DIP switches

*Factory setting:* all switches are in OFF position.

- **SW 1**: Not used

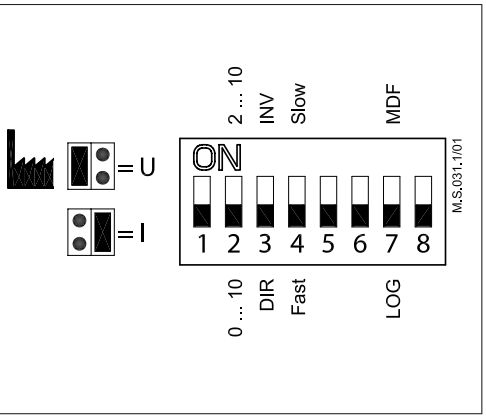
- **SW 2**: Input signal range selector
  - *OFF position;* the input signal is in the range from 0-10 V (voltage input) or from 0-20 mA (current input)
  - *ON position;* the input signal is in the range from 2-10 V (voltage input) or from 4-20 mA (current input)

- **SW 3**: Direct or Inverse acting selector
  - *OFF position;* the actuator is in direct acting mode (stem extracts as voltage increases)
  - ON position; the actuator is in inverse acting mode (stem retracts as voltage increases)

If used with AB-QM valves, SW 3 is recommended to be in OFF position (factory setting).

- **SW 4**: Fast/Slow - Speed selector
  - *OFF position;* the actuating speed is 7.5 s/mm
  - *ON position;* the actuating speed is 15 s/mm

- **SW 5**: Not used

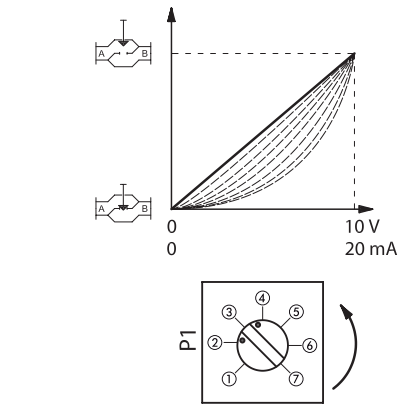



- **SW 6**: Not used

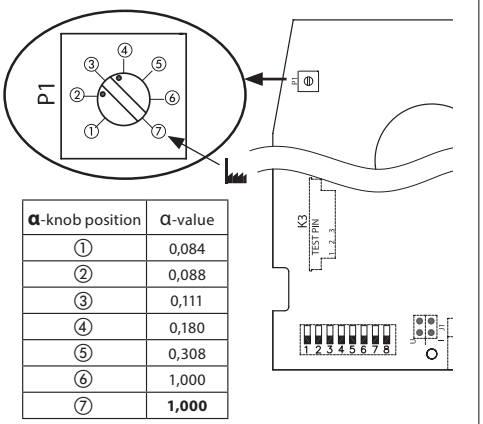
- **SW 7**: LOG/MDF - Logarithmic or modified flow through valve selector
  - *OFF position; ..... LOG (α=0.2, factory setting)*
  - *ON position; ..... MDF* (initial setting: α=1, linear)

  *Explanation:*
  If SW 7 is in OFF position, alpha knob is not activated. Turning alpha knob will not influence α value (α=0.2).
  If SW 7 is in ON position, α value can be manipulated using alpha knob. MDF initial setting of alpha knob is 1, which means linear setting. Regarding alpha knob setting see explanation below.

- **SW 8**: Not used




*Alpha knob found on PCB in MDF initial setting (linear, α=1)*



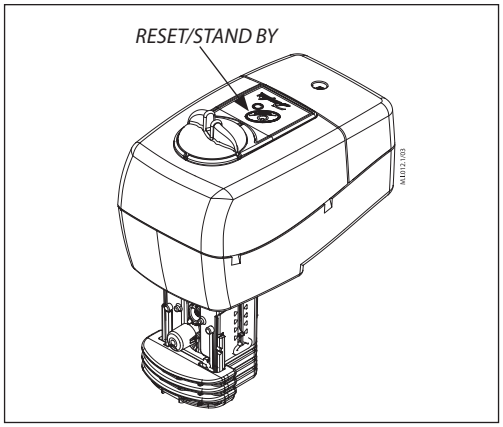

| α-knob position | α-value |
|---|---|
| ① | 0,084 |
| ② | 0,088 |
| ③ | 0,111 |
| ④ | 0,180 |
| ⑤ | 0,308 |
| ⑥ | 1,000 |
| ⑦ | **1,000** |

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

The actuator has a special valve-flow adjustment feature called alpha value. Actuator characteristics can be, by turning the alpha knob counter clockwise (CCW), variably-adjusted from α=1 (linear) to α=0.1.

In order to have optimal control, linear characteristics of system (valve, actuator, HEX) is required. This can be assured using the right α value. Appropriate α value depends on temperatures of heating/cooling medium and controlled temperature of heated/cooled medium. Calculate α value according to the Tech Note number VNHUA102 (Setting the right α value).

## Led signalling/ Actuator operating modes




| | |
|---|---|
| Flashing green LED: Calibrating mode (period is every second) | 1s |
| Constant green LED: Positioning mode | |
| Flashing green LED: Normal mode (period is every 6 seconds) | 6s |
| Flashing red LED: STAND BY mode (period is every two seconds) | 2s |

### LED function indicator

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

### External button

Actuator has external STAND BY/RESET button which is located next to LED indicator. By pressing on this button different operating modes are initiated:

- **Calibrating mode**
  Pressing the STAND BY/RESET button for 5 sec. causes the actuator to start *Calibrating procedure*:
  The bi-colour LED flashes green at 1 sec. intervals during calibration procedure, which begins by extracting the stem. When the maximum force is detected (at the end valve 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 bi-colour 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 button switches the actuator to STAND BY mode. The actuator keeps its last position in this mode and does not react to any control signal. This mode can be used for manual operation during the commissioning of other equipment, or for service purposes.
  The bi-colour LED flashes red at 2 sec. intervals.
  After pressing the STAND BY/RESET button again actuator switches to normal mode.

## Manual override

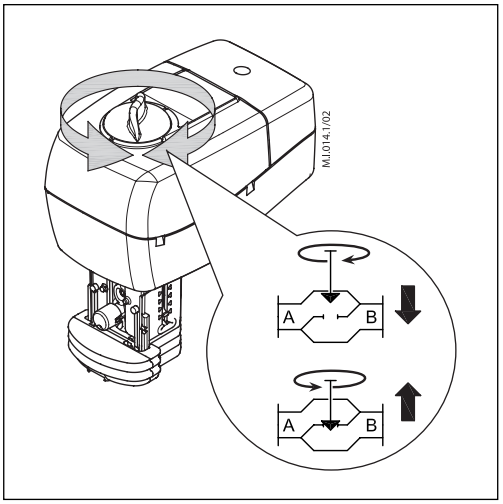
Manual override is done by means of control knob on actuator housing:

- Disconnect power supply or press STAND BY/ RESET button
- Adjust valve position using the control knob (observe the rotation direction)

When manual override is not needed:

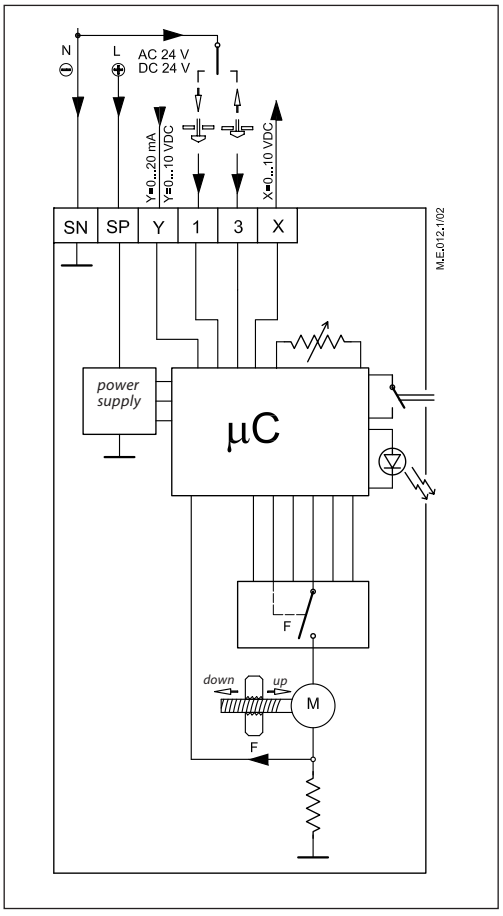
- Restore power supply or press STAND BY/ RESET button again

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




## Wiring

*24 VAC/DC only*




**SP** 24 VAC/DC ..... Power supply

**SN** 0 V ..... Common

**Y** 0-10 V ..... Input signal
(2-10 V)
0-20 mA
(4-20 mA)

**X** 0-10 V ..... Output signal
(2-10 V)

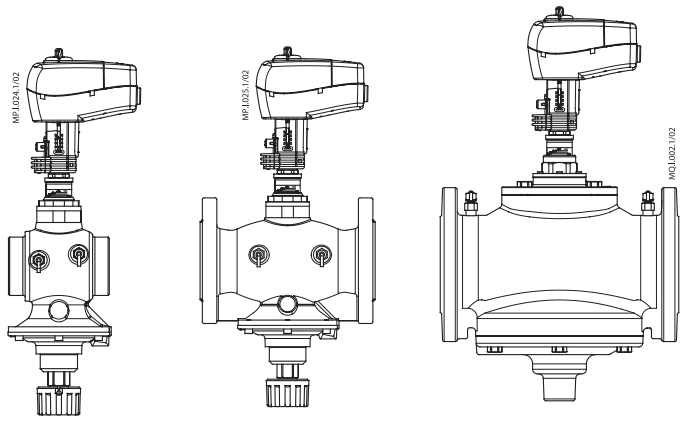
**1, 3** Override input signal

The actuator can be driven to the fully-open position by connecting SN to terminal 1 or fully-closed by connecting SN to terminal 3.
Signal 1 can be connected to thermostat to prevent freezing and signal 3 can be connected to thermostat to prevent overheating.

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

Important: AME 435QM can be used only for modulating control. For 3-point control use AMV 435 (082H0162/163). It is recommend to use modulating control with AB-QM.

## Actuator - valve combinations

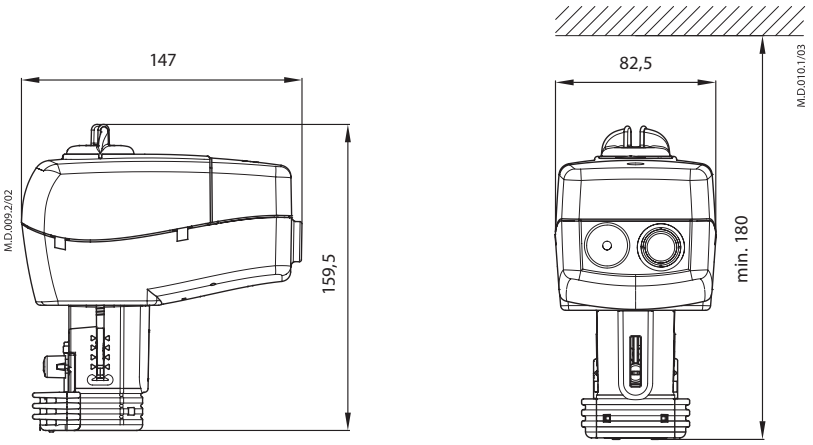



AME 435 QM + AB-QM (DN 40/50)

AME 435 QM + AB-QM (DN 50)

AME 435 QM + AB-QM (DN 65-100)

## Dimensions



# Data sheet

# Actuators for modulating control

## **AME 110 NLX** - with position feedback signal

### Description

The actuators are used together with automatically balanced combination valve type AB-QM for DN 10 to DN 32.

The actuator can be used with fan coil units, induction units, small reheaters, recoolers and zone applications in which hot/cold water is the controlled medium.

**Main data:**

- Position feedback or output signal (X=0-10 VDC)
- Gap detection at stem up position
- Modulating control
- Force switch-off at stem down position prevents overload of actuator and valve.
- No tools required for mounting
- Maintenance-free lifetime
- Low-noise operation
- Self-positioning process
- Halogen free cables

### Ordering

| Type | Supply voltage | Speed | Cable length | Code No. |
|---|---|---|---|---|
| AME 110 NLX | 24 V~ | 24 s/mm | 1,5 m | **082H8060** |
| | | | 5,0 m | **082H8062** |
| | | | 10 m | **082H8064** |

***Note:*** *Package of actuators is Single Pack - each actuator is packed in separate box.*

### Technical data

| | | | |
|---|---|---|---|
| Power supply | | V | 24 ±20 %; AC |
| Power consumption | running | VA | 1,5 |
| | standby | W | 0,4 |
| Frequency | | Hz | 50/60 |
| Control input Y | | V | 0-10 (2-10) Ri = 200 kΩ |
| | | mA | 0-20 (4-20) Ri = 500 Ω |
| Control output X | | V | 0-10 $Ro_{(min)}$ = 38 kΩ |
| Closing force | | N | 130 |
| Stroke | | mm | 5 |
| Speed | | s/mm | 24 |
| Max. medium temperature | | °C | 120 |
| Ambient temperature | | | 0 … 55 |
| Storage and transport temperature | | | –40 … 70 |
| Protection class | | | III safety extra-low voltage |
| Grade of enclosure | | | IP 42 |
| Weight | | | 0,3 kg |
| CE - marking in accordance with standards | | | Low Voltage Directive 2006/95/EC, EN 60730-1, EN 60730-2-14<br>EMC Directive 2004/108/EEC, EN 61000-6-1, EN 61000-6-3 |

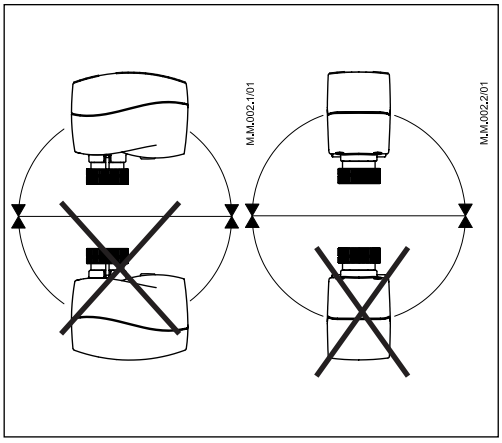
## Installation

**Mechanical**
The actuator should be mounted with the valve stem in either horizontal position or pointing upwards.

The actuator is fixed to the valve body by means of a mounting ring, which requires no tools for mounting. The ring should be tightened by hand.

**Electrical**
Important: It is strongly recommended that the mechanical installation is completed before the electrical installation.

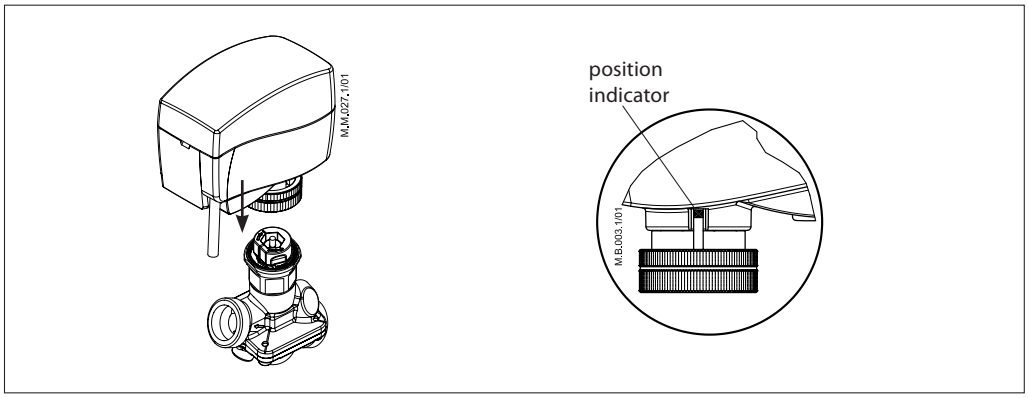
**Auto sleep mode**
1. If actuator AME 110 NL is charged by 24 V supply voltage and if it is not installed on AB-QM valve, it will stop in lower position and switch off all LED indicators after 5 minutes.
2. **It is mandatory to drive the spindle of the actuator to upper position before it will be installed on AB-QM valve (please refer to manual override drawings)!**




3. Auto sleep mode switches back to learning mode by pressing RESET button or by cycling power supply.

Each actuator is supplied with the connecting cable for the controller.

## Installation procedure



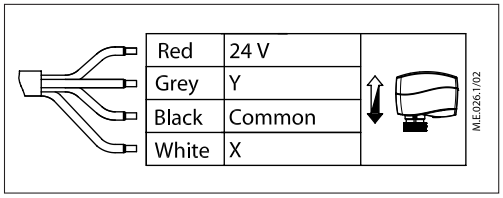

1. Check the valve neck. The actuator should be in stem up position (factory setting).

   Ensure that the actuator is mounted securely on the valve body

2. Wire the actuator according to the wiring diagram

3. The direction of the stem movement can be observed on the position indicator

## Wiring




## Commissioning

The factory setting of the spindle is the fully stem up position because of easier mechanical connection of the actuator on the valve.

## DIP Switch Setting
*(for service purposes only)*

The actuator has a function selection DIP switch under the removable cover.

The switch provides the following functions:

- SW1:
  **0/2 - Input signal range selector**
  If set to OFF position, the input signal is in the range from 2-10 V (voltage input) or from 4-20 mA (current input).
  If set to ON position, the input signal is in the range from 0-10 V (voltage input) or from 0-20 mA (current input).

- SW2:
  **D/I - Direct or inverse acting selector**
  If set to OFF position, the actuator is direct acting (stem lowers as voltage increases).
  If the actuator is set to ON position, the actuator is inverse acting (stem raises as voltage increases).

- SW3:
  **---/Seq - Normal or sequential mode selector:**
  If set to OFF position, the actuator is working in range 0(2)-10 V or 0(4)-20 mA.
  If set to ON position, the actuator is working in sequential range; 0(2)-5(6) V or (0(4)-10(12)mA) or (5(6)-10 V) or (10(12)-20 mA).

- SW4:
  **0-5 V/5-10 V - Input signal range in sequential mode:**
  If set to OFF position, the actuator is working in sequential range 0(2)-5(6) V or 0(4)-10(12) mA.
  If set to ON position, the actuator is working in sequential range; 5(6)-10 V or 10(12)-20 mA.

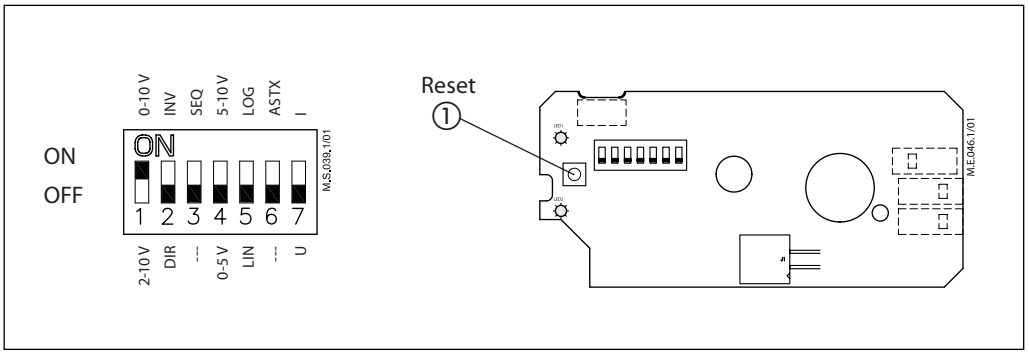
- SW5:
  **LIN/LOG - Linear or equal percentage flow through valve selector**
  If set to OFF position, the flow through the valve is equal percentage-wise equals the control signal.
  If set to ON position, the flow through the valve is linear in accordance to the control signal.

- SW6:
  **---/ASTK - Anti-blocking function**
  Exercises the valve to avoid blocking in periods when the heating/cooling is off.
  If set to ON position (ASTK), the valve motion is switched on. The actuator opens and closes the valve every 7 days.
  If set to OFF position (---), the function is disabled.

- SW7:
  **U/I - Input signal type selector**
  If set to OFF position, voltage input is selected. If set to ON position, current input is selected.

**Note:**
*The reset button ① will cause the actuator to go through a self stroking cycle (press it for 2 s).*

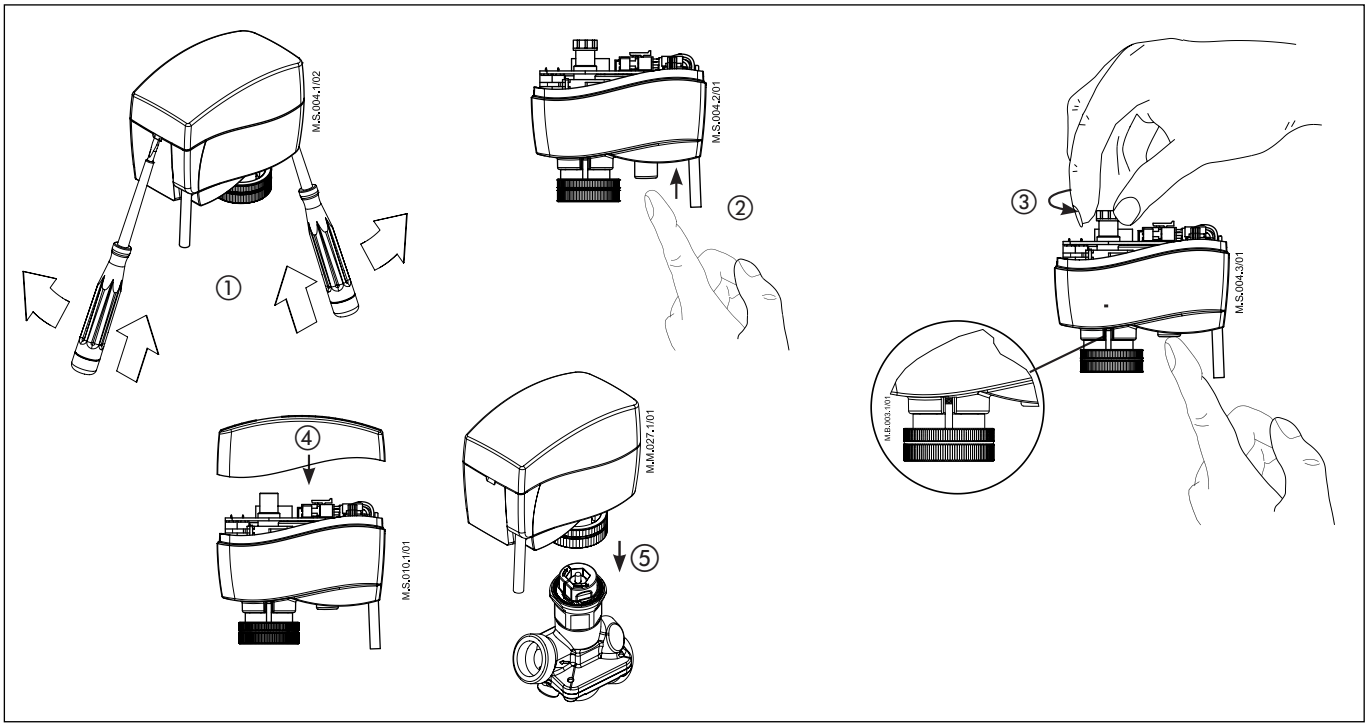
**Remark:**
*When the manual override has been used, the output signal (X) is not correct until the actuator reaches its end position.*




## Disposal

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

**Manual override** *(for service purposes only)*




***Caution:***
***Do not manually operate the drive if power is connected!***

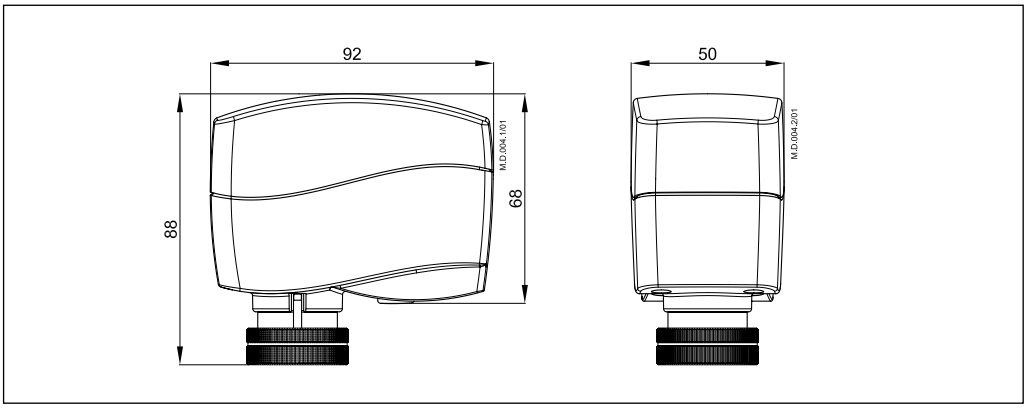
***Do not dismount the actuator from the valve when it is in a stem down position!***
If dismounted in a stem down position, there is a high risk that the actuator gets stuck.

- Remove cover ①
- Press and hold the button ② (on the bottom side of the actuator) during manual override ③
- Replace cover ④
- Install actuator on valve ⑤

**Remark:**
A 'click' sound after energising the actuator indicates that the gear wheel has jumped into normal position.

**If manual override has been used, the Y signal will not be correct until the actuator has reached its end position. If this is not accepted, reset the actuator.**

**Dimensions** *(mm)*



# Model AB-QM Pressure Independent Balancing and Control Valve

## Actuator Submittal, Proportional AME 13 SU/SD Safety Function Actuator

**DATE** _____ **SPEC. SECTION** _____ **PAGE** _____ **OF** _____

| **PROJECT** | **ARCHITECT/ENGINEER** |
|---|---|
| | |
| **SUPPLIER** | **CONTRACTOR** |
| | |
| **ORDER NO.** | |

**APPROVALS**

| AGENCY | REPRESENTATIVE | DATE | NOTES |
|---|---|---|---|
| ARCHITECT | | | |
| ENGINEER | | | |
| CONTRACTOR 1 | | | |
| CONTRACTOR 2 | | | |
| (OTHER) | | | |

| *NOTE* | *COMMENT* |
|---|---|
| | |
| | |
| | |
| | |
| | |


*Description*

The AME 13 SU/SD actuators are low voltage proportional actuators that are available with spring return function that are installed on the pressure independent control valve AB-QM in sizes ranging from ½" to 1¼". The spring return function of the AME provides a safety open or close of the valve in the event of power failure. Other features of the AME 13 SU/SD include:

- No tool requirement for installation
- Linear characteristic actuator
- Force sensitive switch-off reducing overload to the actuator

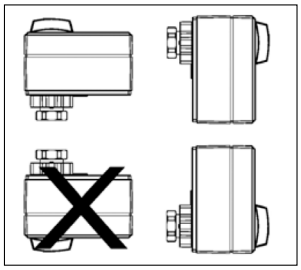
| Model | Number | Unit Tag | Qnty |
|---|---|---|---|
| AME 13 SU | | | |
| | *- requires adapter 003Z3960* | | |
| AME 13 SD | | | |
| | *- required spacer 003Z0257* | | |

*Specification*

The motorized actuator shall be 24VAC powered and mount to the AB-QM valve body. The actuator shall be capable of ensuring that excessive overload travel of actuator does not occur and have a safety function of either full close or full open in the event of power failure. The operation of the actuator shall be determined based upon a proportional input signal of 0-10VDC, 2-10VDC, 0-20mA, or 4-20mA and in addition be capable of a feedback signal for position indication. The actuator characteristic shall be linear.

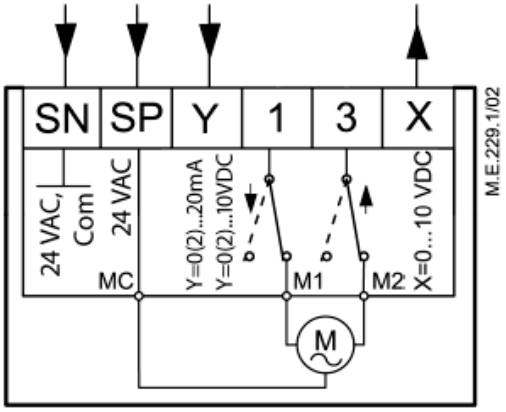
| **Code No.** | AME 13 SU | AME 13 SD |
|---|---|---|
| | **082H3044** | **082G3006** |
| Power supply | 24 VAC; +10%...-15% | |
| Power consumption | 9 VA | |
| Frequency | 50 Hz/60 Hz | |
| Control input | Proportional, 0(2) -10VDC, 0(4) -20mA | |
| Output signal | 0 - 10 VDC | |
| Close off force | 300 N | |
| Max. actuator travel | 5 mm | 5.5 mm |
| Speed | 11.75 s/mm | |
| Safety function speed | 10 sec. from full open/close | |
| Max. medium temperature | 266°F (130 °C) | |
| Ambient temperature | 32 … 131 °F (0 … 55 °C) | |
| Degree of protection | IP 54, NEMA 2 | |
| Weight | 1.3 lb (0.6 kg) | |
| 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 | |

## Orientation



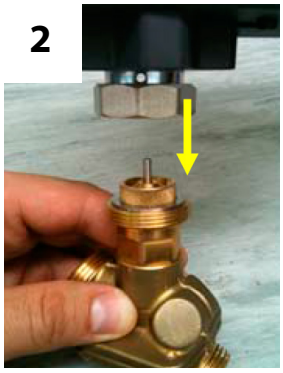
The actuator should be mounted with the valve stem in either horizontal position or pointing upwards. The actuator is fixed to the valve body by means of a mounting ring which is tightened by hand and requires no additional tools for mounting. Prior to wiring the valve it is recommended that the actuator is mounted.

## Wiring

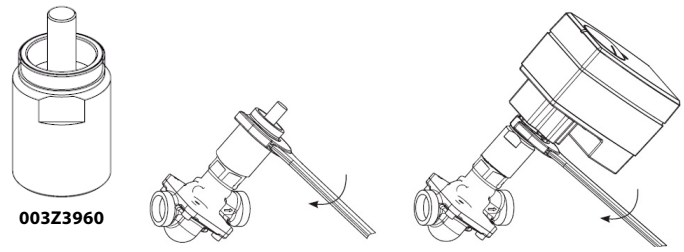



| | | |
|---|---|---|
| **SP** | 24 VAC/DC | Power supply |
| **SN** | Neutral | Common |
| **Y** | 0(2) to 10VDC | Input Signal |
| | 0(4) to 20mA | |
| **X** | 0(2) to 10VDC | Output signal |

## Mounting

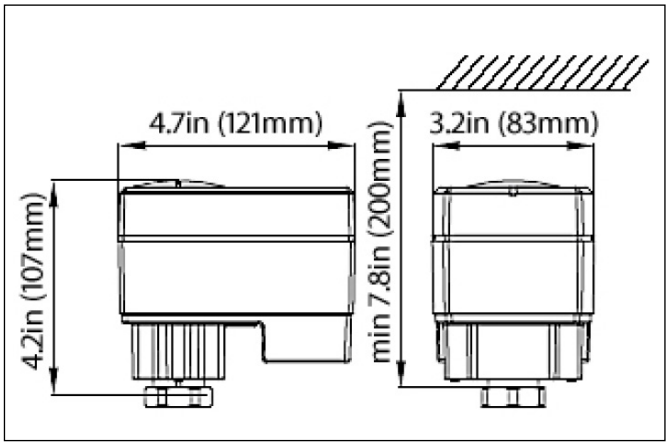

AME 13 SD (**082G3006**):
A spacer (prt# **003Z0257**) is required to be placed between the AB-QM valve body and the motor actuator. Then the actuator is tightened to the valve.



**003Z3960**

AME 13 SU (**082H3044**):
An adapter (prt# **003Z3960**) is required to be installed onto the AB-QM valve prior to the installation of the actuator. Then the actuator is tightened to the valve.

## Dimensions



Data sheet

# Actuators for modulating control AME 25 SD (spring down), AME 25 SU (spring up)

## Description

AME 25 SD or AME 25 SU electric actuators are used with VRB, VRG, VL, VF, VFS 2 and VEFS 2 valves up to DN 50 diameter.
The actuator automatically adapts its stroke to valve end positions which reduces commisioning time.

**Main data:**

- The advanced design incorporates load related 'switch-off' to ensure that actuators and valves are not exposed to overload.
- The advanced design incorporates a diagnostic LED, operational data capture and self stroking feature.
- Low weight and robust.
- Spring return versions:
  - SD - spring down or
  - SU - spring up.

## Ordering

| Type | Supply voltage | Code No. |
|---|---|---|
| AME 25 SD (spring down) | 24 V~ | **082H3038** |
| AME 25 SU (spring up) | 24 V~ | **082H3041** |

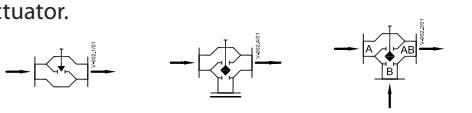
| Accessories | Code No. |
|---|---|
| Adapter for VFS 2 valves DN 15 - 50 (for media temp. over 150 °C) | **065Z7548** |
| Adapter for VEFS 2 valves DN 25 - 50 (for media temp. over 150 °C) | **065Z7549** |
| Stem heater (for valves DN 15 - 50) | **065B2171** |
| Active return signal kit for AME 25 SD, AME 25 SU | **082H3069** |

## Technical data

| | |
|---|---|
| Power supply | 24 Vac |
| Power consumption | 14 VA |
| Frequency | 50 Hz / 60 Hz |
| Control input Y | 0 to 10 V (2 to 10 V) Ri = 24 kΩ<br>0 to 20 mA (4 to 20 mA) Ri = 500 Ω |
| Output signal X | 0 to 10 V (2 to 10 V) |
| Close of force | 450 N |
| Max. stroke | 15 mm |
| Speed | 15 s/mm |
| Max. medium temperature | 150 °C (200 °C - with adapter or mounted horizontally) |
| Ambient temperature | 0 … 55 °C |
| Storage and transport temp. | –40 … +70 °C |
| Protection code | IP 54 |
| Weight | 2.3 kg |
| CE - marking in accordance with standards | Low Voltage Directive 73/23/EEC, EMC-Directive 2004/108/EEC:<br>- EN 60730-1, EN 60730-2-14 |

## Spring function

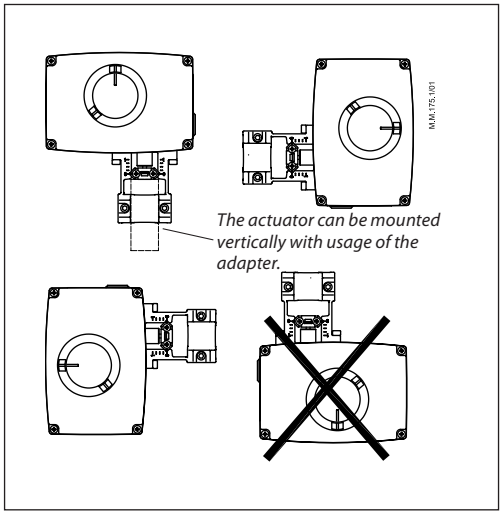
The spring function will fully open or close the valve when the power is removed, depending upon the spring action selected. Valve selection will also affect the spring action. The spring return unit is factory fitted to the rear of the actuator.




VFS 2, VEFS 2 VF 2, VL 2 VL 3, VRG 3, VRB 3

| Valve type | Spring action selection will | |
|---|---|---|
| | Close port A-AB | Open port A-AB |
| VRB, VRG | SU | SD |
| VL | SU | SD |
| VF | SU | SD |
| VFS 2 | SD | SU |
| VEFS 2 | SD | SU |

## Spring function




**Note that the actuator without adapter should be mounted horizontally by media temperatures over 150 °C.**

### Mechanical

The actuator should be mounted with the valve stem either horizontal, or pointing upwards.
Use a 4 mm Allen key (not supplied) to fit the actuator to the valve body.
Allow necessary clearance for maintenance purposes.

During commissioning, the valve sense (e.g. raise for heat) can be indicated by fitting red and blue pins (supplied) at either end of the positon indication scale.

### Electrical

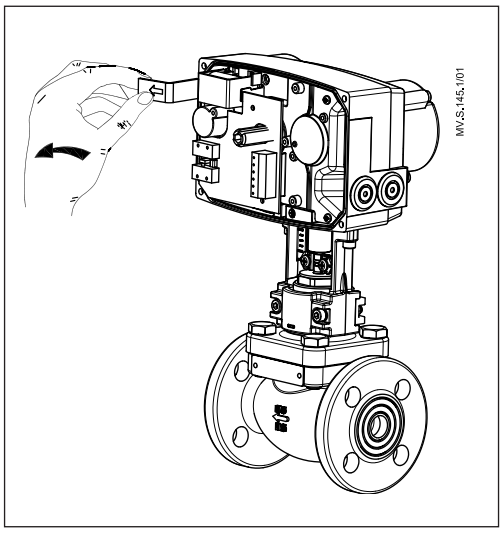
Electrical connections are accessible by removing the cover. Two M16 x 1.5 cable entries are provided. However, in order to maintain the enclosure IP rating an appropriate cable gland must be used.

## Disposal

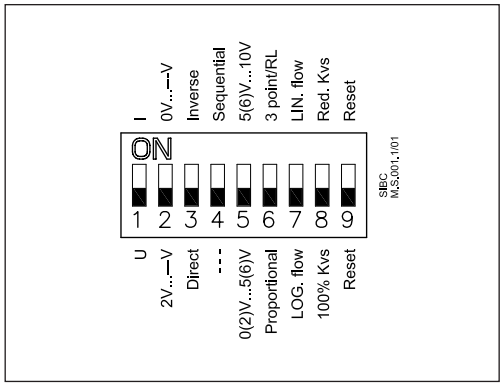
The actuator must be dismantled and the elements sorted into various material groups before disposal.

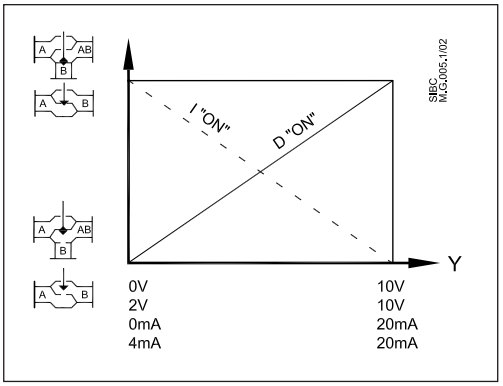
## Spring return activation

(AME 25 SD only)



## DIP switch setting




The actuator has a function selection DIP switch under the removable cover. In particular, if SW6 is set to ON, the actuator will perform as 3-point actuator.
The switch provides the following functions:

**• SW1: U/I - Input signal type selector:**
If set to OFF position, voltage input is selected. If set to ON position, current input is selected.

**• SW2: 0/2 - Input signal range selector:**
If set to OFF position, the input signal is in the range from 2 V to 10 V (voltage input)
or from 4 mA to 20 mA (current input). If set to ON position, the input signal is in the range from 0 V to 10 V (voltage input) or from 0 mA to 20 mA (current input).

**• SW3: D/I - Direct or inverse acting selector:**
If set to OFF position, the actuator is direct acting (stem lowers as voltage increases). If actuator is set to ON position the actuator is inverse acting (stem raises as voltage increases).

**• SW4: —/Seq - Input signal range in sequential mode:**
If set to OFF position, the actuator is working in range 0(2)…10 V or 0(4)…20 mA. If set to ON position, the actuator is working in sequential range; 0(2)…5 (6) V or (0(4)…10 (12) mA) or (5(6)…10 V) or (10(12)…20 mA).

**• SW5: 0…5V/5…10V - Normal or sequential mode selector:**
If set to OFF position, the actuator is working in sequential range 0(2)…5 (6) V or 0(4)…10 (12) mA. If set to ON position, the actuator is working in sequential range; 5(6)…10 V or 10(12)…20 mA.

**• SW6: Prop./3-pnt - Modulating or 3-point mode selector:**
If set to OFF position, the actuator is working normally according to control signal. If set to ON position, the actuator is working as 3-point actuator.

**• SW7: LOG/LIN - Equal percentage or linear flow through valve selector [1]:**
If set to OFF position, the flow through valve is equal percentage. If set to ON position, the he flow through valve is linear according to control signal.

**• SW8: 100% $K_{VS}$/Reduced $K_{VS}$ - Flow reduction through valve selector [1]:**
If set to OFF position, the flow through valve is not reduced. If set to ON position, the he flow through valve reduced by half of increment standard $K_{VS}$ values (exsample: valve with $K_{VS}$ 16 and SW8 set to ON – maximum flow through the velve is $K_{VS}$13 (meidle between standard $K_{VS}$ 16 and $K_{VS}$ 10).

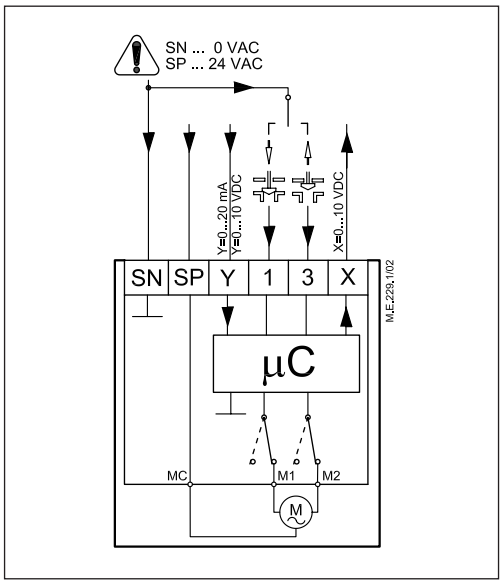
[1] NOTE: To be used only in combination with valves with equal percentage characteristic.

**• SW9: Reset:**
Changing this switch position will cause the actuator to go through a self stroking cycle.

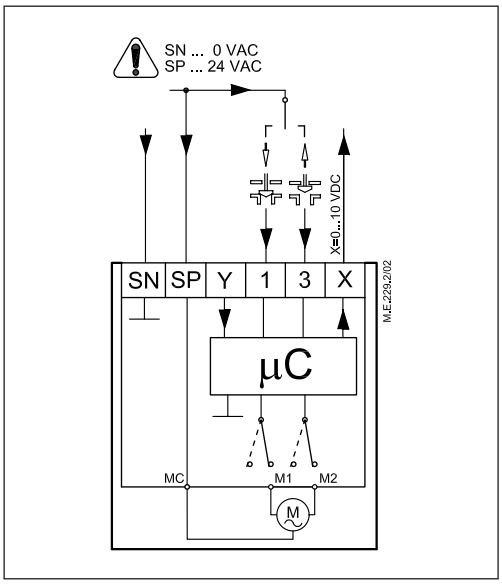
## Wiring

***24 Vac only.***

*Wiring for modulating control*




*Wiring for 3-point control*




**Automatic self stroking feature**
When power is first applied, the actuator will automatically adjust to the length of the valve stroke. Subsequently, the self stroking feature can be re-initialised by changing position of SW9.

**Diagnostic LED**
The red diagnostic LED is located on the pcb under the cover. It provides indication of three operational states: Actuator Healthy (Permanently ON), Self Stroking (Flashes once per second), Error (Flashes 3 times per second - seek technical assistance).

| Wiring length | Recommended square of the wiring |
|---|---|
| 0 - 50 m | 0.75 mm$^2$ |
| > 50 m | 1.5 mm$^2$ |

SP 24 V~ .....Power supply

SN 0 V .....Common

Y 0 to 10 V .....Input signal
(2 to 10 V)
0 to 20 mA
(4 to 20 mA)

X 0 to 10 V .....Output signal
(2 to 10 V)

## Commissioning

Complete the mechanical and electrical installation and perform the necessary checks and tests:

- Isolate control medium. (e.g. self stroking in a steam application without suitable mechanical isolation could cause a hazard).
- Apply the power. Note that the actuator will now perform the self stroking function.
- Apply the appropriate control signal and check the valve stem direction is correct for the application.
- Ensure that the actuator drives the valve over its full stroke, by applying the appropriate control signal. This action will set the valve stroke length.

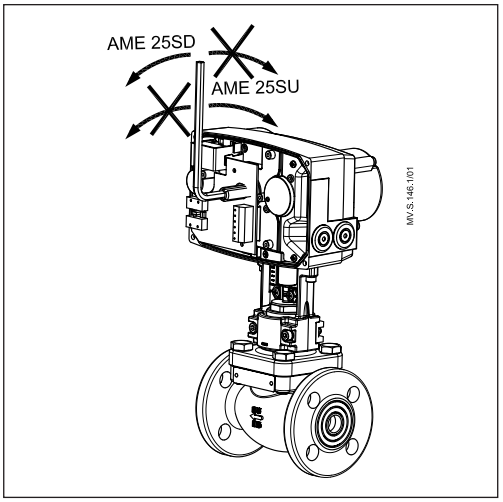
The unit is now fully commissioned.

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

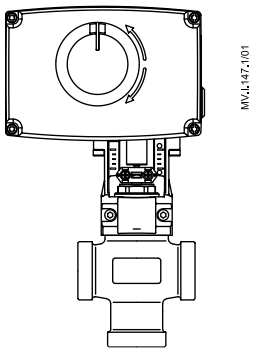
## Manual override

On spring versions manual override is achieved by disconnecting the power supply, removing the cover and inserting a
5 mm Allen key (not supplied) into the top of the positioning spindle and turning the key against the spring. Observe the direction of rotation symbol. To hold a manual override position, the key must be wedged.

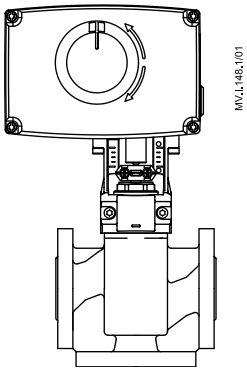
If manual override has been used then X and Y signal are not correct until the actuator reaches its end position. If this is not accepted reset the actuator, or apply accessory active return kit.



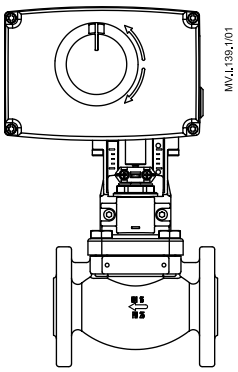

## Actuator - valve combinations



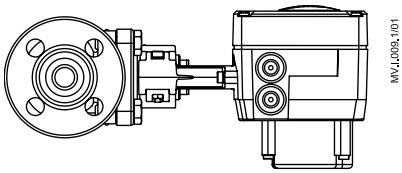

*AME 25 SD / SU +*
*VRB 3, VRG 3 (DN 15 - 50)*




*AME 25 SD / SU +*
*VL 2-3 / VF 2-3 (DN 15 - 50)*

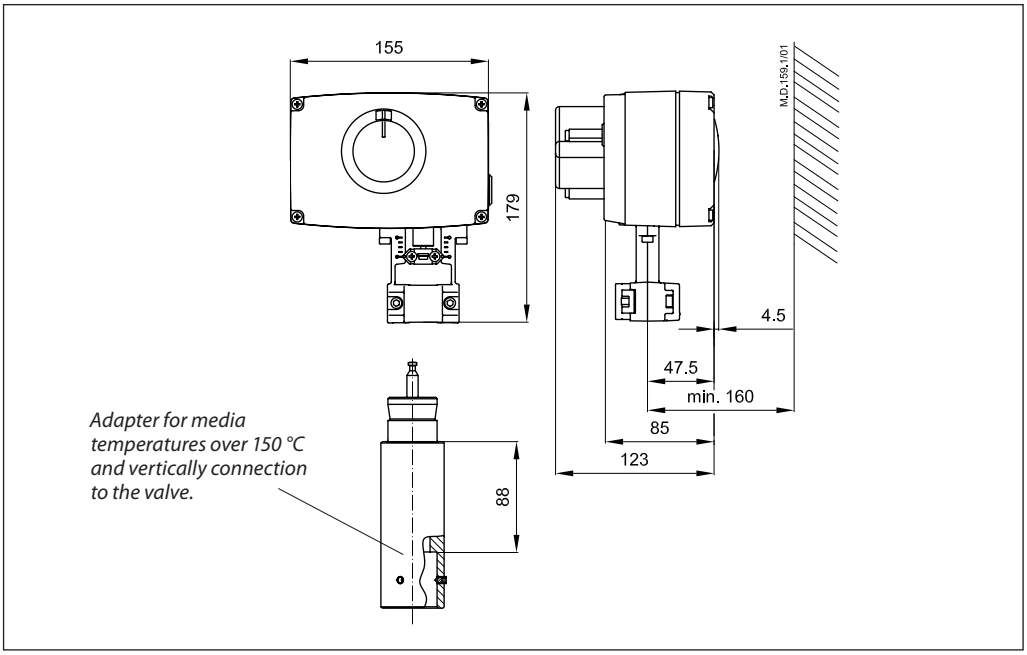



*AME 25 SD / SU +*
*VFS 2 (DN 15 - 50)*
*VEFS 2 (DN 25 - 50)*




*AME 25 SD / SU +*
*VEFS 2 (DN 25 - 50) - 200 °C*

## Dimensions


155
179
M.D.159.101
4.5
47.5
min. 160
85
123
Adapter for media temperatures over 150 °C and vertically connection to the valve.
88