

# MiniFlush 40

Prefabricated Flushing Bypass Assembly for Terminal Applications



## Overview

Miniflush 40 is a prefabricated flushing bypass arrangement for balance, control, isolation and operation of terminal devices. It is designed for use with fan coil units, chilled beams and other terminal devices where the flow is controlled via a pressure independent control valve and isolation, drain, flushing bypass and flow measurement is required.

## Product Information

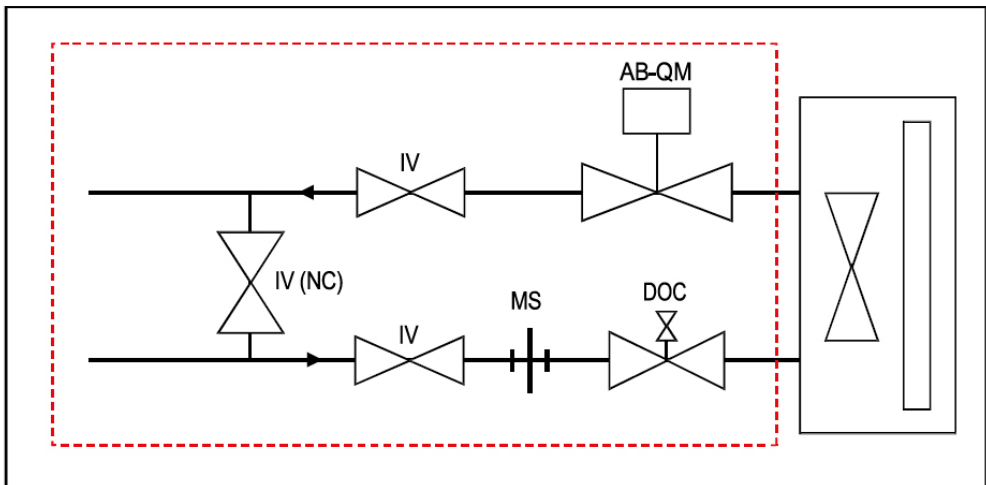
- Compact, prefabricated design
- Factory pressure tested assembly
- Each assembly is labelled with FCU location and Miniflush 40 instructions
- High flow DN15 option for direct connection to CHW terminals with flows up to 0.315 l/s
- Low flow option for LTHW flow rates down to 0.008 l/s
- Left and right-handed versions to prevent clashes within the fan coil
- A wide range of connection options, including BSP, compression and solder connections to the coil
- Danfoss AB-QM type pressure independent control valve for balance at full or partial loads
- A comprehensive range of actuators to enable it to be connected to a building management system or other controllers
- Flow mounted drain for flushing and quick drain downs
- Flow measurement function in all sizes



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# Technical Information

## Schematic and Design



### Schematic Symbol Guide

- AB-QM -Pressure Independent Control Valve (actuator supplied separately)
- DOC -Drain point
- IV -Isolation valve
- MS -Measuring station

## Ordering

Miniflush Type	Position of Terminal	Nominal Valve Flow Rate l/h	Recommended Q Max (l/h)	Recommended Q Min (l/h)	Orifice kVs	Connection Size	Connection Type Pipework	Connection Type Terminal	Actuator Type Modulating	Actuator Type 3-Point	Actuator Type Thermic
40 10LF0.3	Left Handed	150	60	30	0.3	3/4" BSP	Internal Threaded	Solder	AME 110NL	AMV 110NL	TWA-Z
40 15LF0.6	Left Handed	275	90	60	0.6						
40 15LF0.9	Left Handed	275	230	90	0.9						
40 15 2.1	Left Handed	450	450	230	2.1						
40 15HF 4.0	Left Handed	1135	600	450	4.0						
40 15HF 5.6	Left Handed	1135	1135	600	5.6						
40 10LF0.3	Right Handed	150	60	30	0.3						
40 15LF0.6	Right Handed	275	90	60	0.6						
40 15LF0.9	Right Handed	275	230	90	0.9						
40 15 2.1	Right Handed	450	450	230	2.1						
40 15HF 4.0	Right Handed	1135	600	450	4.0						
40 15HF 5.6	Right Handed	1135	1135	600	5.6						

### Notes:

The recommended flow rates are to enable accurate measurement of flow.  
 Actuators must be ordered separately.  
 Options are available for connection to the pipework and terminal. Please discuss with your representative prior to ordering.

# Operational Modes



## Supply

This is the normal operation of the Miniflush, with flow going through terminal, and out through the return, back to the system.

The AB-QM valve will balance by limiting the flow to the coil, and the actuator will control flow as per the temperature requirement.

## Flushing

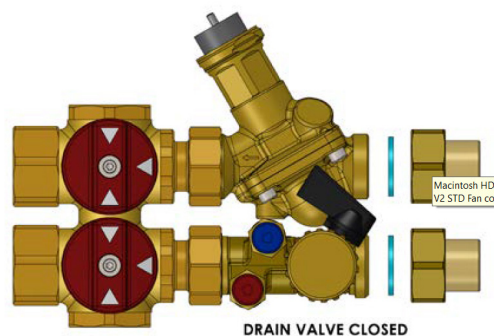
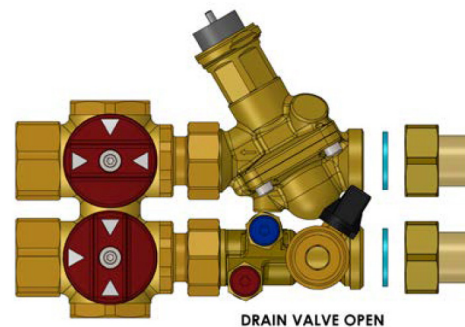
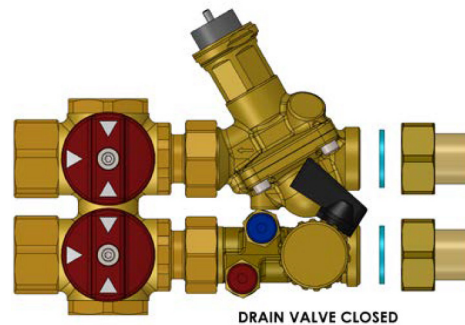
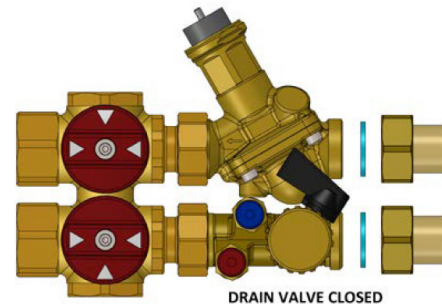
During system flushing, the terminal will be isolated, but a flow around the main system is required. To enable bypassing we have positioned a flushing bypass within the Miniflush assembly, which can open a link between flow and return, to enable mainline system flow for flushing.

## Back Flushing

To enable flushing through the terminal, the return can be opened, with the flow and bypass isolation valves closed. The drain is then opened to allow flow through the coil and any coil debris will be released through the flow side drain point.

## Isolation

For a variety of reasons, it may be required to completely isolate the terminal. For this we can isolate the flow and return and close the bypass to remove all flow through the coil and bypass.



# PICV Specification

## Description

The precise flow control performance of the AB-QM with a Danfoss actuator provides increased comfort and superior Total Cost of Ownership because of savings made on:

- Efficient energy transfer and minimal pumping costs since there are no overflows at partial loads because of the exact pressure independent flow limitation.
- Smaller pump investments and lower energy consumption as the pump head needed are lower than in the traditional setup. With the built-in test plugs, it is easy to troubleshoot and find the optimal setpoint for the pump.
- Reduced movements of the actuator since the built-in differential pressure controller ensure the pressure fluctuations do not influence the room temperature.
- Achieving a stable temperature in a room leading to a lower average temperature at the same comfort level.
- Minimal flow complains as the valve performs as designed.
- Minimal blockage complains as the membrane design makes AB-QM less susceptible to blockage than a cartridge type constriction.
- Trouble-free segmentation of the building project. When sections of a project are finished, they can normally not be handed over to the customer with a fully functional HVAC installation. However, the AB-QM with a Danfoss actuator will automatically control the flow, even when other parts of the installation are still unfinished. It's not needed to adjust the AB-QM after finalisation of the project.
- Commissioning costs, the costs are close to zero because of a convenient setting procedure without the need for flow charts, calculations, or measuring equipment. The AB-QM valves can be set to a precise design value even when the system is up and running.
- Halved mounting costs as the AB-QM valve covers two functions, Balancing & Control.



## Operation of the AB-QM Balancing and Control Valve

### 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.

### Control valve Cv

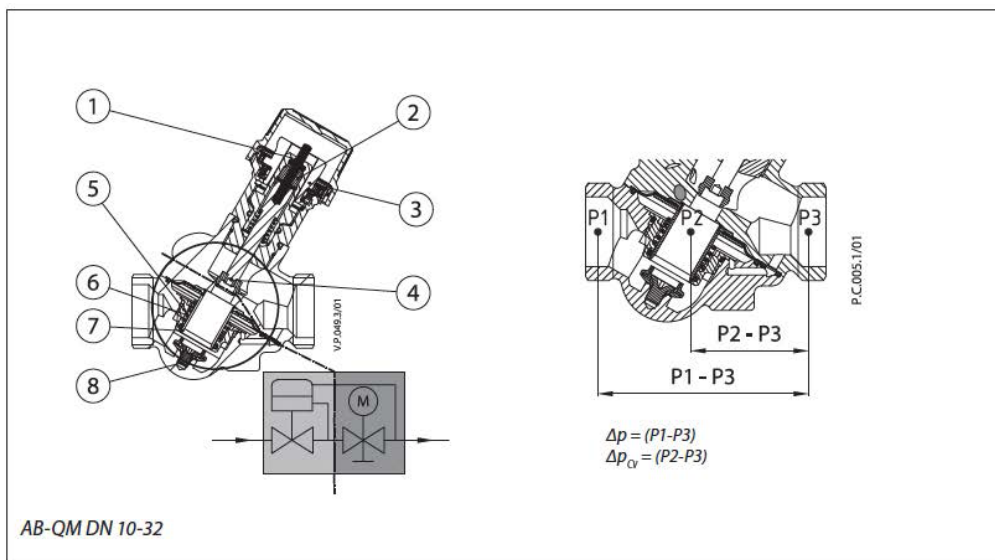
The control valve has a linear characteristic. It features a stroke limitation function that allows adjustment of the Kv value. The percentage marked on the scale equals the percentage of 100 % flow marked on the pointer. Changing the stroke limitation is done by lifting the locking mechanism and turning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

# PICV Technical Details



## Design

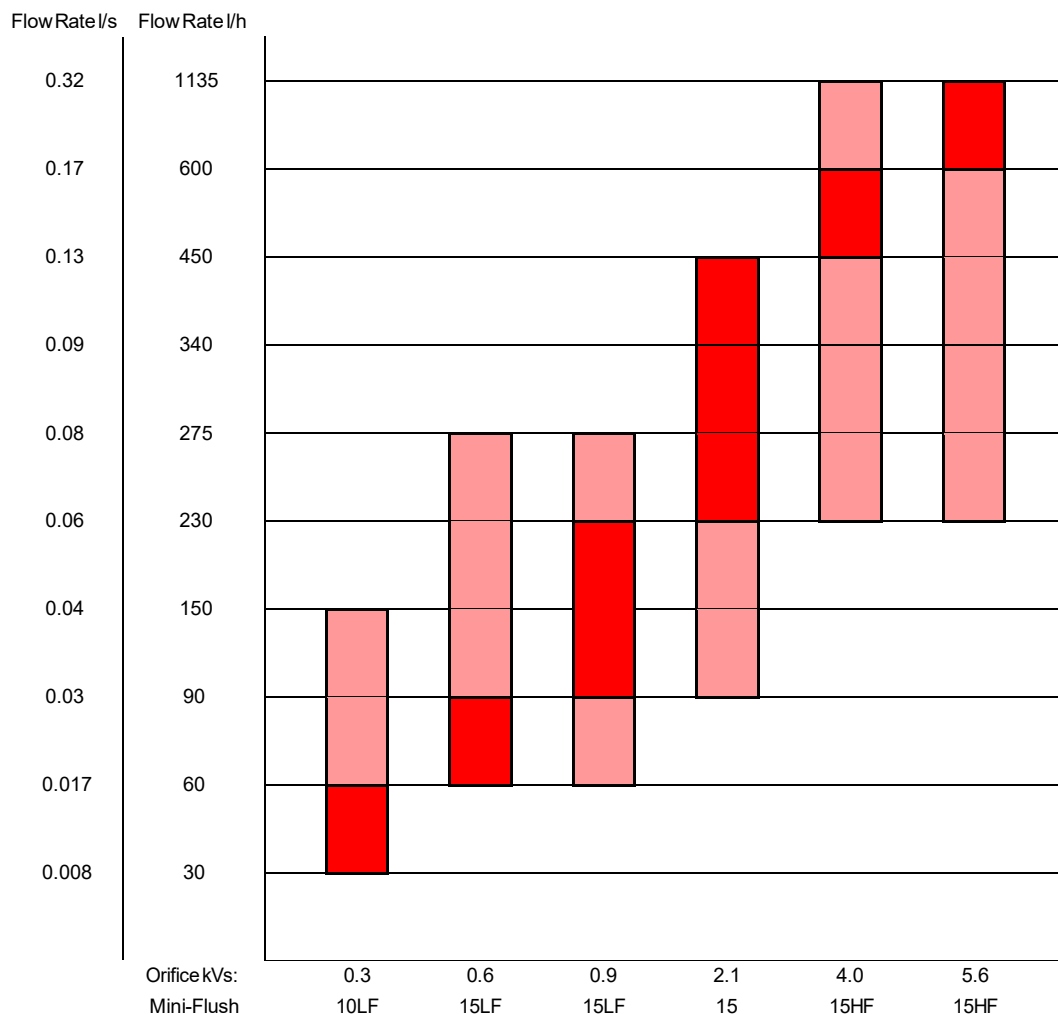
1. Spindle
2. Stuffing box
3. Pointer
4. Control valve's cone
5. Membrane
6. Main spring
7. Hollow cone (pressure controller)
8. Vulcanized seat (pressure controller)



Size		10LF	15LF	15	15HF
Flow Range l/s	Nom	0.042	0.076	0.125	0.315
	Min	0.008	0.015	0.025	0.063
Standard Setting Range		20-100%			
Starting Differential Pressure	kPa	16	16	16	35
Max Differential Pressure	Bar	6	6	6	6
Control Range		1:1000			
Control Characteristic		Linear/Logarithmic with actuator			
Leakage Rate		Novisibleleakage			
Flow Medium		Water and water mixtures for closed heating and cooling systems according to plant type I for DIN EN14868			
Pressure Rating	PN	16			
Medium Temperature	°C	-10...+120			
Storage and Transport Temp	°C	-40...70			
Stroke	mm	2.25			
PICV Connection		Union Threaded/Solder			
Body Material		DZR Brass			
Membrane and O-Ring Material		EPDM			
Control Valve Cone Material		CuZn40Pb3-CW614N			



# Selection Chart



## Notes

This chart is for guidance only. Any selections must be checked with an Essco representative before a final selection can be made.

To select a manifold size take your required design flow rate. Find the flow points it falls between on the flow axis, draw a line horizontally. Select the manifolds in red for optimum selection.

Where you have intersected a manifold in pink, you can select this manifold, but it may not be the optimum selection for accurate flow measurement, and you may experience high orifice pressure loss. PICV flow control performance will not be affected by selection within this range.



# PICV Specification



## Setting the AB-QM

The calculated flow can be adjusted easily without using special tools.

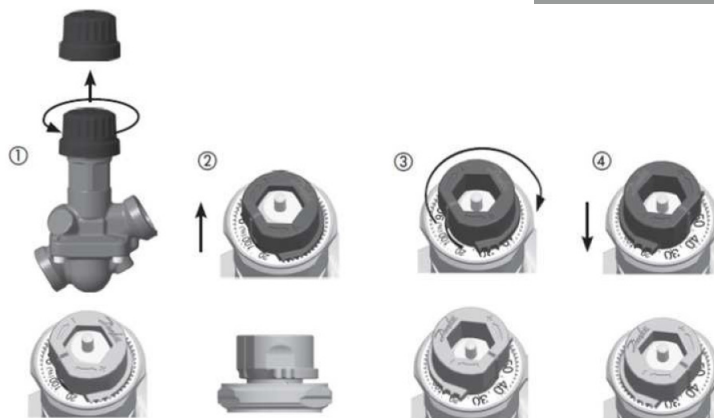
To change the presetting (factory setting is 100 %) follow the four steps below:

- 1) Remove the blue protective cap or the mounted actuator
- 2) Raise the grey pointer
- 3) Turn (clockwise to decrease) to the new presetting
- 4) Press grey pointer back into lock position. After click presetting is locked.

The presetting scale indicates values from 100% flow to 0%. Clockwise turning would decrease the flow value, while counter-clockwise would increase it.

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

Essco recommends a presetting/flow from 20% to 100%. Factory presetting is 100%.



## Verification of Flow Rate

To verify the flow rate, the following steps should be taken:

- 1) Find the kVs of the measuring station on the orifice kVs chart
- 2) Calculate the required pressure drop using the kVs and design flow rate, using the following formula:

$$Q = K_v \times \sqrt{\Delta P}$$

Note  $Q = m^3/h$ ,  $\Delta P = \text{Bar}$

- 3) Plug a manometer into the test points on the measuring station
- 4) If you are getting the required pressure, you have the desired flow rate

A guide to the expected pressure losses can be found in the chart below:

Manifold Type	Nominal Flow Rate l/h	Orifice Kvs	Measuring Station Pressure Drop at PICV Setting (kPa)								
			100%	90%	80%	70%	60%	50%	40%	30%	20%
Miniflush 40 10LF 0.3	150	0.3	25.0	20.3	16.0	12.3	9.0	6.3	4.0	2.3	1.0
Miniflush 40 15LF 0.6	275	0.6	21.0	17.0	13.4	10.2	7.5	5.2	3.4	1.9	
Miniflush 40 15LF 0.9	275	0.9	9.3	7.5	5.9	4.5	3.4	2.3	1.5		
Miniflush 40 15 2.1	450	2.1	4.6	3.7	2.9	2.3	1.7	1.1			
Miniflush 40 15HF 4.0	1135	4.0	8.0	6.5	5.2	3.9	2.9	2.0	1.3		
Miniflush 40 15HF 5.6	1135	5.6	4.1	3.3	2.6	2.0	1.5	1.0			

The highlighted cells indicate the best settings for flow rate measurement

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# Dimensions DN15

