AB-PM:
The exceptional solution for Shopping Centers and Shell & Core

Optimal differential pressure control and flow limitation for each individual zone

4 functions in one valve provides flexible flow control
Shell & core and base building

The exceptional solution

Not all HVAC installations are designed and built by the same company and the same time:

**Shopping malls:** Systems are built up to the shop facade. The installation inside the shop is built and designed by the shop owner.

**Shell & Core:** Typically office buildings where the main infrastructure is put in place but only up to the rental space. Before the occupant occupies his rented floorspace it is fitted out with all the needed HVAC systems.
How to gain control of HVAC system?

Shopping mall
Challenge

The building owner has little or even no control over the installation that the tenant will design and build.

Challenges:

- Bad design of occupants area due to unprecise system information
- Balancing of (oversized) systems
  - Some zones cannot get sufficient flow due to overflow in others
  - Users are complaining about bad comfort
- Long complicated commissioning process / handover
Requirements
Building owner

Reliable HVAC system with low TCO

- Provide precise design conditions for the renter to design their installation -> X flow at Y ΔP
- Easy, fast and simple design process
- Flexible system (easy to change the basic parameters)
- Pre-commissioning of the building (balancing) thus the occupants just needs to connect

There was no a single product that could supply these functions!
(Limit the Q and control the ΔP)
Presenting: Danfoss AB-PM

- **Sizes**: DN10 – DN100
- **Nominal maximal pressure**: 16 bar
- **Max. Pressure drop**: 4 bar
- **Temperature**: -10...+120°C
- **Connections**:
  - DN 10-50: External thread (ISO 288/1)
  - DN 65-100: Flange (EN 1092-2)
- **Actuator**: On/off (DN10-32) Modulating
Presenting: Flexibility
Danfoss AB-PM DN 40-100

DPCV
AB-PM functionality

to

PICV
AB-QM functionality
Staged installation, handover and commissioning:

1\textsuperscript{st} stage:
Ensure differential pressure and flow (Q) for each zone
– handover to building owner

2\textsuperscript{nd} stage:
Installation of terminal units
– handover to tenant
Staged installation, handover and commissioning:

1st stage

2nd stage

DPCV – AB-PM
Vacant zone

DPCV function
(‘AB-PM functionality’)
Multiple terminal units

PIBCV function
(‘AB-QM functionality’)
Single terminal unit
Staged commissioning

1st stage

Base building/ "shell" is constructed

Ensure $\Delta p$ and flow for each zone

DPCV – differential pressure controller
Staged commissioning

2nd stage

Occupant create their own installation
New built or Renovation

AB-PM
6 Benefits in one compact valve body
Danfoss AB-PM

- Controls the differential pressure
- Limits the flow
- Control with actuator
- Flexible zone design
- Shut off
- Flow verification DN 40-100
Sizing / Selection

Pressure legend

\( Q = \) needed design flow for the loop

\( \Delta p_r = \) needed differential pressure for the loop

\( \Delta p_v = \) differential pressure on AB-PM

\( \Delta p_a = \) min. available differential pressure (for both AB-PM and loop)

\( \Delta p_a = \Delta p_v + \Delta p_r \)
Sizing / setting

**AB-PM DN 40-100**

1. Select valve size based on needed flow rate and Δp demand of loop

2. Setting of valve based on sizing diagram or table

3. a. Increase Δp setting range if higher Δp/flow is needed than given by factory setting

<table>
<thead>
<tr>
<th>Factory setting</th>
<th>DN 40-100</th>
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<tr>
<td>Δp setting</td>
<td>min. setting</td>
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<tr>
<td>Flow %</td>
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</table>

   b. Adjust flow limitation scale if design Δp/flow is lower than factory setting
Sizing / setting
Sizing graph/table for DN 40

Example 1
*Given:* Design flow to zone 5000 l/h, pressure drop over the zone at design flow 35 kPa.

*Solution:* AB-PM DN 40 is selected. Δp setting turned 5 times clockwise while % flow is left at factory setting 100%.

Example 2
*Given:* Design flow to zone 5544 l/h, pressure drop over the zone at design flow 20 kPa.

*Solution:* AB-PM DN 40 is selected. Flow presetting should be 80% on AB-PM flow limiter part.
Add value in all phases
The quick and easy design and build process

**Design**
- Save design time
- No $k_{vs}$ or authority calculations
- Easy pump-sizing

**Construction**
- Save installation and commissioning time
- No need for commissioning, just set and forget
- Easy to set
- Phased handover

**Operation**
- Guaranteed flow and differential pressure for users
- No problems from badly designed/executed tenant installations
- Unrented shops or floors do not impact other users
- Flow verification and easy troubleshooting
Save time at all stages and secure a high satisfaction rate among tenants

Results

- Better comfort for users
- Fewer complaints
- Save money on energy efficiency
- Flexible design and redesign of zones and shops
Pressure difference controller with flow limiter
Full size range

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<thead>
<tr>
<th>Description*</th>
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<tbody>
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* For more information see AB-PM datasheet
Reference project
Shopping mall and office building

Post am Rochus, Vienna, Austria
- Investor: Öster. Post AG
- Installer: Hely-Hofstätter
- 50.000m² office, 5.000m² shopping mall

Used Danfoss products
- RA-DV, TWA-K 700 pcs. – 10.000 €
- VF2/3 MCV – 22.000 €
- VFY butterfly valves – 37.000 €
- AB-PM (DN 40-50) and AB-QM – 30.000 €

AB-PM application
- Floor connection