

OPTIMA-R-FC...BM

VAV Controller, Belimo Modbus Modular

Handbook



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Description

OPTIMA-R-FC...BM is a variable air volume controller with or without an insulation. The product is intended to control the flow volume of supply or return air. The product is installed into circular ducts of 80 mm up to 630 mm in diameter. The product is ideal for all applications, where a variable air flow volume in ventilation, cooling or heating is required (offices, hotel rooms, meeting rooms, health care premisses, residentials, etc.)

Highlights

- Damper tightness class 4 according to EN 1751
- Casing tightness class C according to EN 1751
- High measurement/control accuracy of 5 %
- Air volume range of 36 m³/h to 12344 m³/h
- Operating range of pressure drop up to 1000 Pa
- Actuators with quick transition or safety positioning function available
- Insulated version OPTIMA-RI-FC...BM with external insulation for sound reduction

Types of Product

- **OPTIMA-R-FC...BM:** Non-insulated VAV controller
- **OPTIMA-RI-FC...BM:** Insulated VAV controller

Type of Controller

- **BM:** Modbus-RTU or BACnet MS/TP switchable port for communication of all variables, analog setpoint and feedback signals DC 0 (2)V ... 10 V applicable

Types of Actuators

- **S:** Standard actuator
- **Q:** Actuator with short transition time
- **QE:** Actuator with short transition time and electric safety function
- **F:** Actuator with mechanical safety function – spring return

List of Accessories

- **ZTH-EU:** Handheld Tool
- **ZIP-BT-NFC:** Communication Port Bluetooth/NFC

Design

OPTIMA-R-FC...BM is manufactured from galvanized steel sheet. The product consists of a casing, a duct connection with a rubber gasket, a damper blade with a rubber gasket and a modular VAV control device. OPTIMA-RI-FC...BM is equipped by an insulation for sound reduction. The insulation is a 19 mm thick closed cell foam mat, protected by galvanized steel sheet. The modular VAV control device consists of an aluminium measurement probe, polyurethane measurement impulse tubes, an air flow transmitter, a modular control unit and an actuator. The measurement probe is a special design cross. It is a multi-point averaging flow sensor for accurate air flow readings. The measurement impulse tubes connect the measurement probe with the air flow transmitter.

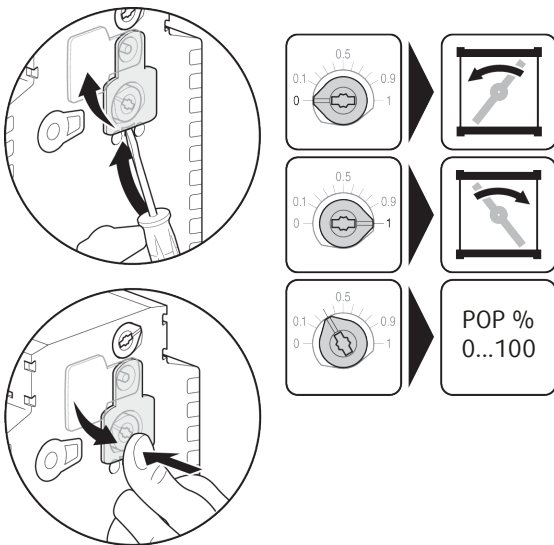
Actuators

- **S**: Standard actuator
- **Q**: Actuator with short transition time
- **QE**: Actuator with short transition time and electric safety function

The default manufacturer setting of the actuator safety function is **closing after power supply interruption**.

Upon request the manufacturer setting can be changed to **opening after power supply interruption**. Adjustment of intermediate final safety position (0% ... 100% opening) is possible.

The possibility to change the safety function on site is available.



- **F**: Actuator with mechanical safety function – spring return

The default manufacturer setting of the actuator safety function is **closing after power supply interruption**.

Upon request the manufacturer setting can be changed to **opening after power supply interruption**.

| DN | T _{max} (Nm) | OPTIMA-R-FC...BM-S/Q/QE/F | | | |
|-----|-----------------------|---------------------------|------------|------------|-----------|
| | | S | Q | QE | F |
| 80 | 4 | LM24A-VST | LMQ24A-VST | NKQ24A-VST | LF24A-VST |
| 100 | 4 | | | | |
| 125 | 4 | | | | |
| 140 | 4 | | | | |
| 160 | 4 | | | | |
| 180 | 4 | | | | |
| 200 | 4 | | | | |
| 225 | 4 | | | | |
| 250 | 4 | | | | |
| 280 | 4 | | | | |
| 315 | 4 | | | | |
| 355 | 5 | | | | |
| 400 | 5 | NM24A-VST | NMQ24A-VST | - | NF24A-VST |
| 500 | 8 | | SMQ24A-VST | - | |
| 630 | 10 | | | | |

| | ∠ | ⌚ | ⌚⊗ | P _r (VA) | P (W) |
|------------|-----|----------|--------|---------------------|-------|
| LM24A-VST | 90° | ⌚/⌚120 s | - | 4 | 2,5 |
| NM24A-VST | 90° | ⌚/⌚120 s | - | 6 | 3,5 |
| LMQ24A-VST | 90° | ⌚/⌚2,5 s | - | 25 | 14,5 |
| NMQ24A-VST | 90° | ⌚/⌚4 s | - | 25 | 14,5 |
| SMQ24A-VST | 90° | ⌚/⌚7 s | - | 28 | 16,5 |
| NKQ24A-VST | 90° | ⌚/⌚4 s | ⌚4 s | 24 | 12,5 |
| LF24A-VST | 90° | ⌚/⌚120 s | ⌚<20 s | 7 | 4 |
| NF24A-VST | 90° | ⌚/⌚120 s | ⌚<20 s | 10 | 6,5 |

Legend

∠

Positioning angle

⌚

Transition time

⌚⊗

Transition time without power supply (safety function)

P_r (VA)

Power rating (actuator + controller VRU...)

P (W)

Power consumption in operation (actuator + controller VRU...)

Noise and thermal insulation material for OPTIMA-RI-FC...BM

| | |
|-----------------------------------|--|
| Base | NBR/PVC |
| Cellular Structure | Closed |
| Colour | Black |
| Density | 80 kg/m ³ |
| Water Absorption | 2 % < 5 % |
| Resistance | Air+ U.V.-Good |
| Thermal Conductivity (t. + 40 °C) | < 0,039 W/m K |
| | Class 1 (DM 26/06/84) |
| | UL 94-HF1 |
| Fire Resistance | Class 0 - BS 476 part6-7 UK |
| | NF certificate n.38 (until mm.32) France |
| | B-s3,d0 (EN 13501-1) Euroclass |
| Marine and Shipbuilding | MED B - MED D - DNV type approval |
| Steam Diffusion | MU > 7.000 |
| Noise Reduction (DIN 4109) | Up to 30 dB |
| Ecological Compatibility | NO CFC - HCFC, asbest free |

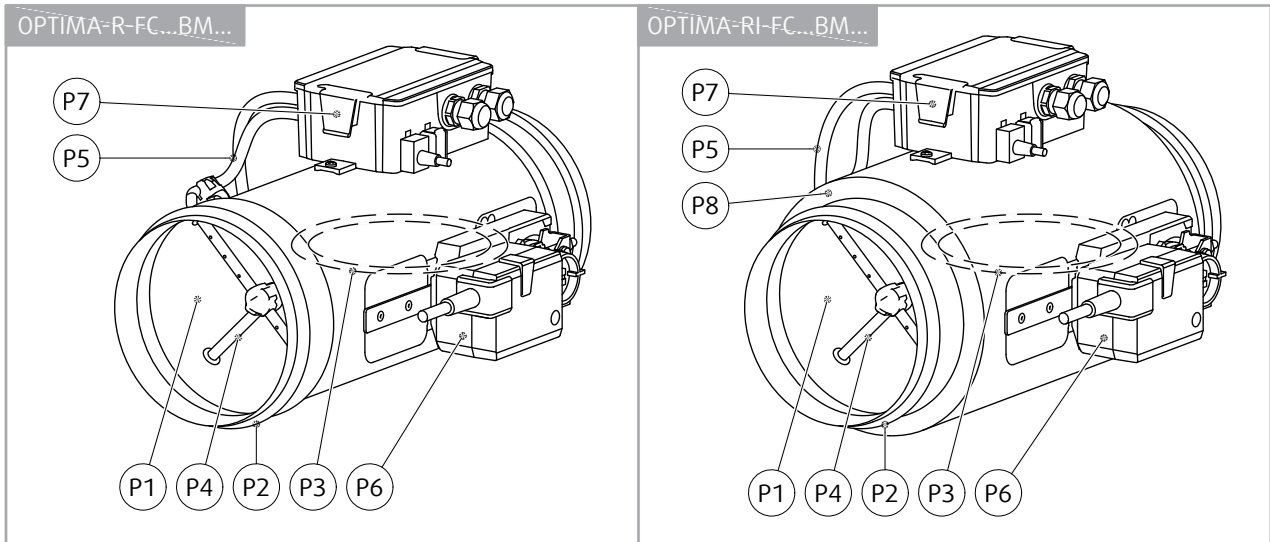
Controls

The VAV controllers are equipped by OEM control module and actuator from Belimo. The control units are factory calibrated as standard to the air volume control range $V_{\min} \dots V_{\max}$. The dimension table shows this standard setting. Upon request the control range $V_{\min} \dots V_{\max}$ can be adjusted to customized settings prior to dispatch. The air volumes can also be re-adjusted on site with ZTH-EU hand held service tool. If specific air values for V_{\min} and V_{\max} would be required, this must be indicated prior to order of the units for adequate calibration in the factory.

Modular Control/Actuator Unit Functionality Description

| {Compact Control/Actuator Unit} | Analog Input | BUS Communication | Parameters Setup | Hard Wired Override | Feedback Signal | Feedback Values | Main BUS Com. Variables | Power Supply |
|---------------------------------|-----------------------|----------------------------|----------------------|--|--|----------------------------------|--|--------------|
| BM-S BM-Q BM-QE BM-F | DC 0 V (2 V) ... 10 V | Modbus-RTU BACnet MS/TP | ZTH-EU ZIP-BT-NFC | OPEN, CLOSE, P _{min} , P _{max} | Modbus-RTU BACnet MS/TP DC 0(2) V ... 10 V | Actual pressure, Damper angle | Read/write : Setpoint, P _{min} , P _{max} , OPEN, CLOSE Read: Actual pressure, damper angle, serial number, fault/alarm messages | AC/DC 24 V |

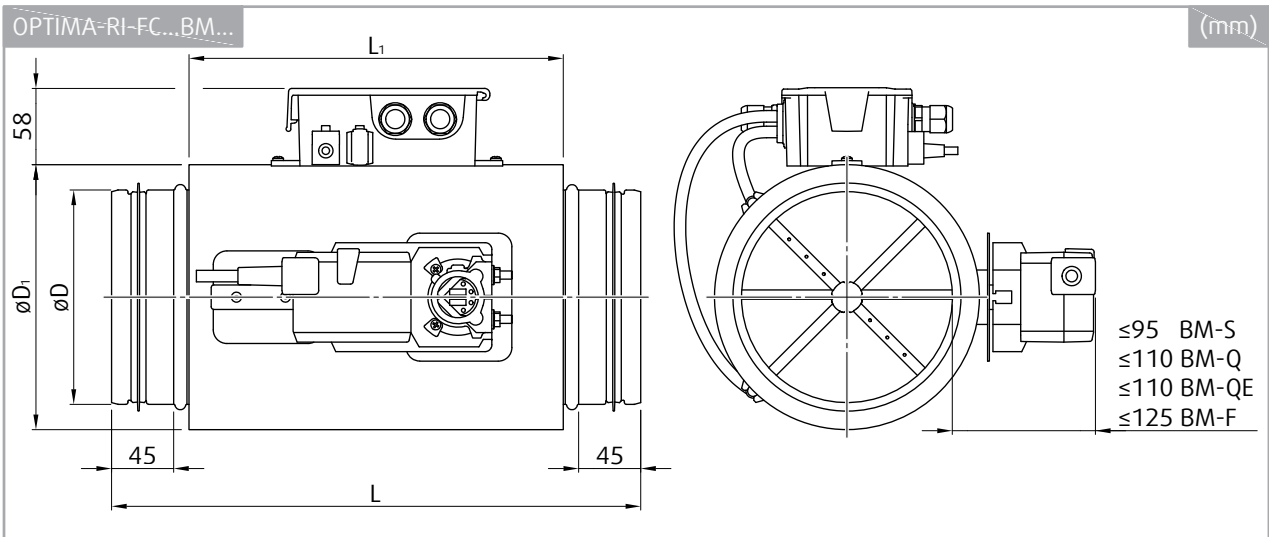
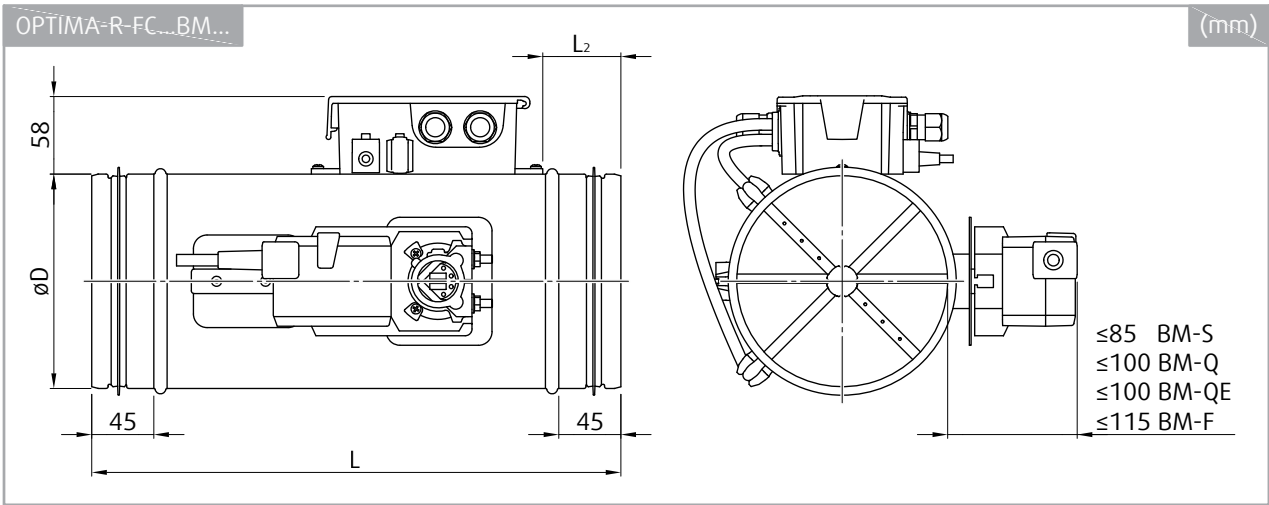
Product Parts



Legend

- P1** Casing
- P2** Duct connection with gasket
- P3** Damper blade with gasket
- P4** Measurement probe
- P5** Measurement impulse tubes
- P6** Modular control/actuator unit
- P7** Air flow transmitter
- P8** Insulation

Dimensions & Weights



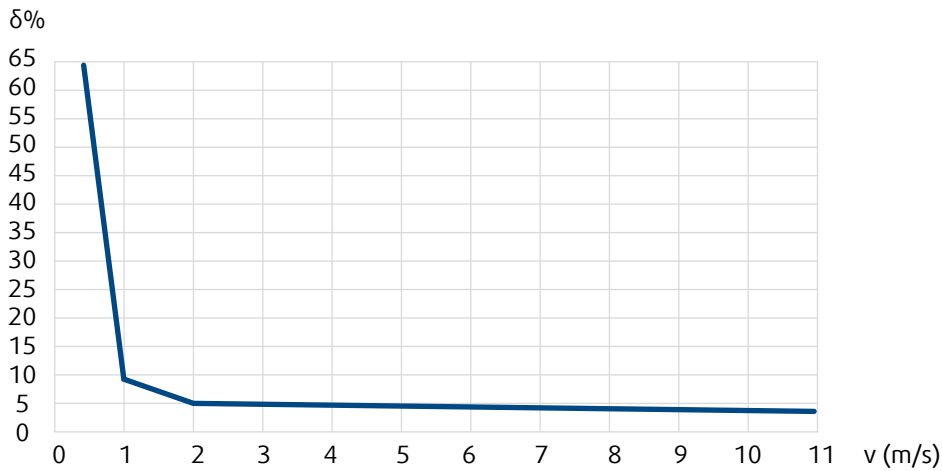
| DN | V_{\min} @ 2 m/s * | | V_{\max} @ 9 m/s * | | V_{nom} @ 11 m/s * | | $\varnothing D$ | L | $\varnothing D_1$ | L_1 | m (R) | m (RI) |
|-----|----------------------|-----|----------------------|------|-----------------------------|------|-----------------|-----|-------------------|-------|-------|--------|
| | m ³ /h | l/s | m ³ /h | l/s | m ³ /h | l/s | | | | | | |
| 80 | 36 | 10 | 163 | 45 | 199 | 55 | DN-2 | 290 | 117 | 180 | 1,2 | 1,6 |
| 100 | 57 | 16 | 254 | 71 | 311 | 86 | | | 137 | | 1,4 | 1,8 |
| 125 | 88 | 24 | 398 | 111 | 486 | 135 | DN-2,5 | 390 | 162 | 280 | 1,6 | 2,4 |
| 140 | 111 | 31 | 499 | 139 | 610 | 169 | | | 177 | | 1,8 | 2,7 |
| 160 | 145 | 40 | 651 | 181 | 796 | 221 | | | 197 | | 2,0 | 3,0 |
| 180 | 183 | 51 | 824 | 229 | 1008 | 280 | | | 217 | | 2,2 | 3,3 |
| 200 | 226 | 63 | 1018 | 283 | 1244 | 346 | | | 237 | | 2,8 | 4,4 |
| 225 | 286 | 79 | 1288 | 358 | 1575 | 438 | | 490 | 262 | 380 | 3,5 | 5,3 |
| 250 | 353 | 98 | 1590 | 442 | 1944 | 540 | | | 287 | | 4,2 | 6,2 |
| 280 | 443 | 123 | 1995 | 554 | 2438 | 677 | | 590 | 317 | 480 | 5,0 | 7,7 |
| 315 | 561 | 156 | 2525 | 701 | 3086 | 857 | | | 352 | | 5,6 | 8,6 |
| 355 | 713 | 198 | 3207 | 891 | 3920 | 1089 | | | 392 | | 6,4 | 9,8 |
| 400 | 905 | 251 | 4072 | 1131 | 4976 | 1382 | 437 | | 8,0 | | 11,7 | |
| 500 | 1414 | 393 | 6362 | 1767 | 7775 | 2160 | DN-3 | 790 | 537 | 680 | 12,7 | 19,2 |
| 630 | 2244 | 623 | 10100 | 2806 | 12344 | 3429 | | | 667 | | 17,6 | 26,8 |

NOTES:

* Standard factory air volume setting if not indicated upon order.

The V_{\min} can be adjusted from 0 m³/h to V_{nom} value from the table above.

The V_{\max} can be adjusted from 20 % to 100 % of the V_{nom} value from the table above.



Typical max. absolute control deviation δ from actual air flow dependent on the air flow velocity v in the duct

Ordering Codes

OPTIMA-R-FC...BM

Non-insulated VAV Controller

OPTIMA-R-FC

Nominal Size

DN

OEM Belimo, Communication Type

BM Switchable: Modbus-RTU or BACnet MS/TP or MP-Bus or analog setpoint/feedback DC 0 (2) V ... 10 V

Actuator Type

S Standard actuator

Q Actuator with short transition time

QE Actuator with short transition time and electric safety function (only for sizes \leq DN 400)

F Actuator with mechanical safety function – spring return

OPTIMA-RI-FC...BM

Insulated VAV Controller

OPTIMA-RI-FC

Nominal Size

DN

OEM Belimo, Communication Type

BM Switchable: Modbus-RTU or BACnet MS/TP or MP-Bus or analog setpoint/feedback DC 0 (2) V ... 10 V

Actuator Type

S Standard actuator

Q Actuator with short transition time

QE Actuator with short transition time and electric safety function (only for sizes \leq DN 400)

F Actuator with mechanical safety function – spring return

Example of the Ordering Code

OPTIMA-RI-FC-125-BM-F

Insulated VAV controller, nominal size 125, with spring return safety function actuator.

NOTES:

Standard setup of the control module is Modbus communication.

Standard setup of the V_{\min} and V_{\max} is indicated in the Dimensions and Weights table. It can be changed upon request, if requested as a note to the order.

Accessories

ZTH-EU

Handheld Tool



ZTH-EU is a handheld tool for VAV controllers and communicative actuators. The product enables the customer to change the configuration of the VAV controllers.

ZIP-BT-NFC

Communication Port Bluetooth/NFC



ZIP-BT-NFC is a wireless interface connecting the smartphone with configuration app Belimo Assistant via Bluetooth to the VAV controller VRU... with NFC communication protocol.



Configuration with ZTH-EU or by Belimo Assistant app via NFC or via Bluetooth through ZIP BT NFC

Parametrisation

| | | | Tool | | Authorisation |
|---|---|--|---------------|--------|---------------|
| Parameter/Function | Unit/Value | Function/Description/ (Area) | Assistant App | ZTH-EU | Expert/OEM |
| VAV Unit/Air Duct Pressure Control Butterfly Valve - Manufacturer Parameters (OEM Values - Not Variable) | | | | | |
| OSN Actuator | xxxxx-xxxxx-xxx-xxx | Actuator series number | r | - | |
| Rotation Direction | CCW/CW | Actuator direction of rotation setting | r/w | - | E |
| Range of rotation | Adapted/programmed | Actuator adapted/programmed 30°...95° | r/w | - | E |
| Power on behaviour | No action/synch. / adaption | Actuator power on behaviour | r/w | - | E |
| Parametrisation - Project-specific Settings | | | | | |
| Position | Text string | Plant designation (64 Z./ZTH 16 Z.) | r/w | r | |
| Max | m ³ /h l/s cfm (PC-tool/ ZTH %) % (position) | Operating volumetric flow 0% ... 100% V _{nom} Damper position (pos. ctrl.) 0% ... 100% | r/w | r/w | |
| Min | m ³ /h l/s cfm (PC-tool/ ZTH %) % (position) | Operating volumetric flow 0% ... 100% V _{nom} Damper position (pos. ctrl.) 0% ... 100% | r/w | r/w | |
| Altitude compensation | ON/OFF | Switch function ON/OFF | r/w | - | E |
| Altitude of installation | 0 m | Compensated Δp and volumetric flow values to set the altitude of installation (above sea level) | r/w | - | E |
| Function | VAV-CAV/position control | Control function | r/w | - | E |
| Room pressure cascade | ON/OFF | VAV: secondary circuit room pressure cascade | r/w | - | E |
| Setpoint | Analogue/bus | Analogue and hybrid mode/bus | r/w | - | E |
| Setpoint offset | 0 | VAV: ±5% compensation ABL unit | r/w | - | E |
| Reference signal Y | 2 V ... 10 V/0 V ... 10 V/ adjustable | Setting for VAV control | r/w | - | E |
| Feedback type | Volumetric flow/Δp/ position | VAV: volume/Δp/damper position Pressure: Δp/damper position | r/w | - | E |
| Feedback U | 2 V ... 10 V/0 V ... 10 V/ adjustable | Setting U signal | r/w | - | E |

Bus parameter

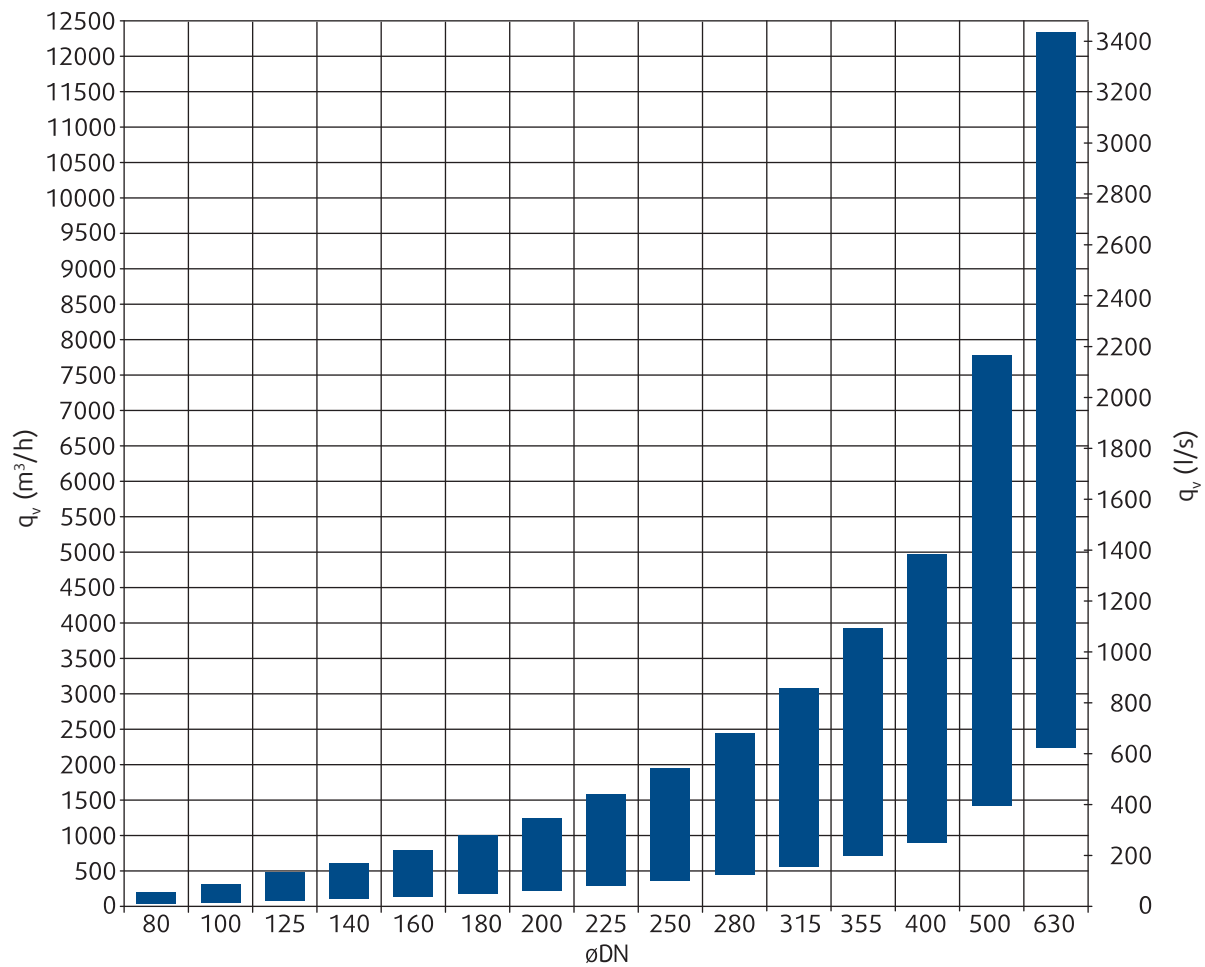
| | | | Tool | | Authorisation |
|--|------------------------------------|---|---------------|--------|---------------|
| Parameter/Function | Unit/Value | Function/Description/ (Area) | Assistant App | ZTH-EU | Expert/OEM |
| Parametrisation – Communication | | | | | |
| Bus protocol | BACnet MS/TP / Modbus / MP | | r/w | – | E |
| Bus protocol | BACnet MS/TP | | | | |
| MAC address | 0...127 | | r/w | – | E |
| Baudrate | 9600 / ... / 115200 | | r/w | – | E |
| Terminating resistor | OFF/ON | | r/w | – | E |
| Instance number | 1...4194304 | | r/w | – | E |
| Device name | VAV universal | (32 Z.) | r/w | – | E |
| Max master | 1...127 | | r/w | – | E |
| Bus protocol | Modbus RTU | | | | |
| Address | 1...247 | | r/w | – | E |
| Baudrate | 9600 / ... / 115200 | | r/w | – | E |
| Terminating resistor | OFF/ON | | r/w | – | E |
| Parity | 1-8-N-2/...E-1/...-0-1/...- N-1 | | r/w | – | E |
| Bus protocol | MP-Bus | | | | |
| MP address | PP/MP1...8 | PP (MP off)/MP1...8 | r/w | – | E |
| Bus fail position | 0 | 0% ... 100% (min...max) | r/w | – | E |
| Compatibility mode | Default/VRP-M | Default: Belimo MP datapool device VRP-M: VRP-M replacement in existing MP system | r/w | – | E |

Legend**X** Application supports function**r** Tool: read**w** Tool: write

– Tool: Does not support parameter

E Only visible in Expert Mode Authorisations - functionally relevant settings are only accessible via the Expert Level of the Belimo Assistant App.

Quick Selection



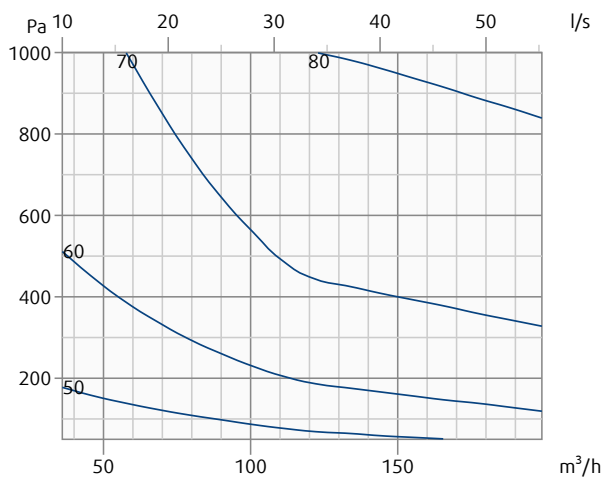
Technical Parameters

Legend

- p_s (Pa) Pressure drop
- q_v (m³/h or l/s) Air flow volume
- L_{WA} (dB(A)) A-weighted total radiated sound power level
- L_w (dB) Non weighted total sound power level

OPTIMA-R-FC-80-BM-F

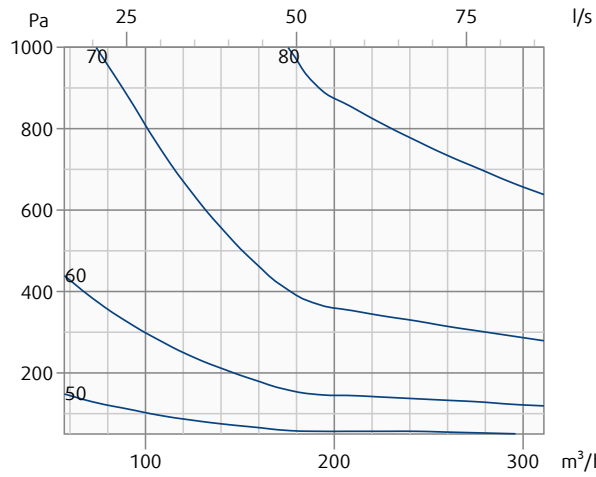
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_w | L_w | | | | | | | | |
|-------------------------|-------------------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|------|
| | m ³ /h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz | |
| OPTIMA-R(I)-FC-80-BM... | 36 | 100 | 45,2 | 50,4 | 43,0 | 44,2 | 43,2 | 43,8 | 41,3 | 35,0 | 27,8 | 23,7 | |
| | | 250 | 53,1 | 55,5 | 44,5 | 45,1 | 47,7 | 49,9 | 49,7 | 44,5 | 40,8 | 36,6 | |
| | | 500 | 59,8 | 60,9 | 45,7 | 45,7 | 51,1 | 54,8 | 56,1 | 51,8 | 50,8 | 46,5 | |
| | | 750 | 64,0 | 64,6 | 46,5 | 46,1 | 53,1 | 57,7 | 59,8 | 56,2 | 56,2 | 56,7 | 52,4 |
| | | 1000 | 67,2 | 67,5 | 47,1 | 46,4 | 54,6 | 59,8 | 62,5 | 59,2 | 60,9 | 60,9 | 56,5 |
| OPTIMA-R(I)-FC-80-BM... | 118 | 100 | 53,3 | 61,6 | 54,5 | 57,4 | 55,9 | 51,4 | 46,3 | 43,4 | 39,2 | 34,2 | |
| | | 250 | 63,1 | 67,3 | 55,3 | 60,0 | 61,4 | 61,9 | 58,5 | 53,5 | 49,3 | 45,0 | |
| | | 500 | 71,3 | 73,8 | 55,9 | 61,9 | 65,9 | 70,0 | 67,6 | 61,2 | 57,0 | 53,1 | |
| | | 750 | 76,3 | 78,2 | 56,2 | 63,1 | 68,7 | 74,8 | 73,0 | 65,8 | 61,4 | 57,9 | |
| | | 1000 | 79,8 | 81,5 | 56,4 | 63,9 | 70,7 | 78,2 | 76,8 | 69,1 | 64,6 | 61,3 | |
| OPTIMA-R(I)-FC-80-BM... | 199 | 100 | 58,3 | 64,9 | 57,5 | 60,1 | 58,8 | 56,4 | 50,6 | 50,8 | 47,0 | 45,1 | |
| | | 250 | 67,2 | 71,4 | 59,5 | 63,4 | 66,0 | 66,1 | 61,6 | 58,7 | 54,7 | 52,4 | |
| | | 500 | 74,4 | 77,5 | 61,0 | 66,0 | 71,4 | 73,5 | 69,8 | 64,7 | 60,6 | 57,8 | |
| | | 750 | 78,8 | 81,4 | 61,9 | 67,6 | 74,7 | 78,0 | 74,7 | 68,3 | 64,0 | 61,1 | |
| | | 1000 | 81,9 | 84,4 | 62,5 | 68,7 | 77,0 | 81,1 | 78,1 | 70,9 | 66,5 | 63,3 | |

OPTIMA-R-FC-100-BM-F

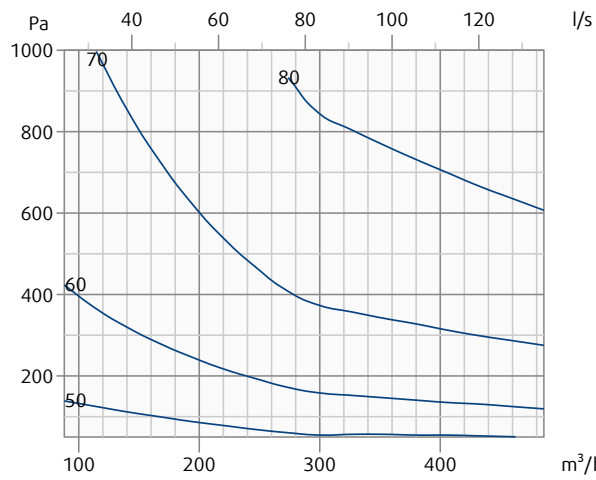
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m³/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R()-FC-100-BM... | 57 | 100 | 46,8 | 55,3 | 48,8 | 52,4 | 46,1 | 44,5 | 42,8 | 36,2 | 28,4 | 23,6 |
| | | 250 | 54,7 | 58,7 | 48,5 | 52,1 | 52,0 | 52,2 | 51,1 | 45,6 | 41,2 | 36,4 |
| | | 500 | 61,3 | 63,5 | 48,4 | 51,9 | 56,5 | 58,2 | 57,4 | 52,8 | 50,9 | 46,1 |
| | | 750 | 65,4 | 66,9 | 48,3 | 51,9 | 59,3 | 61,7 | 61,0 | 57,1 | 56,6 | 51,8 |
| | | 1000 | 68,3 | 69,6 | 48,2 | 51,8 | 61,2 | 64,3 | 63,6 | 60,1 | 60,6 | 55,9 |
| OPTIMA-R()-FC-100-BM... | 184 | 100 | 55,9 | 63,9 | 56,8 | 60,3 | 56,8 | 54,3 | 50,0 | 46,5 | 40,5 | 35,1 |
| | | 250 | 65,6 | 71,0 | 60,1 | 65,2 | 65,7 | 64,6 | 60,6 | 55,3 | 50,3 | 46,1 |
| | | 500 | 73,2 | 77,4 | 62,6 | 68,9 | 72,4 | 72,4 | 68,7 | 62,2 | 57,8 | 54,5 |
| | | 750 | 77,7 | 81,4 | 64,1 | 71,1 | 76,4 | 77,0 | 73,5 | 66,3 | 62,2 | 59,4 |
| | | 1000 | 80,9 | 84,4 | 65,2 | 72,6 | 79,3 | 80,2 | 76,9 | 69,3 | 65,3 | 62,9 |
| OPTIMA-R()-FC-100-BM... | 311 | 100 | 58,0 | 60,7 | 47,9 | 53,1 | 50,7 | 56,1 | 52,4 | 51,0 | 47,3 | 46,0 |
| | | 250 | 68,7 | 71,7 | 56,5 | 63,2 | 63,8 | 67,7 | 63,8 | 60,3 | 55,5 | 53,9 |
| | | 500 | 77,0 | 80,3 | 63,0 | 70,9 | 73,7 | 76,4 | 72,4 | 67,4 | 61,9 | 59,9 |
| | | 750 | 82,0 | 85,4 | 66,9 | 75,4 | 79,5 | 81,6 | 77,5 | 71,5 | 65,6 | 63,4 |
| | | 1000 | 85,6 | 89,1 | 69,7 | 78,6 | 83,6 | 85,3 | 81,1 | 74,5 | 68,3 | 65,9 |

OPTIMA-R-FC-125-BM-F

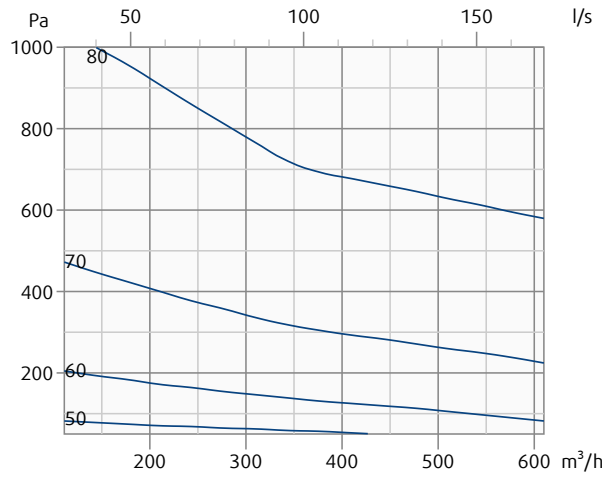
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|---------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m^3/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R(0)-FC-125-BM... | 88 | 100 | 47,2 | 55,6 | 49,1 | 52,5 | 46,1 | 46,2 | 42,0 | 36,7 | 28,6 | 23,6 |
| | | 250 | 55,2 | 59,7 | 51,3 | 53,1 | 52,5 | 54,2 | 49,8 | 46,2 | 40,8 | 36,6 |
| | | 500 | 61,6 | 64,5 | 53,0 | 53,8 | 57,4 | 60,2 | 55,8 | 53,5 | 50,1 | 46,5 |
| | | 750 | 65,5 | 67,8 | 54,0 | 54,3 | 60,3 | 63,8 | 59,2 | 57,8 | 55,6 | 52,3 |
| | | 1000 | 68,4 | 70,3 | 54,7 | 54,8 | 62,4 | 66,3 | 61,7 | 60,8 | 59,5 | 56,4 |
| OPTIMA-R(0)-FC-125-BM... | 287 | 100 | 55,1 | 67,7 | 63,1 | 64,5 | 58,5 | 52,7 | 47,7 | 40,8 | 35,0 | 28,5 |
| | | 250 | 65,0 | 72,3 | 64,1 | 67,7 | 66,9 | 64,2 | 59,1 | 52,7 | 47,2 | 42,3 |
| | | 500 | 73,3 | 78,1 | 65,0 | 70,2 | 73,6 | 72,9 | 67,7 | 61,8 | 56,6 | 52,8 |
| | | 750 | 78,3 | 82,2 | 65,6 | 71,8 | 77,7 | 78,0 | 72,8 | 67,1 | 62,0 | 58,9 |
| | | 1000 | 81,8 | 85,4 | 66,0 | 72,9 | 80,7 | 81,6 | 76,4 | 71,0 | 65,9 | 63,2 |
| OPTIMA-R(0)-FC-125-BM... | 486 | 100 | 57,9 | 67,1 | 60,6 | 64,4 | 58,3 | 55,3 | 52,7 | 47,3 | 44,5 | 40,7 |
| | | 250 | 68,9 | 75,4 | 65,4 | 71,4 | 69,1 | 67,9 | 63,6 | 57,4 | 53,5 | 49,7 |
| | | 500 | 77,5 | 82,7 | 69,2 | 76,9 | 77,3 | 77,4 | 72,1 | 65,2 | 60,3 | 56,6 |
| | | 750 | 82,7 | 87,4 | 71,4 | 80,3 | 82,1 | 83,0 | 77,2 | 69,9 | 64,2 | 60,6 |
| | | 1000 | 86,4 | 90,8 | 73,0 | 82,7 | 85,5 | 87,0 | 80,8 | 73,2 | 67,1 | 63,5 |

OPTIMA-R-FC-140-BM-F

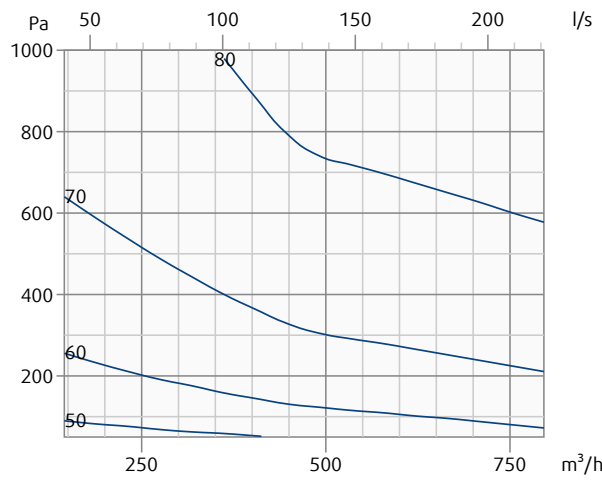
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------------------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m ³ /h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R(0)-FC-140-BM... | 111 | 100 | 52,0 | 64,0 | 59,8 | 60,7 | 52,9 | 51,2 | 45,3 | 38,1 | 31,7 | 25,5 |
| | | 250 | 62,4 | 69,5 | 62,0 | 65,2 | 62,9 | 61,6 | 56,8 | 51,1 | 45,3 | 40,2 |
| | | 500 | 70,7 | 75,5 | 63,7 | 68,8 | 70,5 | 69,5 | 65,6 | 60,9 | 55,6 | 51,4 |
| | | 750 | 75,7 | 79,6 | 64,7 | 71,1 | 75,0 | 74,1 | 70,8 | 66,7 | 61,7 | 57,9 |
| | | 1000 | 79,3 | 82,7 | 65,5 | 72,7 | 78,1 | 77,3 | 74,5 | 70,7 | 66,0 | 62,5 |
| OPTIMA-R(0)-FC-140-BM... | 360 | 100 | 56,5 | 67,6 | 63,9 | 63,3 | 58,1 | 54,5 | 50,9 | 44,8 | 40,6 | 35,0 |
| | | 250 | 67,4 | 75,4 | 67,8 | 71,8 | 68,7 | 66,4 | 61,7 | 55,8 | 51,3 | 46,6 |
| | | 500 | 75,9 | 82,5 | 71,1 | 78,3 | 76,7 | 75,4 | 69,9 | 64,2 | 59,5 | 55,4 |
| | | 750 | 80,8 | 86,9 | 73,1 | 82,3 | 81,4 | 80,6 | 74,7 | 69,0 | 64,2 | 60,6 |
| | | 1000 | 84,4 | 90,1 | 74,5 | 85,1 | 84,8 | 84,4 | 78,2 | 72,5 | 67,6 | 64,2 |
| OPTIMA-R(0)-FC-140-BM... | 610 | 100 | 61,9 | 66,7 | 58,3 | 62,1 | 58,3 | 58,5 | 58,0 | 52,8 | 50,9 | 47,6 |
| | | 250 | 71,1 | 76,6 | 66,0 | 72,5 | 69,7 | 69,2 | 66,5 | 61,1 | 58,2 | 55,1 |
| | | 500 | 78,4 | 84,5 | 71,9 | 80,5 | 78,4 | 77,4 | 73,2 | 67,4 | 63,7 | 60,7 |
| | | 750 | 82,8 | 89,2 | 75,4 | 85,3 | 83,4 | 82,2 | 77,2 | 71,1 | 66,9 | 64,0 |
| | | 1000 | 86,0 | 92,6 | 77,8 | 88,7 | 87,0 | 85,6 | 80,1 | 73,7 | 69,2 | 66,3 |

OPTIMA-R-FC-160-BM-F

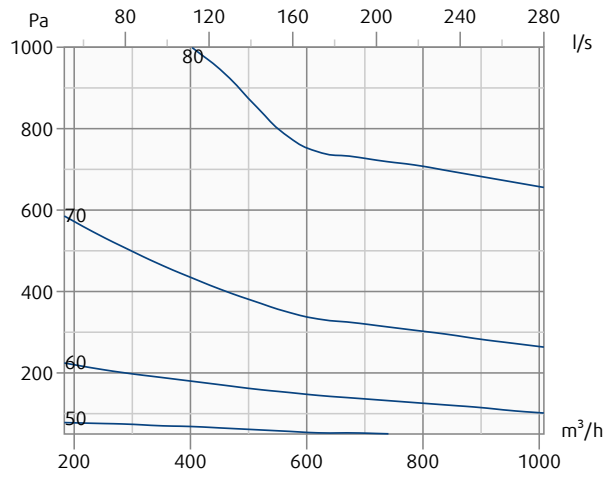
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m³/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R()-FC-160-BM... | 145 | 100 | 50,9 | 60,3 | 55,3 | 56,8 | 50,6 | 50,7 | 44,6 | 37,9 | 31,1 | 25,9 |
| | | 250 | 59,8 | 64,5 | 54,3 | 58,9 | 57,7 | 58,8 | 54,6 | 50,4 | 44,0 | 39,7 |
| | | 500 | 67,2 | 69,8 | 53,8 | 60,8 | 63,1 | 65,0 | 62,3 | 59,9 | 53,8 | 50,1 |
| | | 750 | 71,8 | 73,6 | 53,7 | 62,1 | 66,2 | 68,6 | 66,9 | 65,4 | 59,5 | 56,3 |
| | | 1000 | 75,2 | 76,5 | 53,6 | 63,0 | 68,5 | 71,2 | 70,2 | 69,4 | 63,6 | 60,6 |
| OPTIMA-R()-FC-160-BM... | 470 | 100 | 57,6 | 72,3 | 70,8 | 65,4 | 59,1 | 55,4 | 51,6 | 46,0 | 40,5 | 34,4 |
| | | 250 | 67,5 | 75,9 | 70,4 | 71,3 | 68,9 | 66,2 | 61,8 | 56,7 | 51,5 | 46,7 |
| | | 500 | 75,3 | 81,3 | 70,5 | 75,9 | 76,4 | 74,4 | 69,6 | 64,8 | 59,7 | 55,9 |
| | | 750 | 80,0 | 85,1 | 70,8 | 78,6 | 80,8 | 79,2 | 74,2 | 69,5 | 64,6 | 61,4 |
| | | 1000 | 83,3 | 88,1 | 71,1 | 80,6 | 83,9 | 82,6 | 77,5 | 72,9 | 68,0 | 65,3 |
| OPTIMA-R()-FC-160-BM... | 796 | 100 | 62,9 | 70,0 | 65,1 | 65,6 | 59,9 | 60,2 | 59,2 | 53,1 | 50,1 | 46,5 |
| | | 250 | 71,7 | 78,7 | 70,6 | 75,4 | 70,6 | 69,9 | 67,0 | 61,6 | 58,0 | 54,6 |
| | | 500 | 78,6 | 85,8 | 74,9 | 82,9 | 78,7 | 77,2 | 73,0 | 68,1 | 63,9 | 60,7 |
| | | 750 | 82,7 | 90,2 | 77,5 | 87,4 | 83,5 | 81,5 | 76,7 | 71,9 | 67,4 | 64,2 |
| | | 1000 | 85,6 | 93,3 | 79,4 | 90,6 | 86,9 | 84,6 | 79,3 | 74,5 | 69,9 | 66,7 |

OPTIMA-R-FC-180-BM-F

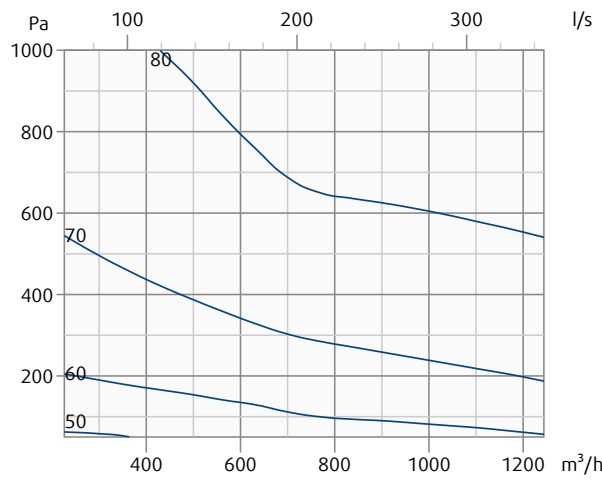
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------------------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m ³ /h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R(0)-FC-180-BM... | 183 | 100 | 52,3 | 61,0 | 56,4 | 56,8 | 51,0 | 52,8 | 45,1 | 39,5 | 32,9 | 26,1 |
| | | 250 | 61,1 | 65,4 | 54,9 | 58,8 | 58,4 | 60,8 | 55,4 | 51,4 | 45,4 | 40,0 |
| | | 500 | 68,3 | 70,9 | 54,3 | 60,8 | 64,0 | 66,8 | 63,2 | 60,4 | 55,0 | 50,5 |
| | | 750 | 72,7 | 74,7 | 54,1 | 62,1 | 67,3 | 70,3 | 67,8 | 65,6 | 60,6 | 56,6 |
| | | 1000 | 76,0 | 77,5 | 54,1 | 63,2 | 69,6 | 72,8 | 71,1 | 69,3 | 64,5 | 61,0 |
| OPTIMA-R(0)-FC-180-BM... | 595 | 100 | 55,7 | 72,4 | 71,2 | 65,0 | 57,4 | 53,2 | 48,8 | 44,6 | 39,6 | 32,0 |
| | | 250 | 66,3 | 75,1 | 70,4 | 70,0 | 67,9 | 65,3 | 60,0 | 55,8 | 51,2 | 45,5 |
| | | 500 | 74,9 | 80,6 | 70,0 | 74,1 | 76,1 | 74,4 | 68,5 | 64,2 | 59,9 | 55,8 |
| | | 750 | 80,0 | 84,9 | 70,0 | 76,6 | 80,9 | 79,7 | 73,5 | 69,2 | 65,1 | 61,8 |
| | | 1000 | 83,7 | 88,2 | 70,1 | 78,4 | 84,4 | 83,5 | 77,1 | 72,6 | 68,7 | 66,0 |
| OPTIMA-R(0)-FC-180-BM... | 1008 | 100 | 59,9 | 71,0 | 69,3 | 63,9 | 57,3 | 56,9 | 56,3 | 50,5 | 47,5 | 43,9 |
| | | 250 | 69,5 | 78,0 | 73,3 | 73,9 | 68,9 | 67,7 | 64,5 | 59,6 | 56,3 | 52,9 |
| | | 500 | 77,0 | 84,9 | 76,6 | 81,6 | 77,8 | 75,9 | 70,8 | 66,5 | 62,9 | 59,7 |
| | | 750 | 81,5 | 89,3 | 78,7 | 86,1 | 82,9 | 80,7 | 74,6 | 70,5 | 66,7 | 63,6 |
| | | 1000 | 84,8 | 92,5 | 80,3 | 89,4 | 86,6 | 84,1 | 77,3 | 73,4 | 69,5 | 66,5 |

OPTIMA-R-FC-200-BM-F

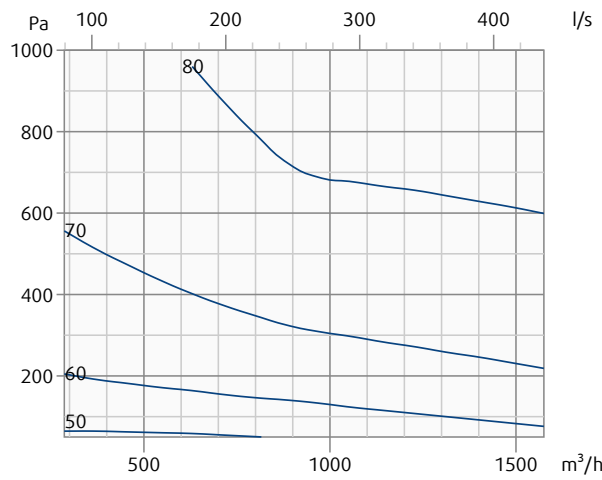
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m³/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R()-FC-200-BM... | 226 | 100 | 53,5 | 65,4 | 63,3 | 59,2 | 53,0 | 54,1 | 45,3 | 39,8 | 32,5 | 26,4 |
| | | 250 | 61,9 | 67,9 | 61,4 | 62,0 | 60,3 | 61,9 | 55,8 | 51,9 | 45,4 | 40,3 |
| | | 500 | 69,1 | 72,6 | 60,1 | 64,7 | 65,9 | 67,8 | 63,8 | 61,0 | 55,2 | 50,8 |
| | | 750 | 73,5 | 76,1 | 59,3 | 66,5 | 69,1 | 71,3 | 68,6 | 66,3 | 61,0 | 57,0 |
| | | 1000 | 76,8 | 78,8 | 58,8 | 67,9 | 71,4 | 73,8 | 72,1 | 70,1 | 65,1 | 61,4 |
| OPTIMA-R()-FC-200-BM... | 735 | 100 | 59,9 | 79,5 | 79,0 | 69,4 | 58,0 | 55,3 | 50,5 | 45,5 | 38,9 | 32,3 |
| | | 250 | 68,2 | 80,6 | 78,9 | 73,6 | 69,3 | 67,2 | 61,4 | 57,0 | 51,2 | 45,5 |
| | | 500 | 76,6 | 84,0 | 78,8 | 77,5 | 77,9 | 76,3 | 69,7 | 65,7 | 60,5 | 55,5 |
| | | 750 | 81,7 | 87,6 | 78,8 | 80,2 | 83,0 | 81,6 | 74,6 | 70,7 | 66,0 | 61,4 |
| | | 1000 | 85,4 | 90,6 | 78,8 | 82,2 | 86,7 | 85,3 | 78,1 | 74,3 | 69,8 | 65,5 |
| OPTIMA-R()-FC-200-BM... | 1244 | 100 | 64,5 | 78,3 | 77,3 | 69,6 | 60,9 | 61,6 | 60,7 | 53,9 | 50,0 | 46,0 |
| | | 250 | 72,6 | 84,3 | 82,3 | 78,0 | 71,7 | 70,9 | 67,3 | 62,4 | 58,3 | 54,4 |
| | | 500 | 79,2 | 89,5 | 86,1 | 84,8 | 79,9 | 78,1 | 72,6 | 68,8 | 64,6 | 60,7 |
| | | 750 | 83,3 | 93,0 | 88,3 | 88,9 | 84,7 | 82,3 | 75,8 | 72,5 | 68,3 | 64,4 |
| | | 1000 | 86,2 | 95,6 | 89,9 | 91,8 | 88,1 | 85,3 | 78,1 | 75,2 | 70,9 | 67,1 |

OPTIMA-R-FC-225-BM-F

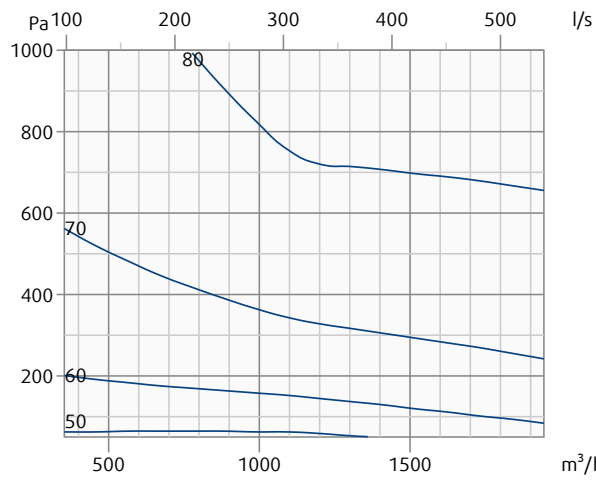
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------------------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m ³ /h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R()-FC-225-BM... | 286 | 100 | 53,6 | 63,5 | 59,4 | 59,2 | 53,4 | 54,2 | 46,1 | 40,5 | 33,0 | 26,6 |
| | | 250 | 61,9 | 67,6 | 59,1 | 62,0 | 60,8 | 61,7 | 56,1 | 52,1 | 45,7 | 40,4 |
| | | 500 | 68,9 | 72,5 | 58,9 | 64,6 | 66,3 | 67,5 | 63,8 | 60,9 | 55,3 | 51,0 |
| | | 750 | 73,2 | 75,9 | 58,8 | 66,3 | 69,6 | 70,8 | 68,3 | 66,0 | 61,0 | 57,1 |
| | | 1000 | 76,4 | 78,5 | 58,8 | 67,6 | 71,9 | 73,2 | 71,5 | 69,6 | 65,0 | 61,5 |
| OPTIMA-R()-FC-225-BM... | 930 | 100 | 56,7 | 72,9 | 71,4 | 66,7 | 57,1 | 54,5 | 49,3 | 44,4 | 37,3 | 30,3 |
| | | 250 | 67,2 | 76,8 | 72,6 | 72,1 | 68,6 | 66,4 | 60,6 | 56,2 | 50,3 | 44,3 |
| | | 500 | 75,9 | 82,5 | 73,6 | 77,0 | 77,5 | 75,4 | 69,2 | 65,1 | 60,1 | 55,0 |
| | | 750 | 81,1 | 86,7 | 74,2 | 80,1 | 82,6 | 80,7 | 74,3 | 70,4 | 65,9 | 61,2 |
| | | 1000 | 84,7 | 90,0 | 74,6 | 82,4 | 86,3 | 84,4 | 77,9 | 74,1 | 69,9 | 65,6 |
| OPTIMA-R()-FC-225-BM... | 1575 | 100 | 62,5 | 74,7 | 72,7 | 68,8 | 61,3 | 61,1 | 56,7 | 52,1 | 47,4 | 43,0 |
| | | 250 | 71,3 | 81,3 | 77,5 | 77,0 | 71,6 | 70,1 | 65,0 | 61,1 | 56,7 | 52,3 |
| | | 500 | 78,2 | 87,1 | 81,2 | 83,4 | 79,5 | 77,0 | 71,3 | 67,9 | 63,7 | 59,4 |
| | | 750 | 82,3 | 90,7 | 83,3 | 87,3 | 84,0 | 81,2 | 75,0 | 71,9 | 67,8 | 63,5 |
| | | 1000 | 85,2 | 93,5 | 84,9 | 90,0 | 87,3 | 84,1 | 77,7 | 74,7 | 70,7 | 66,4 |

OPTIMA-R-FC-250-BM-F

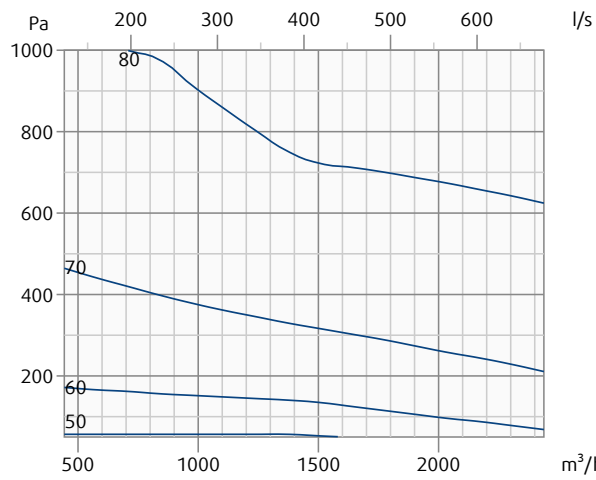
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|---------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m^3/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R(0)-FC-250-BM... | 353 | 100 | 53,9 | 63,1 | 57,8 | 59,2 | 53,8 | 54,5 | 46,9 | 41,3 | 33,5 | 26,7 |
| | | 250 | 62,1 | 67,6 | 57,7 | 62,1 | 61,2 | 61,7 | 56,5 | 52,3 | 46,0 | 40,6 |
| | | 500 | 68,8 | 72,5 | 58,1 | 64,6 | 66,8 | 67,3 | 63,8 | 60,7 | 55,4 | 51,1 |
| | | 750 | 73,0 | 75,8 | 58,5 | 66,1 | 70,1 | 70,5 | 68,1 | 65,7 | 61,0 | 57,3 |
| | | 1000 | 76,0 | 78,4 | 58,8 | 67,3 | 72,4 | 72,8 | 71,2 | 69,1 | 64,9 | 61,7 |
| OPTIMA-R(0)-FC-250-BM... | 1149 | 100 | 55,3 | 71,4 | 70,2 | 64,2 | 56,3 | 53,7 | 48,2 | 43,4 | 35,7 | 28,3 |
| | | 250 | 66,4 | 75,4 | 70,5 | 71,0 | 68,0 | 65,5 | 59,9 | 55,5 | 49,4 | 43,2 |
| | | 500 | 75,2 | 81,7 | 71,0 | 76,6 | 77,0 | 74,5 | 68,8 | 64,6 | 59,7 | 54,5 |
| | | 750 | 80,5 | 86,3 | 71,5 | 80,1 | 82,3 | 79,8 | 74,0 | 70,0 | 65,7 | 61,1 |
| | | 1000 | 84,2 | 89,7 | 71,9 | 82,7 | 86,1 | 83,6 | 77,6 | 73,8 | 70,0 | 65,7 |
| OPTIMA-R(0)-FC-250-BM... | 1944 | 100 | 61,6 | 77,0 | 76,1 | 68,3 | 61,7 | 60,7 | 53,7 | 50,2 | 44,9 | 40,0 |
| | | 250 | 70,3 | 81,1 | 78,0 | 76,1 | 71,5 | 69,2 | 63,1 | 59,8 | 55,0 | 50,3 |
| | | 500 | 77,2 | 86,0 | 79,8 | 82,1 | 79,0 | 76,0 | 70,2 | 67,0 | 62,7 | 58,0 |
| | | 750 | 81,4 | 89,4 | 81,0 | 85,7 | 83,4 | 80,0 | 74,3 | 71,3 | 67,2 | 62,6 |
| | | 1000 | 84,3 | 92,0 | 82,0 | 88,3 | 86,5 | 83,0 | 77,3 | 74,3 | 70,4 | 65,8 |

OPTIMA-R-FC-280-BM-F

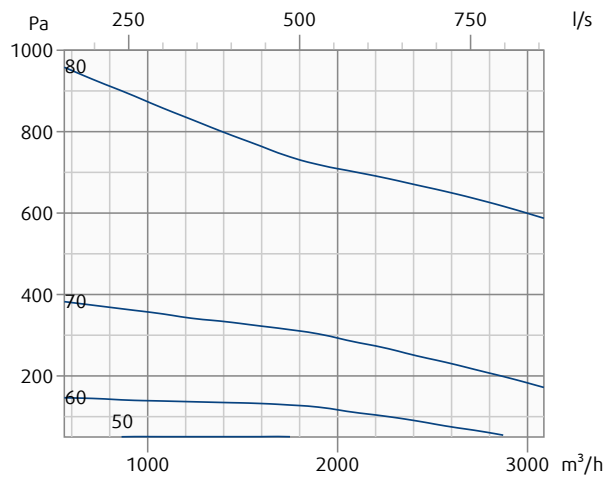
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m³/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R(I)-FC-280-BM... | 443 | 100 | 55,0 | 65,2 | 59,9 | 62,0 | 55,1 | 54,7 | 48,9 | 43,3 | 34,9 | 27,5 |
| | | 250 | 63,7 | 69,9 | 60,8 | 65,2 | 63,7 | 62,7 | 58,5 | 54,2 | 47,6 | 41,9 |
| | | 500 | 70,8 | 75,1 | 61,7 | 68,1 | 70,2 | 68,8 | 65,8 | 62,5 | 57,3 | 52,8 |
| | | 750 | 75,0 | 78,6 | 62,3 | 70,0 | 74,0 | 72,4 | 70,1 | 67,4 | 63,0 | 59,2 |
| | | 1000 | 78,1 | 81,3 | 62,8 | 71,4 | 76,7 | 74,9 | 73,2 | 70,8 | 67,0 | 63,7 |
| | 1441 | 100 | 56,2 | 71,6 | 70,1 | 65,0 | 56,9 | 54,8 | 49,5 | 45,0 | 37,9 | 30,7 |
| | | 250 | 66,9 | 76,5 | 71,8 | 72,1 | 68,6 | 65,7 | 60,6 | 56,6 | 50,9 | 45,0 |
| | | 500 | 75,4 | 82,6 | 73,3 | 78,1 | 77,5 | 74,1 | 69,0 | 65,3 | 60,7 | 55,8 |
| | | 750 | 80,4 | 86,9 | 74,4 | 81,7 | 82,7 | 79,0 | 73,9 | 70,5 | 66,5 | 62,2 |
| | | 1000 | 83,9 | 90,1 | 75,2 | 84,4 | 86,4 | 82,5 | 77,4 | 74,1 | 70,6 | 66,7 |
| | 2438 | 100 | 63,3 | 76,1 | 74,5 | 68,7 | 62,7 | 63,4 | 55,6 | 52,3 | 47,6 | 43,3 |
| | | 250 | 71,5 | 81,8 | 78,2 | 77,0 | 72,3 | 70,8 | 64,3 | 61,2 | 56,8 | 52,6 |
| | | 500 | 77,9 | 87,1 | 81,4 | 83,3 | 79,7 | 76,6 | 70,9 | 67,9 | 63,8 | 59,7 |
| | | 750 | 81,7 | 90,5 | 83,4 | 87,0 | 83,9 | 80,0 | 74,8 | 71,8 | 67,9 | 63,8 |
| | | 1000 | 84,4 | 93,0 | 84,9 | 89,7 | 87,0 | 82,4 | 77,5 | 74,6 | 70,8 | 66,7 |

OPTIMA-R-FC-315-BM-F

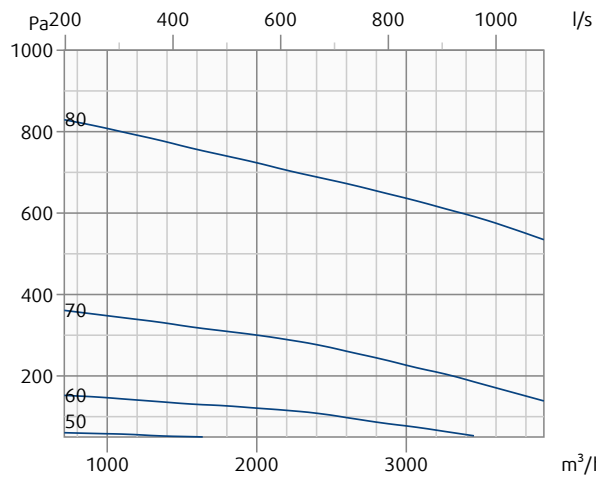
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|---------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m^3/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R(0)-FC-315-BM... | 561 | 100 | 56,3 | 67,7 | 62,3 | 65,1 | 56,4 | 54,9 | 50,8 | 45,4 | 36,3 | 28,4 |
| | | 250 | 65,5 | 72,5 | 64,0 | 68,4 | 66,2 | 63,8 | 60,6 | 56,1 | 49,3 | 43,2 |
| | | 500 | 72,9 | 77,9 | 65,4 | 71,7 | 73,6 | 70,4 | 68,0 | 64,3 | 59,2 | 54,4 |
| | | 750 | 77,3 | 81,7 | 66,2 | 73,8 | 77,9 | 74,3 | 72,3 | 69,1 | 65,0 | 61,0 |
| | | 1000 | 80,5 | 84,5 | 66,8 | 75,5 | 81,0 | 77,1 | 75,4 | 72,5 | 69,1 | 65,7 |
| | 1824 | 100 | 57,2 | 71,9 | 70,2 | 65,9 | 57,6 | 56,0 | 50,7 | 46,6 | 40,1 | 33,2 |
| | | 250 | 67,5 | 77,6 | 73,2 | 73,4 | 69,2 | 66,0 | 61,2 | 57,7 | 52,4 | 46,8 |
| | | 500 | 75,6 | 83,7 | 75,7 | 79,7 | 78,0 | 73,7 | 69,2 | 66,0 | 61,8 | 57,2 |
| | | 750 | 80,4 | 87,8 | 77,3 | 83,6 | 83,2 | 78,2 | 73,9 | 71,0 | 67,3 | 63,3 |
| | | 1000 | 83,9 | 90,9 | 78,5 | 86,5 | 86,9 | 81,4 | 77,2 | 74,5 | 71,2 | 67,6 |
| | 3086 | 100 | 66,1 | 75,8 | 73,1 | 69,2 | 63,7 | 67,5 | 57,5 | 54,4 | 50,3 | 46,7 |
| | | 250 | 72,9 | 82,6 | 78,6 | 78,0 | 73,1 | 72,8 | 65,5 | 62,6 | 58,6 | 55,0 |
| | | 500 | 78,6 | 88,3 | 83,1 | 84,6 | 80,3 | 77,2 | 71,6 | 68,7 | 64,9 | 61,3 |
| | | 750 | 82,1 | 91,9 | 86,0 | 88,5 | 84,5 | 80,0 | 75,2 | 72,3 | 68,5 | 65,0 |
| | | 1000 | 84,7 | 94,5 | 88,1 | 91,3 | 87,5 | 82,0 | 77,7 | 74,9 | 71,1 | 67,6 |

OPTIMA-R-FC-355-BM-F

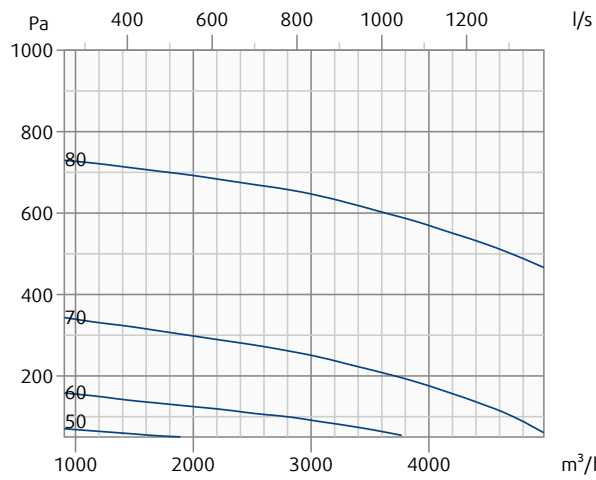
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|---------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m^3/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R()-FC-355-BM... | 713 | 100 | 55,2 | 66,8 | 63,8 | 62,4 | 55,3 | 53,7 | 50,0 | 44,4 | 35,6 | 28,1 |
| | | 250 | 65,7 | 72,9 | 66,4 | 68,3 | 66,2 | 63,5 | 60,8 | 56,3 | 49,6 | 43,5 |
| | | 500 | 73,9 | 79,2 | 68,5 | 73,3 | 74,5 | 71,0 | 69,0 | 65,3 | 60,2 | 55,2 |
| | | 750 | 78,8 | 83,3 | 69,8 | 76,5 | 79,3 | 75,4 | 73,9 | 70,6 | 66,4 | 62,1 |
| | | 1000 | 82,3 | 86,5 | 70,6 | 78,8 | 82,8 | 78,5 | 77,3 | 74,4 | 70,8 | 66,9 |
| | 2316 | 100 | 58,7 | 72,3 | 70,6 | 65,9 | 58,3 | 57,9 | 52,6 | 48,1 | 42,0 | 35,1 |
| | | 250 | 68,6 | 78,3 | 74,4 | 73,6 | 69,3 | 67,0 | 62,8 | 59,2 | 54,1 | 48,5 |
| | | 500 | 76,3 | 84,0 | 77,5 | 79,8 | 77,5 | 73,8 | 70,5 | 67,5 | 63,3 | 58,8 |
| | | 750 | 80,9 | 87,8 | 79,4 | 83,6 | 82,4 | 77,9 | 75,0 | 72,4 | 68,7 | 64,7 |
| | | 1000 | 84,2 | 90,7 | 80,8 | 86,3 | 85,8 | 80,7 | 78,2 | 75,9 | 72,5 | 69,0 |
| | 3920 | 100 | 67,8 | 77,1 | 74,4 | 69,9 | 64,7 | 69,7 | 59,7 | 56,2 | 51,8 | 48,2 |
| | | 250 | 74,2 | 83,5 | 79,9 | 78,3 | 73,4 | 74,4 | 67,3 | 64,2 | 60,1 | 56,5 |
| | | 500 | 79,5 | 88,9 | 84,4 | 84,6 | 80,0 | 77,9 | 73,1 | 70,3 | 66,4 | 62,7 |
| | | 750 | 82,7 | 92,1 | 87,2 | 88,4 | 83,9 | 80,1 | 76,5 | 73,8 | 70,0 | 66,4 |
| | | 1000 | 85,1 | 94,5 | 89,1 | 91,0 | 86,7 | 81,6 | 78,9 | 76,3 | 72,6 | 68,9 |

OPTIMA-R-FC-400-BM-F

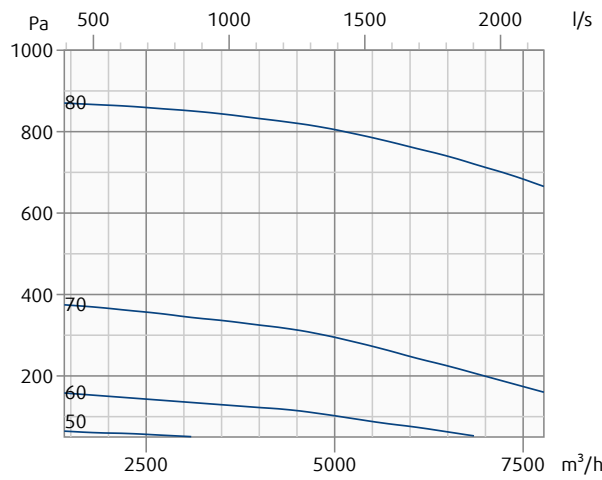
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------------------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m ³ /h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R(I)-FC-400-BM... | 905 | 100 | 54,3 | 67,0 | 65,5 | 59,7 | 54,4 | 52,6 | 49,1 | 43,4 | 34,9 | 27,9 |
| | | 250 | 65,9 | 73,6 | 69,1 | 68,2 | 66,3 | 63,5 | 61,1 | 56,4 | 49,8 | 43,9 |
| | | 500 | 75,0 | 80,6 | 71,8 | 75,1 | 75,4 | 71,9 | 70,1 | 66,3 | 61,1 | 56,0 |
| | | 750 | 80,4 | 85,2 | 73,5 | 79,3 | 80,8 | 76,8 | 75,4 | 72,2 | 67,8 | 63,1 |
| | | 1000 | 84,2 | 88,7 | 74,6 | 82,3 | 84,6 | 80,3 | 79,2 | 76,3 | 72,5 | 68,2 |
| | 2941 | 100 | 60,5 | 73,9 | 72,7 | 66,0 | 59,3 | 60,2 | 54,5 | 49,7 | 43,9 | 37,0 |
| | | 250 | 69,8 | 79,8 | 77,1 | 73,9 | 69,4 | 68,0 | 64,4 | 60,7 | 55,8 | 50,3 |
| | | 500 | 77,1 | 85,0 | 80,5 | 80,0 | 77,1 | 74,1 | 71,8 | 69,0 | 64,8 | 60,3 |
| | | 750 | 81,6 | 88,4 | 82,5 | 83,7 | 81,6 | 77,7 | 76,2 | 73,9 | 70,0 | 66,2 |
| | | 1000 | 84,7 | 91,0 | 84,0 | 86,3 | 84,8 | 80,2 | 79,3 | 77,4 | 73,8 | 70,4 |
| | 4976 | 100 | 71,6 | 80,0 | 77,0 | 70,6 | 66,0 | 75,0 | 61,9 | 58,0 | 53,3 | 49,7 |
| | | 250 | 76,0 | 85,2 | 82,3 | 78,6 | 73,8 | 77,0 | 69,2 | 65,9 | 61,6 | 57,9 |
| | | 500 | 80,5 | 89,8 | 86,5 | 84,7 | 79,8 | 78,9 | 74,6 | 71,8 | 67,9 | 64,1 |
| | | 750 | 83,5 | 92,8 | 88,9 | 88,3 | 83,4 | 80,2 | 77,9 | 75,3 | 71,6 | 67,7 |
| | | 1000 | 85,7 | 94,9 | 90,7 | 90,8 | 85,9 | 81,3 | 80,1 | 77,8 | 74,2 | 70,3 |

OPTIMA-R-FC-500-BM-F

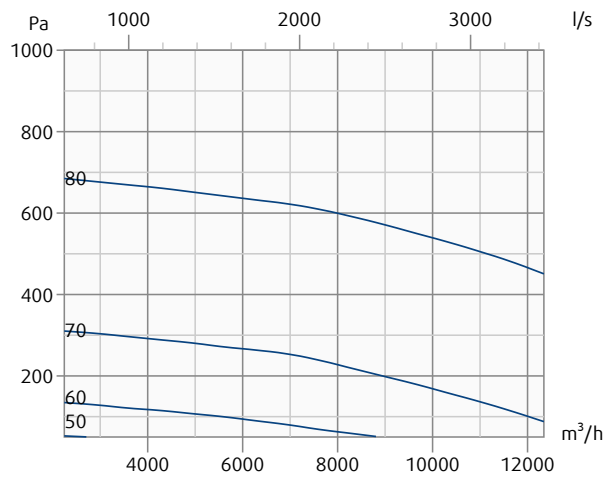
Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|---------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m^3/h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R()-FC-500-BM... | 1414 | 100 | 54,9 | 64,4 | 62,8 | 56,1 | 51,5 | 51,6 | 51,0 | 46,9 | 40,1 | 31,0 |
| | | 250 | 65,3 | 72,1 | 67,7 | 66,3 | 63,9 | 62,0 | 60,8 | 57,2 | 52,3 | 46,2 |
| | | 500 | 73,4 | 79,4 | 71,7 | 74,7 | 73,5 | 69,9 | 68,3 | 65,0 | 61,7 | 57,7 |
| | | 750 | 78,2 | 84,2 | 74,1 | 79,8 | 79,1 | 74,5 | 72,7 | 69,7 | 67,2 | 64,4 |
| | | 1000 | 81,7 | 87,8 | 75,8 | 83,5 | 83,1 | 77,8 | 75,8 | 72,9 | 71,1 | 69,2 |
| | 4595 | 100 | 58,8 | 72,0 | 70,8 | 63,6 | 58,9 | 55,5 | 53,7 | 49,3 | 43,9 | 35,6 |
| | | 250 | 67,8 | 78,1 | 75,8 | 72,0 | 67,5 | 63,6 | 62,6 | 59,5 | 55,4 | 49,4 |
| | | 500 | 74,8 | 83,4 | 79,8 | 78,4 | 74,3 | 69,7 | 69,4 | 67,3 | 64,2 | 59,9 |
| | | 750 | 79,1 | 86,8 | 82,2 | 82,3 | 78,4 | 73,3 | 73,4 | 71,9 | 69,3 | 66,1 |
| | | 1000 | 82,1 | 89,3 | 84,0 | 85,0 | 81,3 | 75,9 | 76,2 | 75,1 | 72,9 | 70,4 |
| | 7775 | 100 | 67,0 | 77,0 | 75,2 | 68,1 | 65,9 | 66,4 | 60,9 | 57,6 | 53,4 | 47,6 |
| | | 250 | 73,0 | 83,3 | 81,2 | 76,6 | 71,9 | 70,4 | 67,3 | 64,7 | 61,3 | 56,7 |
| | | 500 | 77,9 | 88,4 | 85,9 | 83,0 | 77,0 | 73,6 | 72,1 | 70,0 | 67,3 | 63,6 |
| | | 750 | 80,9 | 91,6 | 88,8 | 86,7 | 80,2 | 75,5 | 75,0 | 73,2 | 70,8 | 67,7 |
| | | 1000 | 83,1 | 93,9 | 90,9 | 89,4 | 82,5 | 76,9 | 77,0 | 75,4 | 73,3 | 70,5 |

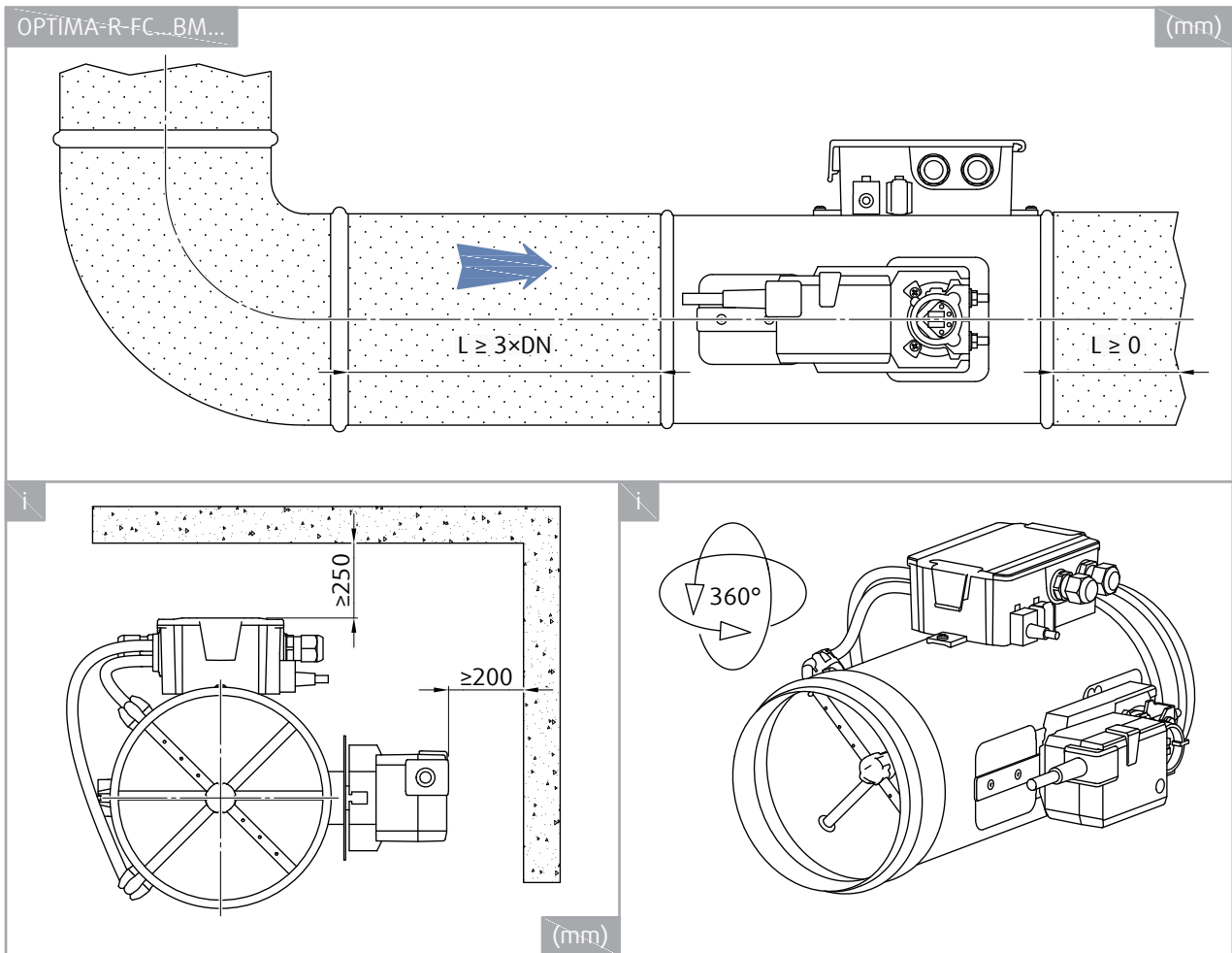
OPTIMA-R-FC-630-BM-F

Pressure drop & A-weighted sound power level in dB(A)



| | q_v | p_s | L_{WA} | L_W | L_W | | | | | | | |
|--------------------------|-------------------|-------|----------|-------|-------|--------|--------|--------|-------|-------|-------|-------|
| | m ³ /h | Pa | dB | | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz |
| OPTIMA-R()-FC-630-BM... | 2244 | 100 | 56,7 | 68,6 | 65,6 | 64,3 | 56,6 | 54,4 | 51,4 | 46,9 | 39,9 | 31,2 |
| | | 250 | 67,4 | 74,8 | 69,4 | 70,3 | 66,7 | 65,0 | 62,4 | 58,6 | 54,7 | 48,8 |
| | | 500 | 75,9 | 80,9 | 72,2 | 75,4 | 74,3 | 73,0 | 70,7 | 67,6 | 66,1 | 62,2 |
| | | 750 | 81,2 | 85,0 | 73,9 | 78,6 | 78,8 | 77,7 | 75,6 | 72,8 | 72,8 | 70,0 |
| | | 1000 | 85,1 | 88,2 | 75,1 | 81,0 | 82,0 | 81,0 | 79,1 | 76,5 | 77,6 | 75,5 |
| OPTIMA-R()-FC-630-BM... | 7294 | 100 | 62,1 | 77,4 | 74,5 | 73,5 | 63,9 | 58,8 | 54,3 | 49,3 | 43,8 | 36,7 |
| | | 250 | 70,1 | 81,2 | 78,0 | 76,9 | 70,3 | 67,0 | 64,2 | 61,0 | 57,9 | 52,6 |
| | | 500 | 77,5 | 84,7 | 80,6 | 79,6 | 75,2 | 73,3 | 71,8 | 69,9 | 68,7 | 64,7 |
| | | 750 | 82,4 | 87,3 | 82,2 | 81,2 | 78,0 | 76,9 | 76,4 | 75,1 | 75,1 | 71,7 |
| | | 1000 | 86,1 | 89,5 | 83,3 | 82,4 | 80,0 | 79,5 | 79,5 | 79,6 | 78,8 | 79,7 |
| OPTIMA-R()-FC-630-BM... | 12344 | 100 | 70,6 | 82,7 | 79,0 | 78,9 | 70,9 | 71,5 | 61,7 | 57,7 | 53,4 | 51,0 |
| | | 250 | 75,8 | 86,6 | 83,4 | 82,0 | 74,8 | 75,0 | 69,0 | 66,2 | 63,9 | 61,1 |
| | | 500 | 80,8 | 89,8 | 86,8 | 84,3 | 77,9 | 77,7 | 74,7 | 72,7 | 72,0 | 68,7 |
| | | 750 | 84,2 | 91,7 | 88,8 | 85,7 | 79,8 | 79,4 | 78,0 | 76,5 | 76,8 | 73,3 |
| | | 1000 | 86,7 | 93,3 | 90,3 | 86,7 | 81,1 | 80,7 | 80,4 | 79,2 | 80,2 | 76,5 |

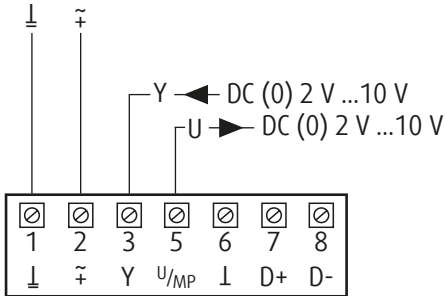
Installation



Electrical Connections

AC/DC 24 V, modulating (VAV)

The VAV controller operates with setpoint adjusted through analog input signal (terminal 3) and feedback signal (terminal 5).



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

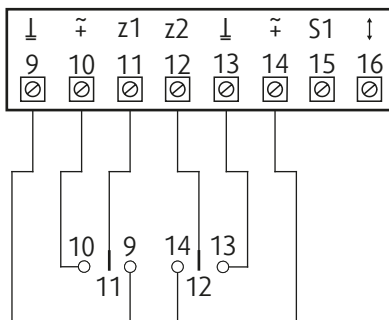
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{\max}

11 and 12 without contact = no priority override through z1 or z2



Priority rule - Analog VAV-control

1. z1
2. z2
3. a) adaption (autonomous initializing controller function)
4. b) synchronisation (autonomous initializing controller function)
5. Y-Modulating: $V_{\min} \dots V_{\max}$ (through analog input)

AC/DC 24 V, contactor step control (CAV)

The VAV controller operates with setpoint in discrete steps generated by different potentials connected to the analog input (terminal 3) and analog feedback signal (terminal 5).

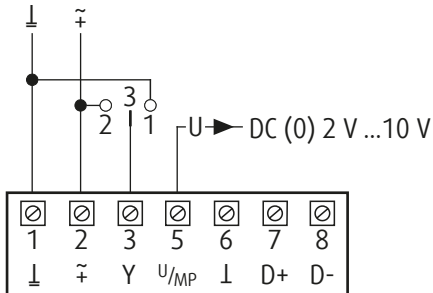
Contact 2-3 = V_{max}

3 not connected = V_{min}

Contact 1-3 = damper CLOSE (control signal mode 2...10V)

Contact 1-3 = V_{min} (control signal mode 0...10 V)

The control signal mode can be adjusted in the VAV controller by the handheld configuration tool ZTH-EU.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

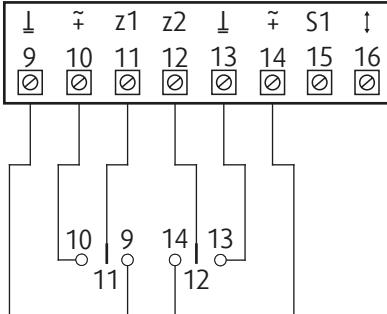
Contact 11-9 = Motor STOP

Contact 11-10 = Damper OPEN

Override control z2 Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{max}

11 and 12 without contact = no priority override through z1 or z2



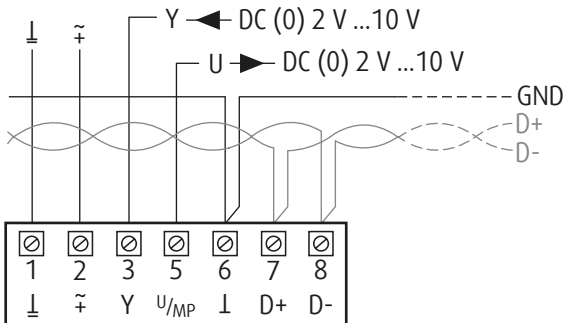
Priority rule - Step-Control

1. z1
2. z2
3. a) adaption (autonomous initializing controller function)
4. b) synchronisation (autonomous initializing controller function)
5. Y-Step Control: Close - V_{min} - V_{max} (through analog input)

BACnet MS/TP or Modbus RTU

(This operation mode requires parametrization)

VAV control in $V_{\min} \dots V_{\max}$ range and other functionalities with all variables communicated through bus (terminals 7, 8)
 – by Modbus or BACnet protocol.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

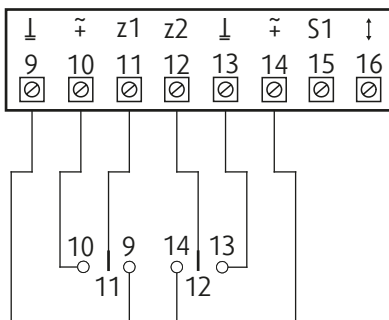
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{\max}

11 and 12 without contact = no priority override through z1 or z2



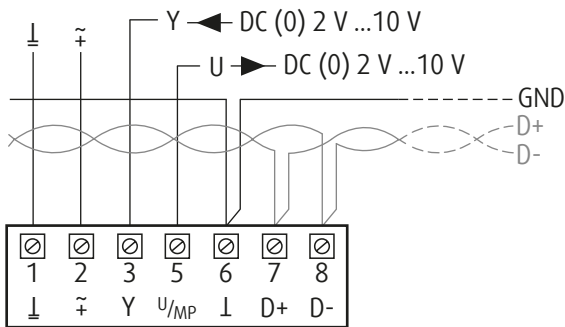
Priority rule – BACnet / Modbus Control

1. z1
2. z2
3. Bus Watchdog
4. a) adaption (autonomous initializing controller function)
5. b) synchronisation (autonomous initializing controller function)
6. Bus Override
7. Bus Setpoint: $V_{\min} - V_{\max}$

BACnet MS/TP or Modbus RTU with analog setpoint (hybrid mode)

(This operation mode requires parametrization)

VAV control in $V_{\min} \dots V_{\max}$ range and other functionalities with setpoint reading through analog input (terminal 3) and feedback through analog output (terminal 5). All other variables are communicated through bus (terminals 7, 8) – by Modbus or BACnet protocol.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

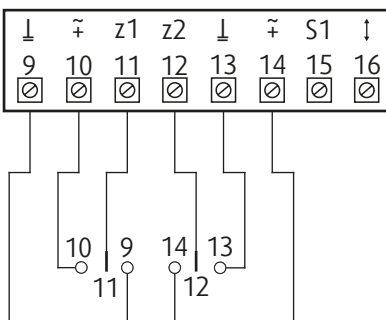
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{\max}

11 and 12 without contact = no priority override through z1 or z2



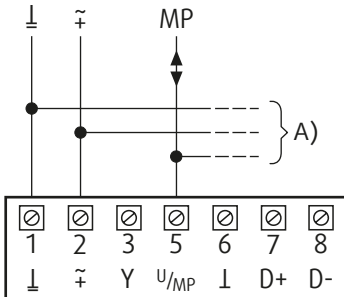
Priority rule – BACnet / Modbus Control

1. z1
2. z2
3. Bus Watchdog
4. a) adaption (autonomous initializing controller function)
5. b) synchronisation (autonomous initializing controller function)
6. Bus Override
7. Y-Step Control: Close – V_{\min} - V_{\max} (through analog input – see wiring for AC/DC 24V Step Control)
8. Y-Modulating: $V_{\min} \dots V_{\max}$ (through analog input – see wiring for Modulating VAV)

MP-Bus

(This operation mode requires parametrization)

VAV control in $V_{min} \dots V_{max}$ range and other functionalities with all variables communicated through bus (terminals 1, 2, 5) – by MP-Bus protocol.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

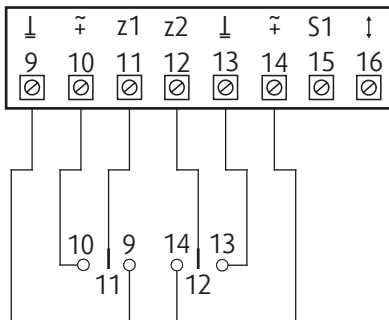
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{max}

11 and 12 without contact = no priority override through z1 or z2



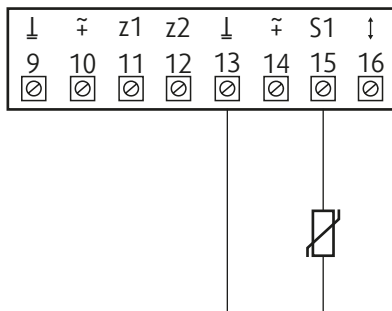
Priority rule – BACnet / Modbus Control

1. z1
2. z2
3. Bus Watchdog
4. a) adaption (autonomous initializing controller function)
5. b) synchronisation (autonomous initializing controller function)
6. Y-Step Control: Close – $V_{min} - V_{max}$ (through analog input – see wiring for AC/DC 24V Step Control)
7. Bus Override
8. Bus Setpoint: $V_{min} - V_{max}$

Connection of passive sensor

(Available in bus operation)

The value measured by the passive sensor can be communicated as a variable by bus.

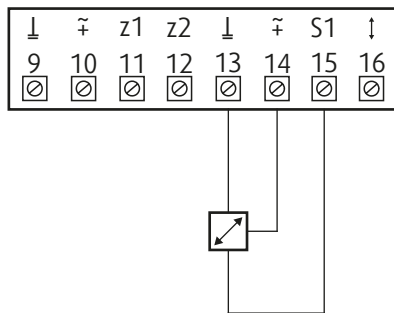


Suitable for Ni1000 and Pt1000

Connection of active sensor

(Available in bus operation)

The value measured by the active sensor can be communicated as a variable by bus.



Possible input voltage range:

DC 0...10 V (resolution 5 mV)

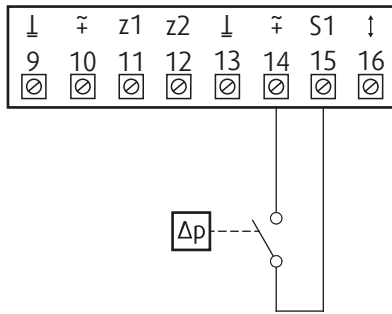
Example:

- Active temperature sensors
- setpoint generator
- humidity sensor

Connection switching contact

(Available in bus operation)

The binary value of the switching contact can be communicated as a variable by bus.



Requirements switching contact: The switch must be capable of switching a current of 10 mA @ 24 V cleanly.

Example:

- dP sensor
- window contact

Transport, Storage and Operation

Transport and storage temperature range: -20 °C to +40 °C, dry indoor conditions.

Operation temperature range: -20 °C ... +70 °C in the duct, -20 °C ... +50 °C on the actuator.

Supplement

Any deviations from the technical specifications contained herein and the terms should be discussed with the manufacturer. We reserve the right to make any changes to the product without prior notice, provided that these changes do not affect the quality of the product and the required parameters.

Current information on all products is available on design.systemair.com.

