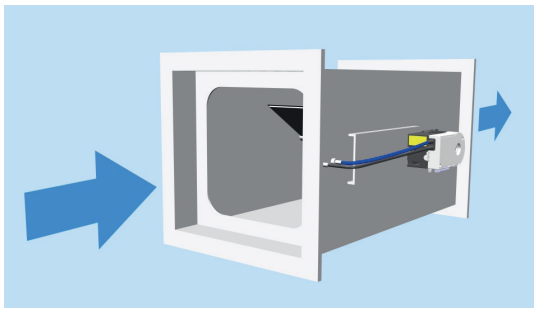
AIR TECH SYSTEMS

Technical Brochure

# LTG Air Distribution

## Variable flow rate controllers VRF



Square, made of PPs

www.LTG.net

# Technical brochure • Variable flow rate controllers VRF, square

LTG Comfort Air Technology

Air-Water Systems

Air Diffusers

**Air Distribution**

## Content



## Notes

Dimensions stated in this brochure are in mm.

Dimensions stated in this brochure are subject to General Tolerances according to DIN ISO 2768-vL.

The actual specifications are available as a word document at www.LTG.net or at your local distributor.

The flow ratecontrollers VRE, VRF, VRE*active* and VRF*active* are designed to be installed in air-conditioning systems in accordance with DIN 6022 Sheets 1+2 and DIN 1946 Sheet 2.

# Flow Rate Control Basics – Which Product for which Application?

## Plant types

### Variable Flow Rate

Units with variable flow rates (VVS) use electronic flow rate controllers providing the room with exactly the required air volume – according to function and energy efficiency.

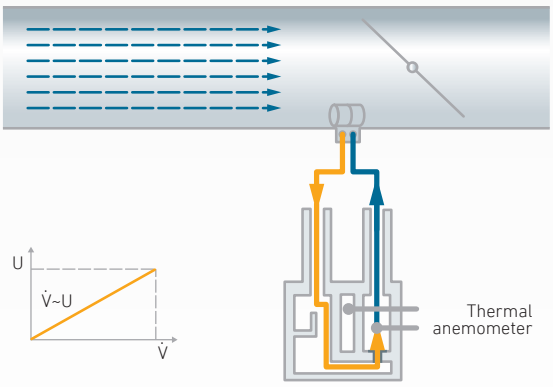
### Constant Flow Rate

Units with constant flow rates (KVS) use flow rate controllers maintaining a constant flow rate mechanically system-powered. Working with no wiring or external power supply, they provide convenient and cost-saving solutions.

## Measuring methods

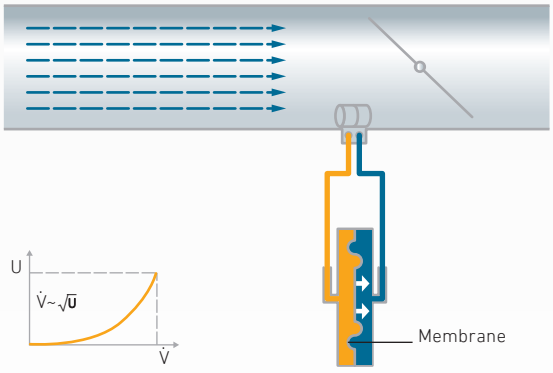
### Dynamic Differential Pressure Management

Dynamic methods measure part of the air that is guided through the differential pressure transducer. Dynamic differential pressure measuring makes economical sense in plants where no dust and/or chemical pollution of the air is expected, potentially leading to the contamination of sensors (e. g. administration and office buildings, museums, etc.).




### Static Differential Pressure Management

Static differential pressure measurement uses a diaphragm pressure transducer. With this method, no air is guided through the sensor, so no dust or chemical pollution by the air is possible and hence, may well be used in such environments.



## Measuring priciple VRF

The continual constriction in the cross-section of a measuring orifice with defined aperture ratio creates a static differential pressure (= active pressure) between the inflow and outflow sides during air flow.

With this method the flow rate depends only on the active pressure.

The active pressure is tapped in front of and behind the orifice using a pair of measuring tappings (plus and minus pressure tapping). Since it is not the dynamic pressure in the air flow which is measured,, unlike in other active pressure transducers (e.g. measuring cross), the risk of contamination of the measuring holes is lower.

Depending on the make of the attached sensor, the measurement in the sensor can be dynamic or static.

In the dynamic measurement the pressure gradient at the orifice is used to generate in the pressure transducer a low bypass airflow from plus to minus pressure tapping.

The air flow is routed via a thermal anemometer of which the output voltage is proportional to the flow velocity inside the damper housing.

The measurement value is independent of the installation position of the sensor.

Since there is a flow through the sensor, it is unsuitable for airthatcontains dustoriscontaminatedby chemicals.

In the static measurement the chambers of the pressure transducer are separated by a diaphragm. The diaphragm is deformed by the pressure difference and leads to a change in the electrical capacitance.

The pressure transducer is calibrated here such that the output signal is proportional to the flow velocity in the damper housing.

With simple diaphragm sensors without position compensation, the measurement value is position-dependent on account of the weight of the diaphragm itself, which is why a zero point calibration might be necessary.

Thesensorissuitableforairthatcontainsdustoriscontaminated by chemicals, as there is no flow through it.

## Control accuracy

Deviations from the set value: ± 5 % of $V_{nom}$ (7 m/s)

## Installation position

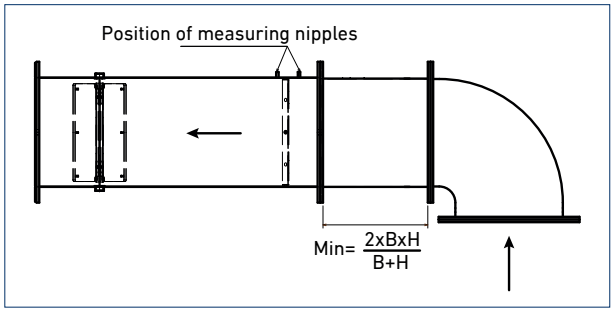
The flow rate controller must be installed with due attention to the airflow direction arrow affixed to the housing and with the damper axis horizontal

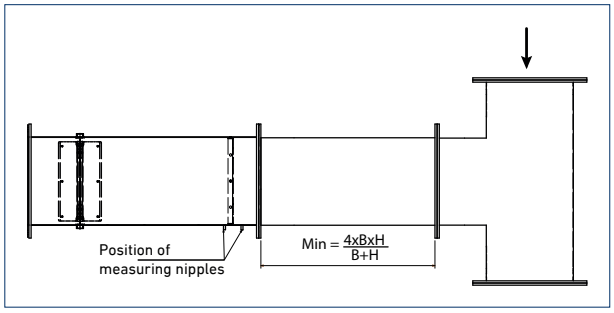
The differential pressure sensor of the attached compact controller, Sauter model ASV215, is position-independent.

In the case of other control components with static differential pressure sensor, the permissible installation position of the sensor can be found in the technical documents valid in each case. If necessary, a zero point adjustment must be conducted.

## Required straight inflow distances

A straight inflow distance „Min“ in front of the flow rate controller - acc. to te following illustrations - is required. Care must be taken with the positions of the measuring nipples to ensure that the specified control accuracy is achieved.




There are no restrictions regarding the outflow side.

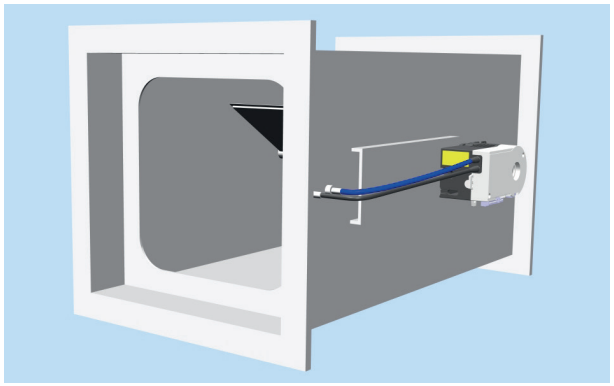
B - width (see section "dimensions")

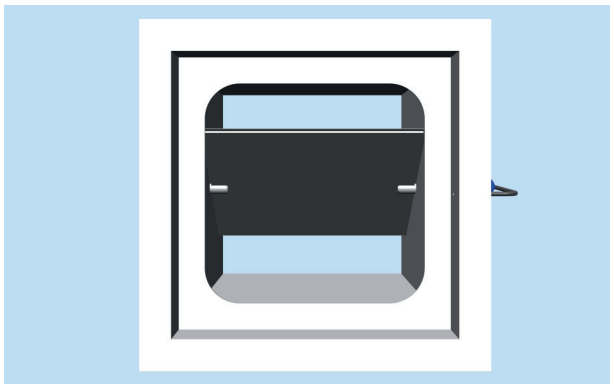
H - height (see section "dimensions")

Min - minimum inflow distance for a control accuracy of ± 5 % of $V_{nom}$

If a combination of fittings that is unfavourable with view to the air flow is unavoidable, the minimum distance is several times the given Min.

## Views of unit





*Inside view in direction of air flow*

## Application

The square flow rate controllers VRF made of plastic PPs are designed to control an initial-pressure independent constant or variable air flow rate in plants with aggressive media.

## Configuration

They comprise of housing, flow rate measuring element with sensor, damper blade with actuator and controller. The housing is provided with flanges to fit square air ducts.

## Mode of operation

The flow rate is measured using a measuring orifice as an active pressure transducer and with a differential pressure sensor, the measured differential pressure being the dimension for the flow rate.

The controller compares the actual value measured by the sensor with the setpoint value, and corrects the divergence by altering the damper setting using the actuating drive.

Control and regulation are achieved with external energy, either electric or pneumatic depending on the chosen design.

All components are factory-wired and hose-connected.

The flow rate controllers are rated for air velocities of 1...7 m/s.

Depending on the size, orifice, the control component and the set flow rate, the minimum pressure difference is approx. 10...120 Pa.

The damper blade closes tight in accordance with DIN EN 1751, so that a complete shut-off is also possible.

To reduce sound emission, the flow rate controller can be optionally retrofitted with an insulating case and/or a silencer.

The mechanism is universally suitable for the attachment of various controller makes and combinations of controllers, sensors and actuators for specific applications too.

The control components also differ here in the measuring principle (dynamic/static), in their actuator function (running time, standby setting) and in their operation (with /without bus mode).

With a static measuring principle of the sensor, the flow rate controller is suitable for aggressive media, for example laboratory waste air (resistance verification required).

For rapid and stable control of critical applications, e.g. in laboratory and pharmaceutical applications, controllers with high-speed actuators are available.

If a standby setting function is required, actuators with spring return or SuperCaps are used..

## Materials, finishes

- Housing, damper and measuring orifice: polypropylene, hardly inflammable (PPs)
- Damper bearing, damper axle: polypropylene (PP)
- Bearing sealings: Ethylen-Propyle-Dien-Kautschuk (EPDM)
- Damper sealing: polyurethane (PU)

## Accessories, special versions

- Insulating case for sound and heat insulation
- Additional pressure tapping points for parallel active pressure/flow rate measurement
- Controller with dynamic differential pressure sensor
- Comunication via MPBus, LON, etc.
- Actuator with spring return
- Actuator with normal running time

Additional accessories and special versions on request.

## Connection

Notes and circuit diagrams for control components can be found in the operating and maintenance instructions.

## Controls

**Sauter model ASV215BF152E (standard)**

- Electronic VAV compact controller, supply 24 V AC/DC
- Position-independent sensor with static measuring principle, suitable for aggressive media and contaminated air
- Running time of actuator 3...15 s / 90°, parametrizable in intermediate levels
- Torque of actuator 10 Nm,suitable for sizes up to 800 x 400
- Analog control with 0 (2)...10 V
- Control digital via 2 switch inputs: override controls CLOSE, OPEN, $V_{min}$ and $V_{max}$
- Feedback of actual value analog with 0...10 V
- Communication via Sauter SLC (max. 31 controllers) or BACnet MSTP
- Parametrization of set values and inputs/outputs using SAUTER CASE VAV software
- Second control circuit for room pressure or room temperature control by connection of an appropriate sensor

**Example for application of a VAV room pressure cascade controller**

In combination with a static room pressure sensor with symmetrical measuring range, the VAV compact controller independently regulates the specified positive or negative pressure in clean rooms, airlocks, surgery areas or laboratories. The room pressure is controlled via the parametrizable room pressure cascade flow rate controller integrated into the VAV compact controller. The room pressure is controlled in accordance with user specifications via the VAV compact controller for exhaust air or supply air. To achieve the maximum room pressure constancy, the room pressure control is only permissible with flow rate controllers for the supply / exhaust air.

A switchover between positive and negative pressure control (septic/aseptic operating mode) can be achieved using a switching contact. All control functions and parameters of the room pressure control circuit can be parametrized using the software tool in the VAV compact controller. The measurement range and the output signal of the connected room pressure sensor can be freely defined.

Output or status signals (from VAV compact controller to DDC/BMS)

1. Flow rate actual value via analog output 0...10 V

Input or control signals (fromDDC/BMS toVAV compact controller)

1. Flow rate setpoint value (variable control) via analog input 0...10 V
2. Room pressure actual value via analog output 0...10 V
3. Flow rate setpoint value (priority control) via digital input
4. Room pressure setpoint value switchover via digital input

## Application ranges and limits

Valid in conjunction with the Sauter model ASV215BF152 compact controller (standard). With other control components, divergences are possible.

- Minimum air speed 1 m/s
- Nominal air speed 7 m/s
- Static over-pressure in the air duct based on ambient pressure up to 1000 Pa
- Static under-pressure in the air duct based on ambient pressure max. 750 Pa
- Media temperature range 0...+55 °C at <85 % rF, non-condensing
- Suitable for polluted or contaminated air flows (resistance verification required)
- Installation with horizontal damper axle only
- Free suction with upstream air duct or via fitting only

## Recommendation for selection

- Air speed up to 7 m/s
- Damper pressure loss up to 500 Pa
- If sound emission via air duct surfaces is critical, all ducts including the controller must be sound insulated up to the sound absorber.

## Flow rate ranges, minimum pressure differences

| Size BxH [mm] | at 1 m/s | at 2 m/s | | at 4 m/s | | at 7 m/s | | |
|---|---|---|---|---|---|---|---|---|
| | $V_{min}$ [m³/h] | V [m³/h] | $\Delta p_{min}$ [Pa] B1 | V [m³/h] | $\Delta p_{min}$ [Pa] B1 | V [m³/h] | $V_{nom}$ [m³/h] B1 | $\Delta p_{min}$ [Pa] B1 |
| 140x140 | 68 | 135 | 11 | 270 | 45 | 473 | 138 | 60 |
| 200x140 | 97 | 194 | | 389 | | 680 | | |
| 250x140 | 122 | 244 | | 487 | | 853 | | |
| 160x160 | 89 | 177 | | 355 | | 621 | | |
| 280x160 | 157 | 313 | | 626 | | 1096 | | |
| 180x180 | 113 | 226 | | 451 | | 789 | | |
| 315x180 | 199 | 398 | | 795 | | 1392 | | |
| 200x200 | 140 | 279 | | 559 | | 978 | | |
| 355x200 | 248 | 495 | | 991 | | 1734 | | |
| 630x200 | 442 | 883 | | 1767 | | 3092 | | |
| 224x224 | 174 | 348 | | 697 | | 1220 | | |
| 400x224 | 314 | 627 | | 1255 | | 2195 | | |
| 250x250 | 218 | 436 | | 871 | | 1525 | | |
| 280x280 | 274 | 548 | | 1097 | | 1920 | | |
| 400x280 | 393 | 787 | | 1574 | | 2754 | | |
| 315x315 | 348 | 696 | | 1393 | | 2437 | | |
| 355x355 | 444 | 887 | | 1774 | | 3105 | | |
| 400x400 | 565 | 1129 | | 2258 | | 3952 | | |
| 500x400 | 704 | 1408 | 9 | 2816 | 37 | 4927 | 114 | 50 |
| 630x400 | 885 | 1770 | | 3540 | | 6196 | | |
| 800x400 | 1126 | 2252 | | 4505 | | 7883 | | |

**V** - Flow rate

**$V_{min}$** - Min. flow rate = lower limit of control

**$V_{nom}$** - Nominal flow rate

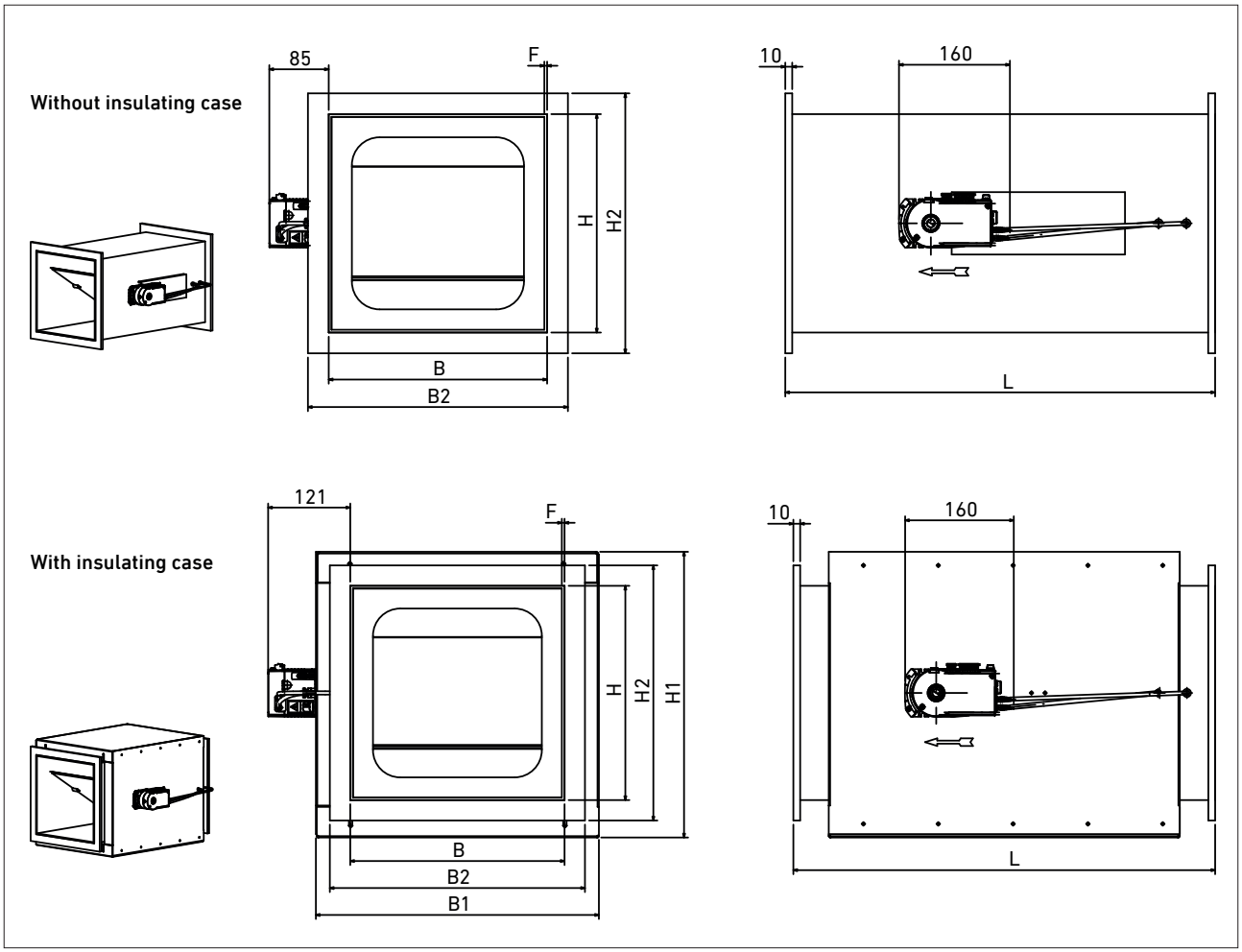
**$\Delta p_{min}$** - Min. pressure loss

**B1** - Orifice type B1 (standard)

## Dimensions, weight

Valid in conjunction with the Sauter ASV215BF152E compact controller (standard). With other control components, divergences are possible.

The necessary space for fitting, connection and maintenance work must be kept accessible.



## Dimensions, weight

Valid in conjunction with the Sauter model ASV215BF152E (standard).
With other control components, divergences are possible.

| Size | | | | | | | | | Weight [kg] | |
|---|---|---|---|---|---|---|---|---|---|---|
| B | H | L | B1 | H1 | B2 | H2 | F | Damper angle | without insulating case | with |
| [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | ca. [°] | | |
| **140** | **140** | 530 | 240 | 240 | 200 | 200 | 3 | 90 | 2.5 | 7.9 |
| **200** | **140** | 530 | 300 | 240 | 260 | 200 | 3 | 90 | 2.8 | 8.9 |
| **250** | **140** | 530 | 350 | 240 | 310 | 200 | 3 | 90 | 3.0 | 9.7 |
| **160** | **160** | 530 | 260 | 260 | 220 | 220 | 3 | 90 | 2.7 | 8.6 |
| **280** | **160** | 530 | 380 | 260 | 340 | 220 | 3 | 90 | 3.3 | 10.7 |
| **180** | **180** | 580 | 280 | 280 | 240 | 240 | 3 | 90 | 3.0 | 10.1 |
| **315** | **180** | 580 | 415 | 280 | 375 | 240 | 3 | 90 | 3.8 | 12.7 |
| **200** | **200** | 580 | 300 | 300 | 260 | 260 | 3 | 90 | 3.2 | 10.8 |
| **355** | **200** | 580 | 455 | 300 | 415 | 260 | 4 | 90 | 4.9 | 14.7 |
| **630** | **200** | 580 | 730 | 300 | 690 | 260 | 4 | 90 | 6.8 | 20.5 |
| **224** | **224** | 580 | 324 | 324 | 284 | 284 | 4 | 90 | 4.1 | 12.4 |
| **400** | **224** | 580 | 500 | 324 | 460 | 284 | 4 | 90 | 5.4 | 16.1 |
| **250** | **250** | 580 | 350 | 350 | 310 | 310 | 4 | 90 | 4.6 | 13.6 |
| **280** | **280** | 580 | 380 | 380 | 340 | 340 | 4 | 90 | 5.0 | 14.8 |
| **400** | **280** | 580 | 500 | 380 | 460 | 340 | 4 | 90 | 6.0 | 17.5 |
| **315** | **315** | 620 | 415 | 415 | 375 | 375 | 4 | 90 | 5.8 | 17.5 |
| **355** | **355** | 620 | 455 | 455 | 415 | 415 | 4 | 90 | 6.5 | 19.4 |
| **400** | **400** | 620 | 500 | 500 | 460 | 460 | 4 | 90 | 7.4 | 21.6 |
| **500** | **400** | 620 | 600 | 500 | 580 | 480 | 5 | 90 | 10.3 | 26.0 |
| **630** | **400** | 620 | 730 | 500 | 710 | 480 | 6 | 90 | 13.4 | 31.0 |
| **800** | **400** | 620 | 900 | 500 | 880 | 480 | 6 | 90 | 15.6 | 35.7 |

## Airborne sound transmission with $\Delta p_{tot}$ = 150 Pa

| Size BxH | Air speed [m/s] | Flow rate [m³/h] | Without silencer | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f_m$ [Hz] | | | | | | | | Sum | |
| | | | 63 | 125 | 250 | 500 | 1 K | 2 K | 4 K | 8 K | $L_{WA}$ [dB(A)] | $L_{pA}$ [dB(A)] |
| | | | $L_W$ [dB/Okt] | | | | | | | | | |
| **140x140** | 1 | 68 | 43 | 45 | 48 | 45 | 39 | 36 | 32 | 26 | **44** | **39** |
| | 4 | 270 | 62 | 63 | 58 | 53 | 42 | 38 | 36 | 36 | **54** | **46** |
| | 7 | 473 | 66 | 67 | 62 | 57 | 46 | 42 | 40 | 40 | **58** | **50** |
| **200x140** | 1 | 97 | 45 | 47 | 50 | 47 | 41 | 38 | 34 | 28 | **46** | **40** |
| | 4 | 389 | 63 | 64 | 59 | 54 | 43 | 39 | 37 | 37 | **55** | **48** |
| | 7 | 680 | 67 | 68 | 63 | 58 | 47 | 43 | 41 | 41 | **59** | **51** |
| **250x140** | 1 | 122 | 46 | 48 | 51 | 48 | 42 | 39 | 35 | 29 | **47** | **41** |
| | 4 | 487 | 64 | 65 | 60 | 55 | 44 | 40 | 38 | 38 | **56** | **49** |
| | 7 | 853 | 68 | 69 | 64 | 59 | 48 | 44 | 42 | 42 | **60** | **51** |
| **160x160** | 1 | 89 | 44 | 46 | 49 | 46 | 40 | 37 | 33 | 27 | **45** | **40** |
| | 4 | 355 | 63 | 64 | 59 | 54 | 43 | 39 | 37 | 37 | **55** | **47** |
| | 7 | 621 | 67 | 68 | 63 | 58 | 47 | 43 | 41 | 41 | **59** | **51** |
| **280x160** | 1 | 157 | 47 | 49 | 52 | 49 | 43 | 40 | 36 | 30 | **48** | **42** |
| | 4 | 626 | 65 | 66 | 61 | 56 | 45 | 41 | 39 | 39 | **57** | **49** |
| | 7 | 1096 | 69 | 70 | 65 | 60 | 49 | 45 | 43 | 43 | **61** | **51** |
| **180x180** | 1 | 113 | 46 | 48 | 51 | 48 | 42 | 39 | 35 | 29 | **47** | **41** |
| | 4 | 451 | 64 | 65 | 60 | 55 | 44 | 40 | 38 | 38 | **56** | **49** |
| | 7 | 790 | 68 | 69 | 64 | 59 | 48 | 44 | 42 | 42 | **60** | **51** |
| **315x180** | 1 | 199 | 48 | 50 | 53 | 50 | 44 | 41 | 37 | 31 | **49** | **43** |
| | 4 | 795 | 66 | 67 | 62 | 57 | 46 | 42 | 40 | 40 | **58** | **49** |
| | 7 | 1392 | 70 | 71 | 66 | 61 | 50 | 46 | 44 | 44 | **62** | **51** |
| **200x200** | 1 | 140 | 46 | 48 | 51 | 48 | 42 | 39 | 35 | 29 | **47** | **42** |
| | 4 | 559 | 65 | 66 | 61 | 56 | 45 | 41 | 39 | 39 | **57** | **49** |
| | 7 | 978 | 69 | 70 | 65 | 60 | 49 | 45 | 43 | 43 | **61** | **51** |
| **355x200** | 1 | 248 | 49 | 51 | 54 | 51 | 45 | 42 | 38 | 32 | **50** | **44** |
| | 4 | 991 | 67 | 68 | 63 | 58 | 47 | 43 | 41 | 41 | **59** | **49** |
| | 7 | 1734 | 71 | 72 | 67 | 62 | 51 | 47 | 45 | 45 | **63** | **51** |
| **224x224** | 1 | 174 | 47 | 49 | 52 | 49 | 43 | 40 | 36 | 30 | **48** | **43** |
| | 4 | 697 | 66 | 67 | 62 | 57 | 46 | 42 | 40 | 40 | **58** | **49** |
| | 7 | 1219 | 70 | 71 | 66 | 61 | 50 | 46 | 44 | 44 | **62** | **51** |
| **400x224** | 1 | 314 | 50 | 52 | 55 | 52 | 46 | 43 | 39 | 33 | **51** | **45** |
| | 4 | 1254 | 68 | 69 | 64 | 59 | 48 | 44 | 42 | 42 | **60** | **49** |
| | 7 | 2195 | 72 | 73 | 68 | 63 | 52 | 48 | 46 | 46 | **64** | **51** |
| **250x250** | 1 | 218 | 48 | 50 | 53 | 50 | 44 | 41 | 37 | 31 | **49** | **44** |
| | 4 | 872 | 67 | 68 | 63 | 58 | 47 | 43 | 41 | 41 | **59** | **49** |
| | 7 | 1525 | 71 | 72 | 67 | 62 | 51 | 47 | 45 | 45 | **63** | **51** |

For other pressure differences and flow rates, the sound levels can be ascertained with our selection program.

**For more sizes** see next page.

$\Delta p_{tot}$ - Total pressure difference

$f_m$ - Octave mid-band frequency

$L_W$ - Sound power level

$L_{WA}$ - Sound power level, A-weighted

$L_{pA}$ - Sound pressure level, A-weighted

## Airborne sound transmission with $\Delta p_{tot}$ = 150 Pa

| Size BxH | Air speed [m/s] | Flow rate [m³/h] | Without silencer | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f_m$ [Hz] | | | | | | | | Sum | |
| | | | 63 | 125 | 250 | 500 | 1 K | 2 K | 4 K | 8 K | $L_{WA}$ [dB(A)] | $L_{pA}$ [dB(A)] |
| | | | $L_W$ [dB/Okt] | | | | | | | | | |
| **280x280** | 1 | 274 | 49 | 51 | 54 | 51 | 45 | 42 | 38 | 32 | **50** | **45** |
| | 4 | 1097 | 68 | 69 | 64 | 59 | 48 | 44 | 42 | 42 | **60** | **49** |
| | 7 | 1919 | 72 | 73 | 68 | 63 | 52 | 48 | 46 | 46 | **64** | **51** |
| **400x280** | 1 | 394 | 51 | 53 | 56 | 53 | 47 | 44 | 40 | 34 | **52** | **46** |
| | 4 | 1574 | 69 | 70 | 65 | 60 | 49 | 45 | 43 | 43 | **61** | **49** |
| | 7 | 2755 | 73 | 74 | 69 | 64 | 53 | 49 | 47 | 47 | **65** | **51** |
| **315x315** | 1 | 348 | 48 | 48 | 51 | 48 | 42 | 39 | 35 | 29 | **47** | **42** |
| | 4 | 1393 | 65 | 66 | 61 | 56 | 45 | 41 | 39 | 39 | **57** | **45** |
| | 7 | 2437 | 69 | 70 | 65 | 60 | 49 | 45 | 43 | 43 | **61** | **47** |
| **355x355** | 1 | 444 | 52 | 51 | 49 | 44 | 43 | 39 | 34 | 29 | **48** | **40** |
| | 4 | 1774 | 65 | 61 | 62 | 55 | 52 | 46 | 41 | 35 | **58** | **45** |
| | 7 | 3105 | 70 | 65 | 67 | 59 | 55 | 48 | 43 | 38 | **62** | **47** |
| **400x400** | 1 | 565 | 51 | 54 | 51 | 46 | 46 | 39 | 34 | 31 | **49** | **42** |
| | 4 | 2258 | 64 | 62 | 61 | 54 | 53 | 47 | 41 | 44 | **58** | **44** |
| | 7 | 3952 | 70 | 65 | 65 | 57 | 55 | 50 | 45 | 49 | **61** | **45** |
| **500x400** | 1 | 704 | 59 | 59 | 58 | 52 | 52 | 55 | 53 | 52 | **63** | **52** |
| | 4 | 2816 | 74 | 73 | 70 | 68 | 64 | 61 | 58 | 56 | **71** | **55** |
| | 7 | 4927 | 78 | 77 | 74 | 72 | 68 | 65 | 62 | 60 | **74** | **57** |
| **630x400** | 1 | 885 | 60 | 60 | 59 | 53 | 53 | 56 | 54 | 53 | **64** | **52** |
| | 4 | 3540 | 75 | 74 | 71 | 69 | 65 | 62 | 59 | 57 | **72** | **55** |
| | 7 | 6196 | 79 | 78 | 75 | 73 | 69 | 66 | 63 | 61 | **75** | **57** |
| **800x400** | 1 | 1126 | 61 | 61 | 60 | 54 | 54 | 57 | 55 | 54 | **65** | **52** |
| | 4 | 4505 | 76 | 75 | 72 | 70 | 66 | 63 | 60 | 58 | **73** | **55** |
| | 7 | 7883 | 80 | 79 | 76 | 74 | 70 | 67 | 64 | 62 | **76** | **57** |

For other pressure differences and flow rates, the sound levels can be ascertained with our selection program.

- $\Delta p_{tot}$ - Total pressure difference
- $f_m$ - Octave mid-band frequency
- $L_W$ - Sound power level
- $L_{WA}$ - Sound power level, A-weighted
- $L_{pA}$ - Sound pressure level, A-weighted

## Casing sound emission with $\Delta p_{tot}$ = 150 Pa

| Size BxH | Air speed [m/s] | Flow rate [m³/h] | Without insulation case | | | | | | | | | | With insulating case 50 mm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f_m$ [Hz] | | | | | | | | Sum | | $f_m$ [Hz] | | | | | | | | Sum | |
| | | | 63 | 125 | 250 | 500 | 1 K | 2 K | 4 K | 8 K | LWA [dB(A)] | LpA [dB(A)] | 63 | 125 | 250 | 500 | 1 K | 2 K | 4 K | 8 K | LWA [dB(A)] | LpA [dB(A)] |
| | | | $L_W$ [dB/Okt] | | | | | | | | | | $L_W$ [dB/Okt] | | | | | | | | | |
| 140 x 140 | 1 | 68 | 47 | 51 | 48 | 43 | 40 | 34 | 31 | 32 | **47** | **37** | 45 | 47 | 31 | 29 | 24 | 19 | <15 | <15 | **35** | **25** |
| | 4 | 270 | 63 | 64 | 57 | 52 | 47 | 41 | 38 | 38 | **55** | **46** | 61 | 63 | 47 | 45 | 40 | 35 | 30 | 30 | **49** | **40** |
| | 7 | 473 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **58** | **48** | 64 | 66 | 50 | 48 | 43 | 38 | 33 | 33 | **55** | **44** |
| 200 x 140 | 1 | 97 | 48 | 52 | 49 | 44 | 41 | 35 | 32 | 33 | **48** | **38** | 46 | 48 | 32 | 30 | 25 | 20 | <15 | <15 | **35** | **25** |
| | 4 | 389 | 64 | 65 | 58 | 53 | 48 | 42 | 39 | 39 | **56** | **47** | 62 | 64 | 48 | 46 | 41 | 36 | 31 | 31 | **50** | **41** |
| | 7 | 680 | 67 | 68 | 61 | 56 | 51 | 45 | 42 | 42 | **59** | **49** | 65 | 67 | 51 | 49 | 44 | 39 | 34 | 34 | **56** | **45** |
| 250 x 140 | 1 | 122 | 48 | 52 | 49 | 44 | 41 | 35 | 32 | 33 | **48** | **38** | 46 | 48 | 32 | 30 | 25 | 20 | 15 | 15 | **36** | **26** |
| | 4 | 487 | 65 | 66 | 59 | 54 | 49 | 43 | 40 | 40 | **56** | **48** | 62 | 64 | 48 | 46 | 41 | 36 | 31 | 31 | **51** | **42** |
| | 7 | 853 | 67 | 68 | 61 | 56 | 51 | 45 | 42 | 42 | **60** | **50** | 66 | 68 | 52 | 50 | 45 | 40 | 35 | 35 | **57** | **45** |
| 160 x 160 | 1 | 89 | 47 | 51 | 48 | 43 | 40 | 34 | 31 | 32 | **47** | **37** | 48 | 50 | 34 | 32 | 27 | 22 | 17 | 17 | **38** | **28** |
| | 4 | 355 | 64 | 65 | 58 | 53 | 48 | 42 | 39 | 39 | **55** | **47** | 64 | 66 | 50 | 48 | 43 | 38 | 33 | 33 | **53** | **44** |
| | 7 | 621 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **59** | **49** | 68 | 70 | 54 | 52 | 47 | 42 | 37 | 37 | **59** | **47** |
| 280 x 160 | 1 | 157 | 49 | 53 | 50 | 45 | 42 | 36 | 33 | 34 | **49** | **39** | 47 | 49 | 33 | 31 | 26 | 21 | 16 | 16 | **36** | **27** |
| | 4 | 626 | 65 | 66 | 59 | 54 | 49 | 43 | 40 | 40 | **57** | **48** | 63 | 65 | 49 | 47 | 42 | 37 | 32 | 32 | **51** | **42** |
| | 7 | 1096 | 68 | 69 | 62 | 57 | 52 | 46 | 43 | 43 | **60** | **50** | 66 | 68 | 52 | 50 | 45 | 40 | 35 | 35 | **57** | **46** |
| 180 x 180 | 1 | 113 | 48 | 52 | 49 | 44 | 41 | 35 | 32 | 33 | **48** | **38** | 46 | 48 | 32 | 30 | 25 | 20 | 15 | 15 | **36** | **26** |
| | 4 | 451 | 65 | 66 | 59 | 54 | 49 | 43 | 40 | 40 | **56** | **48** | 62 | 64 | 48 | 46 | 41 | 36 | 31 | 31 | **51** | **42** |
| | 7 | 790 | 67 | 68 | 61 | 56 | 51 | 45 | 42 | 42 | **60** | **50** | 66 | 68 | 52 | 50 | 45 | 40 | 35 | 35 | **57** | **45** |
| 315 x 180 | 1 | 199 | 50 | 54 | 51 | 46 | 43 | 37 | 34 | 35 | **50** | **40** | 48 | 50 | 34 | 32 | 27 | 22 | 17 | 17 | **37** | **28** |
| | 4 | 795 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **58** | **49** | 64 | 66 | 50 | 48 | 43 | 38 | 33 | 33 | **52** | **43** |
| | 7 | 1392 | 69 | 70 | 63 | 58 | 53 | 47 | 44 | 44 | **61** | **51** | 67 | 69 | 53 | 51 | 46 | 41 | 36 | 36 | **58** | **47** |
| 200 x 200 | 1 | 140 | 49 | 53 | 50 | 45 | 42 | 36 | 33 | 34 | **49** | **39** | 47 | 49 | 33 | 31 | 26 | 21 | 16 | 16 | **36** | **27** |
| | 4 | 559 | 65 | 66 | 59 | 54 | 49 | 43 | 40 | 40 | **57** | **48** | 63 | 65 | 49 | 47 | 42 | 37 | 32 | 32 | **51** | **42** |
| | 7 | 978 | 68 | 69 | 62 | 57 | 52 | 46 | 43 | 43 | **60** | **50** | 66 | 68 | 52 | 50 | 45 | 40 | 35 | 35 | **57** | **46** |
| 355 x 200 | 1 | 248 | 48 | 52 | 49 | 44 | 41 | 35 | 32 | 33 | **48** | **38** | 46 | 48 | 32 | 30 | 25 | 20 | <15 | <15 | **35** | **26** |
| | 4 | 991 | 64 | 65 | 58 | 53 | 48 | 42 | 39 | 39 | **56** | **47** | 62 | 64 | 48 | 46 | 41 | 36 | 31 | 31 | **50** | **41** |
| | 7 | 1734 | 67 | 68 | 61 | 56 | 51 | 45 | 42 | 42 | **59** | **49** | 65 | 67 | 51 | 49 | 44 | 39 | 34 | 34 | **56** | **45** |
| 224 x 224 | 1 | 174 | 49 | 53 | 50 | 45 | 42 | 36 | 33 | 34 | **49** | **39** | 47 | 49 | 33 | 31 | 26 | 21 | 16 | 16 | **37** | **27** |
| | 4 | 697 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **57** | **49** | 63 | 65 | 49 | 47 | 42 | 37 | 32 | 32 | **52** | **43** |
| | 7 | 1219 | 68 | 69 | 62 | 57 | 52 | 46 | 43 | 43 | **61** | **51** | 67 | 69 | 53 | 51 | 46 | 41 | 36 | 36 | **58** | **46** |
| 400 x 224 | 1 | 314 | 48 | 52 | 49 | 44 | 41 | 35 | 32 | 33 | **48** | **38** | 46 | 48 | 32 | 30 | 25 | 20 | 15 | 15 | **36** | **26** |
| | 4 | 1254 | 65 | 66 | 59 | 54 | 49 | 43 | 40 | 40 | **56** | **48** | 62 | 64 | 48 | 46 | 41 | 36 | 31 | 31 | **51** | **42** |
| | 7 | 2195 | 67 | 68 | 61 | 56 | 51 | 45 | 42 | 42 | **60** | **50** | 66 | 68 | 52 | 50 | 45 | 40 | 35 | 35 | **57** | **45** |

For **more sizes and legend** see next page.

## Casing sound emission with $\Delta p_{tot}$ = 150 Pa

| Size BxH | Air speed [m/s] | Flow rate [m³/h] | Without insulation case | | | | | | | | | | With insulating case 50 mm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f_m$ [Hz] | | | | | | | | Sum | | $f_m$ [Hz] | | | | | | | | Sum | |
| | | | 63 | 125 | 250 | 500 | 1 K | 2 K | 4 K | 8 K | LWA [dB(A)] | LpA [dB(A)] | 63 | 125 | 250 | 500 | 1 K | 2 K | 4 K | 8 K | LWA [dB(A)] | LpA [dB(A)] |
| | | | $L_W$ [dB/Okt] | | | | | | | | | | $L_W$ [dB/Okt] | | | | | | | | | |
| 250 x 250 | 1 | 218 | 50 | 54 | 51 | 46 | 43 | 37 | 34 | 35 | **50** | **40** | 48 | 50 | 34 | 32 | 27 | 22 | 17 | 17 | 37 | **28** |
| | 4 | 872 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **58** | **49** | 64 | 66 | 50 | 48 | 43 | 38 | 33 | 33 | 52 | **43** |
| | 7 | 1525 | 69 | 70 | 63 | 58 | 53 | 47 | 44 | 44 | **61** | **51** | 67 | 69 | 53 | 51 | 46 | 41 | 36 | 36 | 58 | **47** |
| 280 x 280 | 1 | 274 | 50 | 54 | 51 | 46 | 43 | 37 | 34 | 35 | **50** | **40** | 48 | 50 | 34 | 32 | 27 | 22 | 17 | 17 | 38 | **28** |
| | 4 | 1097 | 67 | 68 | 61 | 56 | 51 | 45 | 42 | 42 | **58** | **50** | 64 | 66 | 50 | 48 | 43 | 38 | 33 | 33 | 53 | **44** |
| | 7 | 1919 | 69 | 70 | 63 | 58 | 53 | 47 | 44 | 44 | **62** | **52** | 68 | 70 | 54 | 52 | 47 | 42 | 37 | 37 | 59 | **47** |
| 400 x 280 | 1 | 394 | 49 | 53 | 50 | 45 | 42 | 36 | 33 | 34 | **49** | **39** | 47 | 49 | 33 | 31 | 26 | 21 | 16 | 16 | 37 | **27** |
| | 4 | 1574 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **57** | **49** | 63 | 65 | 49 | 47 | 42 | 37 | 32 | 32 | 52 | **43** |
| | 7 | 2755 | 68 | 69 | 62 | 57 | 52 | 46 | 43 | 43 | **61** | **51** | 67 | 69 | 53 | 51 | 46 | 41 | 36 | 36 | 58 | **46** |
| 315 x 315 | 1 | 348 | 49 | 53 | 50 | 45 | 42 | 36 | 33 | 34 | **49** | **38** | 47 | 49 | 33 | 31 | 26 | 21 | 16 | 16 | 36 | **26** |
| | 4 | 1393 | 65 | 66 | 59 | 54 | 49 | 43 | 40 | 40 | **57** | **48** | 63 | 65 | 49 | 47 | 42 | 37 | 32 | 32 | 51 | **42** |
| | 7 | 2437 | 67 | 68 | 61 | 56 | 51 | 45 | 42 | 42 | **60** | **50** | 66 | 68 | 52 | 50 | 45 | 40 | 35 | 35 | 57 | **46** |
| 355 x 355 | 1 | 444 | 49 | 53 | 50 | 45 | 42 | 36 | 33 | 34 | **49** | **39** | 47 | 49 | 33 | 31 | 26 | 21 | 16 | 16 | 37 | **27** |
| | 4 | 1774 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **57** | **48** | 63 | 65 | 49 | 47 | 42 | 37 | 32 | 32 | 52 | **43** |
| | 7 | 3105 | 68 | 69 | 62 | 57 | 52 | 46 | 43 | 43 | **61** | **51** | 67 | 69 | 53 | 51 | 46 | 41 | 36 | 36 | 58 | **46** |
| 400 x 400 | 1 | 565 | 50 | 54 | 51 | 46 | 43 | 37 | 34 | 35 | **50** | **39** | 48 | 50 | 34 | 32 | 27 | 22 | 17 | 17 | 37 | **27** |
| | 4 | 2258 | 66 | 67 | 60 | 55 | 50 | 44 | 41 | 41 | **58** | **49** | 64 | 66 | 50 | 48 | 43 | 38 | 33 | 33 | 52 | **43** |
| | 7 | 3952 | 69 | 70 | 63 | 58 | 53 | 47 | 44 | 44 | **61** | **51** | 67 | 69 | 53 | 51 | 46 | 41 | 36 | 36 | 58 | **47** |
| 500 x 400 | 1 | 704 | 54 | 58 | 55 | 49 | 47 | 41 | 38 | 39 | **53** | **43** | 55 | 57 | 41 | 39 | 34 | 29 | 29 | 29 | 44 | **35** |
| | 4 | 2816 | 72 | 73 | 66 | 61 | 56 | 50 | 47 | 47 | **64** | **54** | 71 | 70 | 60 | 61 | 57 | 49 | 46 | 48 | 60 | **53** |
| | 7 | 4927 | 75 | 76 | 69 | 64 | 59 | 53 | 50 | 50 | **68** | **58** | 76 | 75 | 65 | 66 | 62 | 54 | 51 | 53 | 66 | **59** |
| 630 x 400 | 1 | 885 | 53 | 57 | 54 | 48 | 46 | 40 | 37 | 38 | **52** | **42** | 52 | 54 | 38 | 36 | 31 | 26 | 26 | 26 | 41 | **32** |
| | 4 | 3540 | 71 | 72 | 65 | 60 | 55 | 49 | 46 | 46 | **63** | **53** | 68 | 67 | 57 | 58 | 54 | 46 | 43 | 45 | 57 | **50** |
| | 7 | 6196 | 74 | 75 | 68 | 63 | 58 | 52 | 49 | 49 | **67** | **57** | 73 | 72 | 62 | 63 | 59 | 51 | 48 | 50 | 63 | **56** |
| 800 x 400 | 1 | 1126 | 54 | 58 | 55 | 49 | 47 | 41 | 38 | 39 | **53** | **43** | 53 | 55 | 39 | 37 | 32 | 27 | 27 | 27 | 42 | **33** |
| | 4 | 4505 | 72 | 73 | 66 | 61 | 56 | 50 | 47 | 47 | **64** | **54** | 69 | 68 | 58 | 59 | 55 | 47 | 44 | 46 | 58 | **51** |
| | 7 | 7883 | 75 | 76 | 69 | 64 | 59 | 53 | 50 | 50 | **68** | **58** | 74 | 73 | 63 | 64 | 60 | 52 | 49 | 51 | 64 | **57** |

Casing sound emission data given in the chart refer to the emitting jacket surface of a duct of galvanized sheet steel, total length 6 m, with the flow rate controller installed.

Due to resonance effects given frequency-related sound power level data may vary by ± 6 dB max.

- $\Delta p_{tot}$ - Total pressure difference
- $f_m$ - Octave mid-band frequency
- $L_W$ - Sound power level
- $L_{WA}$ - Sound power level, A-weighted
- $L_{pA}$ - Sound pressure level, A-weighted

## Nomenclature, ordering code

**VRF -S 140x140 / P / D / C540**
(1) (2) (3) (4) (5) (6)

| | | | | |
|---|---|---|---|---|
| (1) | **Series** | **VRF** | = | Variable flow rate controller, square |
| (2) | **Measuring principle** | | = | dynamic |
| | | **-S** | = | static |
| (3) | **Size** | **140x140** | = | Width x Height [mm] |
| | | **200x140** | = | |
| | | **250x140** | = | |
| | | **160x160** | = | |
| | | **280x160** | = | |
| | | **180x180** | = | |
| | | **315x180** | = | |
| | | **200x200** | = | |
| | | **355x200** | = | |
| | | **630x200** | = | |
| | | **224x224** | = | |
| | | **400x224** | = | |
| | | **250x250** | = | |
| | | **280x280** | = | |
| | | **400x280** | = | |
| | | **315x315** | = | |
| | | **355x355** | = | |
| | | **400x400** | = | |
| | | **500x400** | = | |
| | | **630x400** | = | |
| | | **800x400** | = | |
| (4) | **Version** | **P** | = | Plastic PPs |
| (5) | **Insulating case** | **D** | = | With insulating case |
| | | **–** | = | Without insulating case |
| (6) | **Controller type** | **C540** | = | Sauter ASV215BF152E (standard, other controller types see last pages)<br>From height 400 mm actuators with min. 8 Nm torque are required |

## Additional order specifications

- $V_{min}$ [$m^3/h$]
- $V_{max}$ [$m^3/h$]
- Mode 0...10 V or 2...10 V
- Regulating time 3...15 s / 90°

Please notice:

$V_{nom}$ see page 7
$V_{min} \leq V_{max}$
$V_{max} \leq V_{nom}$
$V_{min} \geq 0{,}064 \times V_{nom}$

In the absence of such specifications the unit will be delivered with the following factory settings:

- $V_{min} = 0{,}1 \times V_{nom}$
- $V_{max} = V_{nom}$
- Mode 0...10 V
- Regulating time 3 s

## Ordering example

VRF-S 140x140/P/D/C540, $V_{min}$ = 100 $m^3/h$, $V_{max}$ = 200 $m^3/h$, mode 2...10 V, regulating time 15

## Controller makes

| | Controller make/type | Controller | | Sensor | | | Actuator | | | Controller type | Sensor type | Actuator type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analogue control | Digital control (Bus) | Measuring principle: dynamic | Measuring principle: static | Pressure range [Pa] | Torque [Nm] | Runn time motor/ pring for 90° [s] | Spring return | | | |
| electric | **Belimo** | | | | | | | | | | | |
| | B780 | x | MP | x | | 0...450 | 5 | 150 | | LMVD3MP | incl. | incl. |
| | B610 | x | MP | x | | 0...450 | 10 | 150 | | NMVD3MP | incl. | incl. |
| | B818 | x | | x | | 2...300 | 5 | 150 | | VRD3 | incl. | LM 24AV |
| | B804 | x | | x | | 2...300 | 10 | 150 | | VRD3 | incl. | NM 24AV |
| | B807 / B808 * | x | | x | | 2...300 | 4 | 75/20 | x | VRD3 | incl. | LF 24V |
| | B819 / B820 * | x | | x | | 2...300 | 20 | 150/20 | x | VRD3 | incl. | SF 24AV |
| | B803 | x | | | x | 0...300 | 5 | 150 | | VRPBS | VFP300 | LM 24AV |
| | B531 | x | | | x | 0...300 | 10 | 150 | | VRPBS | VFP300 | NM 24AV |
| | B534 / B535 * | x | | | x | 0...300 | 4 | 75/20 | x | VRPBS | VFP300 | LF 24V |
| | B536 / B537 * | x | | | x | 0...300 | 20 | 150/20 | x | VRPBS | VFP300 | SF 24AV |
| | B815 | x | MP | | x | 0...300 | 10 | 150 | | VRPMVAV | VFP300 | NM24AVST |
| | B818 | x | MP | | x | 0...300 | 20 | 150/20 | x | VRPMVAV | VFP300 | SF 24AVST |
| | B809 | x | MP | | x | 0...300 | 4 | 3 | | VRPMVAV | VFP300 | LMQ24ASRVST |
| | B814 | x | MP | | x | 0...300 | 8 | 4 | | VRPMVAV | VFP300 | NMQ24ASRVST |
| | B800 | | LON | x | | 0...450 | 5 | 150 | | LMVD3LON | incl. | incl. |
| | B801 | | LON | x | | 0...450 | 10 | 150 | | NMVD3LON | incl. | incl. |
| | **Siemens** | | | | | | | | | | | |
| | L540 | x | | x | | 0...300 | 5 | 150 | | GDB 181.1E/LT | incl. | incl. |
| | L560 | x | | x | | 0...300 | 10 | 150 | | GLB 181.1E/3 | incl. | incl. |
| | **Gruner** | | | | | | | | | | | |
| | G610 | x | PP | x | | 0...300 | 10 | 150 | | 227V02410 | incl. | incl. |
| | G780 | x | PP | x | | 0...300 | 5 | 100 | | 227V02405 | incl. | incl. |
| | G750 | x | PP | x | | 0...300 | 5 | 20 | | 227SV02405 | incl. | incl. |
| | G801 | x | PP | x | | 0...300 | 5 | 120 | | GUACD3 | incl. | 22702405V |
| | G521 | x | PP | x | | 0...300 | 8 | 120 | | GUACD3 | incl. | 22702408V |
| | G805 | x | PP | x | | 0...300 | 8 | 4 | | GUACD3 | incl. | 227CS02408V |
| | G544 / G545 * | x | PP | x | | 0...300 | 15 | 150/15 | x | GUACD3 | incl. | 238024015V |
| | G802 | x | PP | | x | 0...300 | 5 | 120 | | GUACS3 | incl. | 22702405V |
| | G531 | x | PP | | x | 0...300 | 8 | 120 | | GUACS3 | incl. | 22702408V |
| | G803 | x | PP | | x | 0...300 | 5 | 35 | | GUACS3 | incl. | 227CS02405V |
| | G581 | x | PP | | x | 0...300 | 8 | 4 | | GUACS3 | incl. | 227CS02408V |
| | G554 / G555 * | x | PP | | x | 0...300 | 15 | 150/15 | x | GUACS3 | incl. | 238024015V |
| | **Sauter** | | | | | | | | | | | |
| | C540 | x | BACnet | | x | 1...300 | 10 | 3...15 | | ASV215BF152E | incl. | incl. |
| | C541 | x | BACnet | | x | 1...300 | 10 | 60...105 | | ASV215BF132E | incl. | incl. |
| | C544 | x | BACnet | | x | 1...300 | 5 | 30...105 | | ASV205BF132 | incl. | incl. |
| pneuumatic | **Sauter** | | | | | | | | | | | |
| | P521 / P522 * | | | | x | 10...250 | | | x | RLP10 F001 | incl. | SMA1 ** |
| | P523 / P524 * | | | | x | 10...250 | | | x | RLP10 F001 | incl. | SMD |
| | P551 / P552 * | | | | x | 6,4...160 | | | x | RLP100 F003 | incl. | SMA1 ** |
| | P553 / P554 * | | | | x | 6,4...160 | | | x | RLP100 F003 | incl. | SMD |

* .../... = dead closed / dead open or pressureless closed / pressureless open

** LTG air motors SMA1 up to max. H = 315

## Controller makes

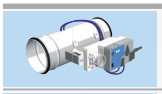
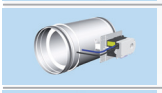
| | Controller make/type | Additional order specifications | | | | | |
|---|---|---|---|---|---|---|---|
| | | Adjustment limits | | | | Operating range for $V_{min}$...$V_{max}$ | Control action actuator |
| | | $V_{min}$ [$m^3/h$] | | $V_{max}$ [$m^3/h$] | | | |
| | | minimal | maximal | minimal | maximal | | |
| elektrisch | **Belimo** | | | | | | |
| | B780 | 0 | $V_{max}$ | 20 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B610 | 0 | $V_{max}$ | 20 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B818 | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B804 | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B807 / B 808* | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | Dead open or closed |
| | B819 / B820* | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | Dead open or closed |
| | B803 | 0 | 80 % of $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 2...10 V | |
| | B531 | 0 | 80 % of $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 2...10 V | |
| | B534 / B535* | 0 | 80 % of $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 2...10 V | Dead open or closed |
| | B536 / B537* | 0 | 80 % of $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 2...10 V | Dead open or closed |
| | B815 | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B818 | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B809 | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B814 | 0 | $V_{max}$ | 30 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B800 | 0 | $V_{max}$ | 20 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | B801 | 0 | $V_{max}$ | 20 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | **Siemens** | | | | | | |
| | L540 | 20 % of $V_{nom}$ | $V_{max}$ | 20 % of $V_{nom}$ | 120 % of $V_{nom}$ | 0...10 or 2...10 V | |
| | L560 | 20 % of $V_{nom}$ | $V_{max}$ | 20 % of $V_{nom}$ | 120 % of $V_{nom}$ | 0...10 or 2...10 V | |
| | **Gruner** | | | | | | |
| | G610 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G780 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G750 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G801 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G521 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G805 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G544 / G545* | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | Dead open or closed |
| | G802 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G531 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G803 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G581 | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | |
| | G554 / G555* | 0 | $V_{max}$ | 0 | $V_{nom}$ | 0...10 or 2...10 V | Dead open or closed |
| | **Sauter** | | | | | | |
| | C540 | 6,4 % of $V_{nom}$ | $V_{max}$ | 6,4 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | C541 | 6,4 % of $V_{nom}$ | $V_{max}$ | 6,4 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| | C544 | 6,4 % of $V_{nom}$ | $V_{max}$ | 6,4 % of $V_{nom}$ | $V_{nom}$ | 0...10 or 2...10 V | |
| pneumatisch | **Sauter** | | | | | | |
| | P521 / P522* | 20 % of $V_{nom}$ | $V_{max}$ | 20 % of $V_{nom}$ | $V_{nom}$ | 0,2...1,0 bar | Pressureless open or closed |
| | P523 / P524* | 20 % of $V_{nom}$ | $V_{max}$ | 20 % of $V_{nom}$ | $V_{nom}$ | 0,2...1,0 bar | Pressureless open or closed |
| | P551 / P552* | 16 % of $V_{nom}$ | $V_{max}$ | 16 % of $V_{nom}$ | $V_{nom}$ | 0,2...1,0 bar | Pressureless open or closed |
| | P553 / P554* | 16 % of $V_{nom}$ | $V_{max}$ | 16 % of $V_{nom}$ | $V_{nom}$ | 0,2...1,0 bar | Pressureless open or closed |

* .../... = dead closed / dead open or pressureless closed / pressureless open

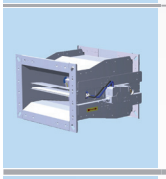
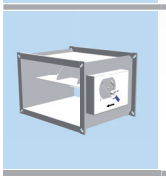
# Product Overview• **LTG Air Distribution**

## Flow rate controllers

### Circular

| | | | |
|---|---|---|---|
| Variable |  | VRE*active* | LTG Map Control System *ActiveControl*. Highest precision, short installation length |
| |  | VRD*active* | |
| |  | VRE | To combine with customized drives; VRE also available in PPS |
| |  | VRD | |
| Constant |  | VRW | Without external power supply, pollution-insentitive |
| |  | VRZ | |

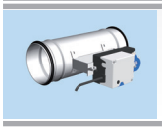
### Square

| | | | |
|---|---|---|---|
| Variable |  | VRF*active* | LTG *ActiveControl*. Highest precision, short installation length |
| |  | VRF*vent* | LTG control principle-*VenturiControl*; high pecision with low pressure loss, to combine with customized drives |
| Constant |  | VRX | Without external power supply; pollution-intensitive |

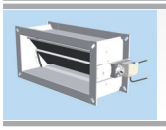
All variable controllers are available with dynamic or static measuring principle

## Pressure controllers

### Circular

| | | |
|---|---|---|
|  | DRE*active* | To balance extreme pressure level differences |

### Square

| | | |
|---|---|---|
|  | DRF*active* | To balance extreme pressure level differences |

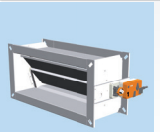
## Shut-off units

### Circular

| | | |
|---|---|---|
|  | KLB | Ultra-tight shut-off damper |
|  | ARE | Air-tight shut-off damper |

Air-tight shut-off acc. toDIN EN 1751: Class 4

### Square

| | | |
|---|---|---|
|  | ARF | Air-tight shut-off damper |

## Engineering Services

LTG Engineering Services Comfort Air Technology

## Portfolio

For our complete portfolio of air distribution products with suitable accessories see
**https://www.ltg.de/en/products-services/ltg-comfort-air-technology/air-distribution/**

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