

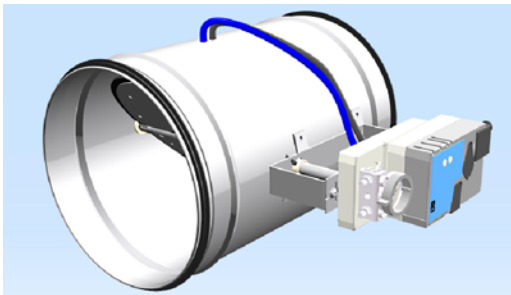


The Innovation Company
LTG Aktiengesellschaft

Technical Brochure

LTG Air Distribution

Variable Flow rate controllers
VREactive



Round, with LTG map control

www.LTG-AG.com

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Variable flow rate controllers *VREactive*

LTG Comfort Air Technology
Air-Water Systems
Air Diffusers
Air Distribution

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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 your local distributor or at www.LTG-AG.com.

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Variable flow rate controllers *VREactive*

Flow Rate Control Basics – Which Product for which Application?

Plant types

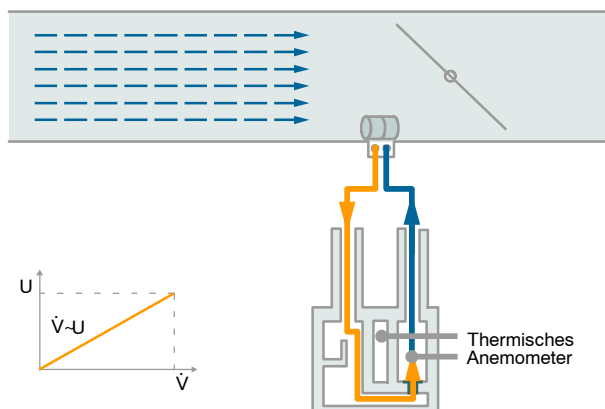
Variable Flow Rate

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.

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.).

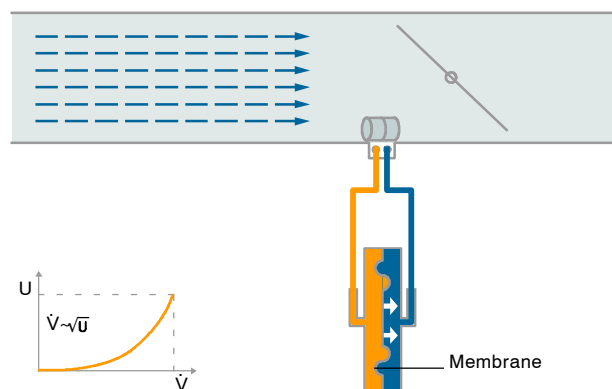


Constant Flow Rate

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.

Static Differential Pressure Management

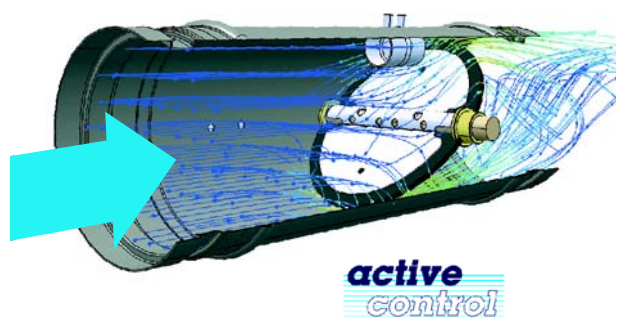
Static differential pressure measurement uses a diaphragm pressure transducer. With this method, no air is guided through the sensor, so no dust or chemical pollution by the air is possible and hence, may well be used in such environments.



Both principles are applied in our products of VR... series: *VRactive* (dynamic) and *VRactive-s* (static).

LTG map control: Differential pressure + Damper setting = Flow rate

Contrary to common measuring techniques, the differential pressure is not measured using an upstream element such as orifice plate or differential pressure sensor. Flow rate controllers *VREactive* and *VRFactive* measure the differential pressure directly in the damper blade area (stronger signal due to locally accelerated air flow).

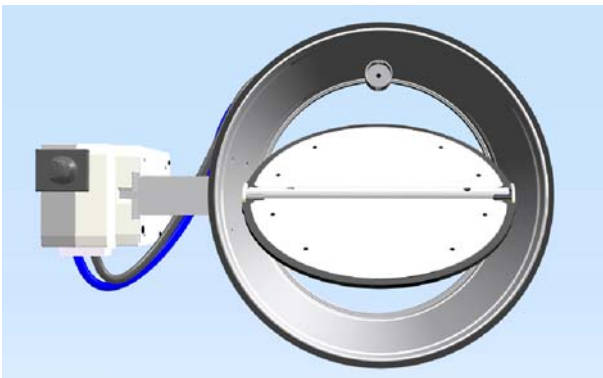
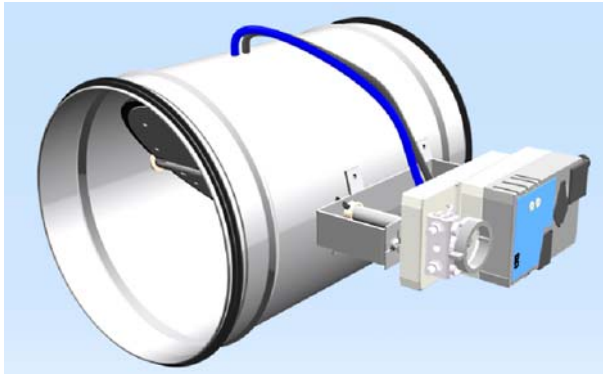


Locally accelerated air flow
at the measuring point

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Views of unit



Inside view in direction of air flow

Application

The round flow rate control unit VRE_{active} is designed to control an initial pressure-independent constant or variable flow rate. Complete shut-off is also possible.

Depending on the model size and flow rate, the minimum initial pressure difference is approx. 5 Pa ... approx. 50 Pa, based on duct air speeds of 1...10 m/s.

The casing is provided with plug-in end pieces with lip-seal gasket to fit lock-seam spiral wound air ducts according to DIN EN 1506. All components are factory-wired and hose-connected.

For sound and heat insulation, a 50 mm mineral wool insulating shell with sheet steel jacket is available.

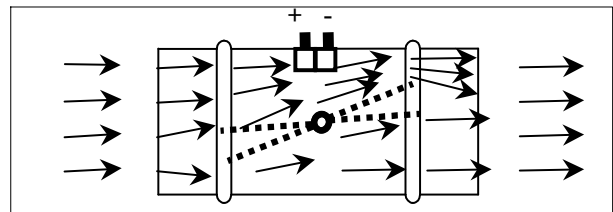
Measuring principle

Contrary to conventional measuring techniques, the differential pressure is not measured through a series-connected element such as an orifice plate. Instead, differential pressure measured by two cup-shaped elements mounted in the damper blade area.

Placing the damper blade in the throttle position creates a „jet effect“, which is concentrated with reduced flow rates and higher throttle settings. This results in increased air speeds at the measuring point even with lower duct air speeds allowing for relatively high and very precisely measurable differential pressures.

With this measuring principle, the highest control accuracy of all known systems is achieved even with very low air speeds.

Using this technique, flow rate control depends on two values, the differential pressure and the damper blade position.



Flow pattern inside the housing

Advantages

- Excellent control accuracy from $\pm 5\%$ ($\dot{V}_{nom}$) to $\pm 15\%$ ($\dot{V}_{min}$)
- Short installation length thanks to differential pressure measurement in the damper blade area. Thus, perfect for retrofitting and limited-space installation conditions.
- High control ratio of 10:1 (air speeds of 1...10 m/s)
- Low minimum pressure loss, resulting in energy savings during operation and lower noise generation.
- Very low air leakage rate with the shut-off damper acc. to DIN EN 1751 Class 4 (DN 100 and 125: Class 3).
- Thanks to "jet effect" good control accuracy even in case of unfavourable entry conditions.
- Plug-in end pieces with lip-seal gasket by default

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Variable flow rate controllers VRE_{active}

Materials, finishes

- Housing, damper, axle and measuring probes of galvanized steel
- Damper bearings of POM plastic
- Sealings of EPDM

Accessories, special versions

- Insulating case for sound and heat insulation (retrofit)
- Flanges according to DIN 24154 R1 at both ends
- Flexible sound absorber SDE-A0 made of aluminium
- Rigid sound absorber SDE-S0 made of galvanized sheet steel
- Compact controller compatible with MP-Bus or LON
- Compact controller with static measuring method

Additional accessories and special versions by request.

Connection

Notes and circuit diagrams for regulating the flow rate can be found in the operating and maintenance instructions.

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
- For sound absorbers, the flow noise downstream of the splitters and the noise created by the increased outflow air speed in the connected fittings must be considered.

Application ranges and limits

- Minimum air speed 1 m/s
- Nominal air speed 10 m/s
- Maximum air speed in the free case section 12 m/s with specific factory-set adjustment
- Static over-pressure in the air duct up to 1000 Pa
- Static under-pressure in the air duct based on ambient pressure 750 Pa max.
- Leakage flow rate via shut damper blade Class 4 acc. to DIN EN 1751 (DN 100 and 125: Class 3)
- Leakage flow rate via casing Class A acc. to DIN EN 1751
- Operating temperature range 0 ...+50 °C at 5...95 % rh, non-condensing (acc. to EN 60730-1)
- Suitable for low-pollution air flows (e.g. ETA1, ETA2 acc. to DIN EN 13779), non-corrosive, aggressive air, without solvents that may affect the EPDM damper sealing
- Installation with horizontal damper axle only
- Free suction with upstream air duct or via fitting only

Flow rate range, minimum pressure difference

	at 1 m/s	at 2 m/s		at 4 m/s		at 7 m/s		at 10 m/s	
DN [mm]	V _{min} [m³/h]	V [m³/h]	Δp _{min} [Pa]	V [m³/h]	Δp _{min} [Pa]	V [m³/h]	Δp _{min} [Pa]	V _{nenn} [m³/h]	Δp _{min} [Pa]
100	27	54	10	109	15	190	20	272	50
125	43	86	10	171	15	300	20	428	40
160	71	141		282		494		706	
200	111	222		443		776		1108	
250	174	348	10	696	15	1217	20	1739	25
315	277	554		1108		1939		2770	
400	448	896		1792		3135		4479	

Legend

- DN - Nominal diameter
V - Flow rate
V_{min} - Minimum flow rate = lower limit of control
V_{nenn} - Nominal flow rate
Δp_{min} - Minimum pressure loss

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Control accuracy

Control accuracy

Deviations from the set value:

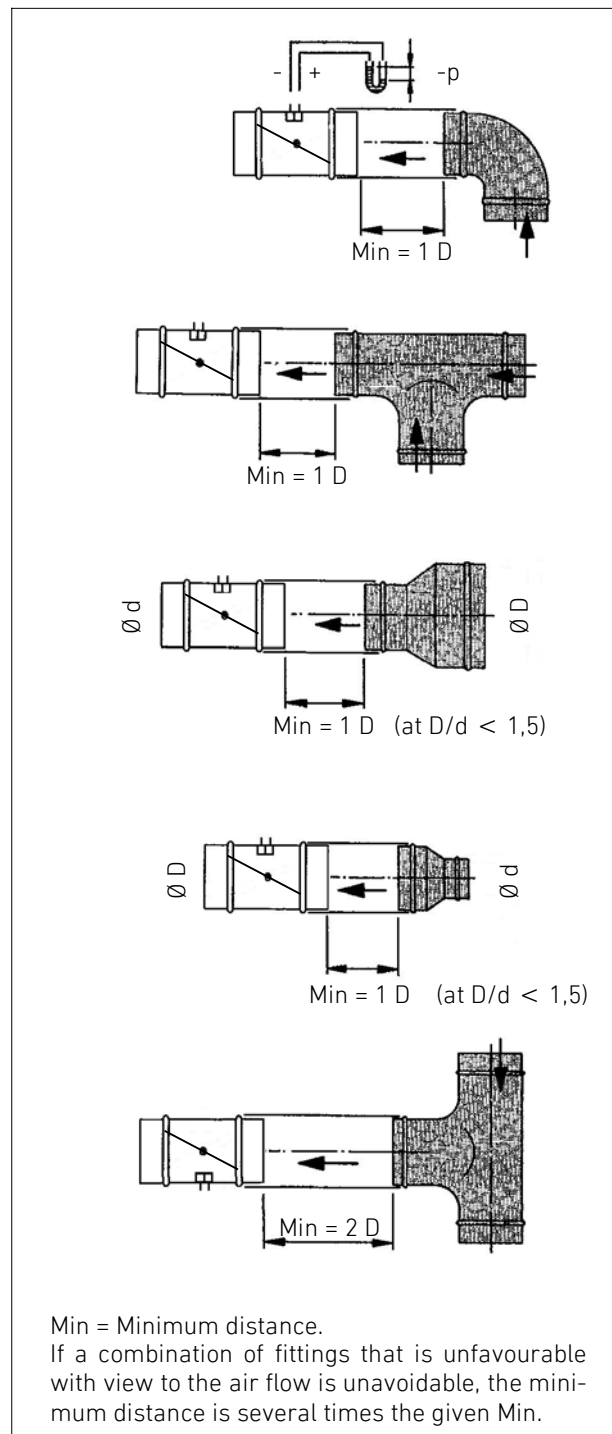
$\pm 5\%$ at V_{neff} (equates to 10 m/s) up to

$\pm 15\%$ at V_{min} (equates to 1 m/s).

Required straight inflow distances

A straight, undisturbed inflow distance of approx. $0.5...3 \times D$ (mm) in front of the flow rate controller is required. There are, however, no restrictions regarding the outflow side.

Please ensure a perfect positioning of the measuring nipples with respect to the air flow. Avoid turbulent air flow and short radius bends or T-branches before the damper.

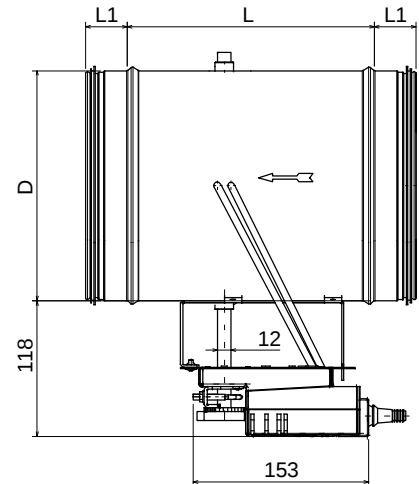
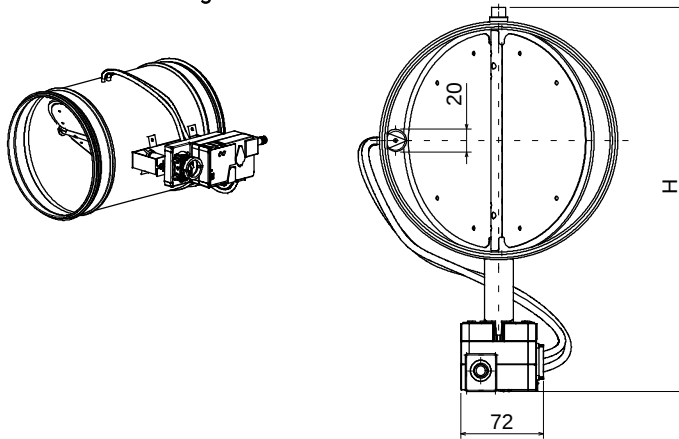


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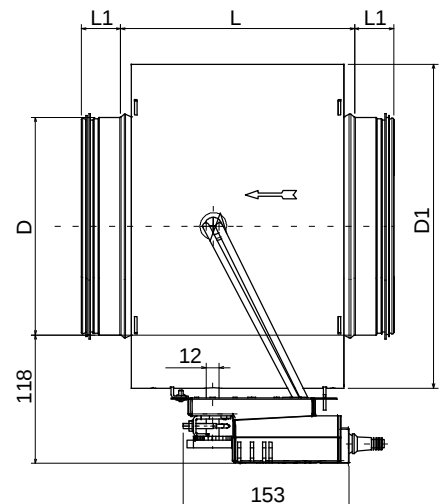
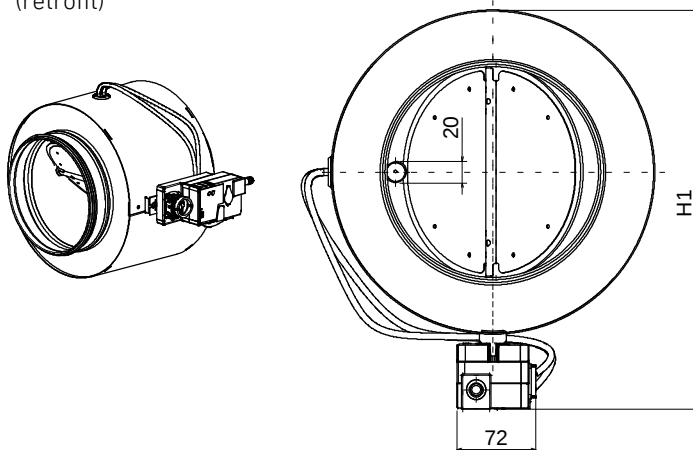
Variable flow rate controllers *VREactive*

Dimensions, weight

Without insulating case



With insulating case
(retrofit)



Version with plug-in ends and lip seal gasket.
Total length of the housing of the version with flange $L + 2 \times L1$.

Nominal diam. DN	L [mm]	L1 [mm]	D [mm]	D1 [mm]	H [mm]	H1 [mm]	Damper angle [°]	Weight [kg]	
								without insulating case	with insulating case
100	195	36	99	199	233	267	60	1.5	2.9
125	195	36	124	224	258	292	60	1.8	3.4
160	215	36	159	259	293	327	60	2.1	4.1
200	215	36	199	299	333	367	60	2.6	4.9
250	260	54	249	349	383	417	60	3.3	6.5
315	260	54	314	414	448	482	60	4.4	8.2
400	315	72	399	499	533	567	60	6.1	11.7

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Variable flow rate controllers *VREactive*

Airborne sound transmission without silencer

Nominal size	Air speed. [m/s]	Flow rate [m³/h]	Δp _{ges} = 100 Pa										Δp _{ges} = 200 Pa									
			f _m [Hz]								Sum		f _m [Hz]								Sum	
			63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]
			L _W [dB/Okt]										L _W [dB/Okt]									
100	1	27	33	32	36	42	43	32	23	26	45	37	35	35	37	41	47	39	32	28	48	41
	4	108	39	48	44	42	41	35	31	27	45	37	42	51	50	48	50	46	47	42	54	46
	7	189	41	50	45	46	45	42	38	33	50	42	44	56	53	51	51	48	49	46	57	49
	10	272	44	51	48	50	49	47	42	43	54	46	47	58	56	55	54	53	49	52	60	52
125	1	43	32	29	31	39	41	32	23	16	42	35	37	29	33	41	49	44	37	29	51	43
	4	172	46	48	42	44	44	38	32	23	47	39	48	53	48	49	50	45	53	48	57	49
	7	299	50	54	48	49	50	42	40	36	53	45	52	61	54	54	55	49	53	51	60	52
	10	428	50	55	50	53	54	46	43	37	57	49	55	63	57	58	58	53	52	49	62	54
160	1	71	43	37	39	42	42	30	23	26	44	37	42	42	44	45	52	43	39	40	53	46
	4	284	49	50	46	46	46	36	29	26	48	41	52	54	53	52	53	46	39	34	55	48
	7	494	55	57	53	53	52	44	40	36	55	48	58	63	59	57	57	51	47	44	61	53
	10	706	58	60	56	57	57	49	45	40	60	51	62	66	63	61	61	55	51	49	65	56
200	1	111	38	33	37	40	39	31	21	15	42	34	41	37	41	46	49	45	36	28	51	44
	4	444	50	46	44	43	43	39	31	22	46	39	55	52	49	47	47	45	40	33	52	44
	7	776	58	53	50	50	51	46	40	37	54	44	62	59	57	54	54	51	47	48	58	49
	10	1108	65	60	58	57	57	53	48	54	61	51	66	63	61	58	58	56	51	56	63	52
250	1	174	38	39	42	43	39	33	28	26	44	36	39	42	45	50	50	46	38	31	53	46
	4	696	53	50	49	44	41	38	31	28	47	38	56	55	54	49	47	45	41	35	53	44
	7	1217	65	59	57	55	52	50	45	39	58	46	69	65	63	58	55	54	51	49	62	50
	10	1739	68	64	61	58	56	54	53	51	62	49	73	70	67	64	61	60	58	57	68	55
315	1	277	46	45	44	44	41	33	28	31	45	38	47	49	48	49	50	46	38	33	53	45
	4	1108	56	52	49	44	42	40	33	31	48	37	61	58	57	52	50	48	45	37	56	45
	7	1939	67	60	56	53	52	49	45	37	57	43	74	67	63	58	55	54	53	46	62	48
	10	2770	-	-	-	-	-	-	-	-	-	-	77	70	66	61	60	58	55	52	66	51
400	1	448	47	46	46	45	43	33	29	36	47	39	50	53	50	50	51	47	39	35	54	46
	4	1792	59	54	49	45	43	42	34	36	50	36	63	60	58	53	50	49	46	39	57	44
	7	3135	69	61	57	54	52	48	45	39	57	41	78	70	64	58	56	54	54	44	63	47
	10	4479	-	-	-	-	-	-	-	-	-	-	80	71	66	62	59	56	52	48	65	48

Legend

- Δp_{ges} - 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

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Variable flow rate controllers *VREactive*

Airborne sound transmission with silencer type SDE-SO 900 mm long

Nominal size	Air speed [m/s]	Flow rate [m³/h]	Δp _{ges} = 100 Pa										Δp _{ges} = 200 Pa									
			f _m [Hz]								Sum		f _m [Hz]								Sum	
			63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]
			L _W [dB/Okt]										L _W [dB/Okt]									
100	1	27	29	22	21	<15	<15	<15	<15	<15	16	<15	31	25	22	<15	<15	<15	<15	<15	17	<15
	4	108	33	28	25	17	<15	<15	<15	<15	20	<15	35	33	28	18	<15	<15	<15	<15	24	<15
	7	189	36	34	29	19	<15	<15	<15	<15	24	16	39	40	34	22	<15	<15	<15	17	30	20
	10	272	40	40	32	23	19	<15	<15	15	29	20	43	47	40	27	20	<15	<15	24	35	26
125	1	43	28	20	17	<15	<15	<15	<15	<15	<15	<15	33	20	19	<15	<15	<15	<15	<15	16	<15
	4	172	34	29	23	17	<15	<15	<15	<15	19	<15	39	31	27	20	<15	<15	<15	<15	24	<15
	7	299	40	37	29	21	<15	<15	<15	<15	27	17	45	42	35	25	<15	<15	<15	18	33	22
	10	428	46	45	35	26	21	17	<15	<15	33	24	51	53	42	31	22	17	17	24	40	30
160	1	71	40	32	28	19	<15	<15	<15	<15	23	<15	39	37	33	22	17	<15	<15	28	30	22
	4	284	45	40	34	24	<15	<15	<15	19	29	20	46	45	39	27	20	<15	<15	31	35	27
	7	494	50	47	39	29	18	<15	<15	23	35	26	52	53	45	33	23	<15	17	34	41	32
	10	706	55	55	45	34	25	19	17	27	42	31	59	61	52	38	28	21	21	36	48	37
200	1	111	37	28	27	21	<15	<15	<15	<15	22	<15	40	32	31	27	17	<15	20	17	28	21
	4	444	46	37	34	27	<15	<15	<15	17	29	21	48	41	38	31	20	18	25	26	34	26
	7	776	55	46	41	32	20	16	23	30	37	27	57	49	44	35	23	21	30	35	40	31
	10	1108	64	55	48	38	28	24	32	43	46	34	65	58	51	39	28	26	35	45	48	37
250	1	174	36	36	33	26	<15	<15	15	18	29	21	37	39	36	33	24	25	25	23	34	27
	4	696	46	44	39	31	19	19	23	26	37	26	48	48	43	38	28	30	32	32	41	32
	7	1217	56	53	46	36	25	26	32	35	45	30	60	58	51	42	31	34	38	40	47	36
	10	1739	66	61	52	41	32	33	40	43	50	36	71	67	58	47	35	39	45	49	56	42
315	1	277	45	43	38	29	20	18	20	24	33	25	46	47	42	34	29	31	30	26	39	31
	4	1108	55	50	44	33	25	26	28	27	40	28	59	56	49	38	31	35	37	32	46	35
	7	1939	66	58	50	38	31	34	37	30	47	32	73	65	57	43	34	39	45	39	54	39
	10	2770	76	65	56	42	37	42	45	33	57	38	86	74	64	47	37	43	52	45	61	46
400	1	448	46	44	41	32	28	25	26	34	38	30	49	51	45	37	36	39	50	33	49	44
	4	1792	57	52	47	37	33	33	34	36	44	30	63	60	52	41	39	43	51	38	53	40
	7	3135	68	59	52	41	37	40	42	37	50	34	77	68	59	45	41	46	51	42	58	41
	10	4479	79	66	57	46	42	47	50	38	59	39	91	76	66	49	44	49	51	46	62	46

Legend

- Δp_{ges} - 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

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Variable flow rate controllers *VREactive*

Casing sound emission without insulating case

Nominal size	Ais peed [m/s]	Fow rate [m³/h]	Δp _{ges} = 100 Pa										Δp _{ges} = 200 Pa									
			f _m [Hz]								Sum		f _m [Hz]								Sum	
			63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]
			L _W [dB/Okt]										L _W [dB/Okt]									
100	1	27	20	<15	18	25	28	23	<15	15	30	21	22	<15	19	23	31	31	20	17	35	26
	4	108	26	24	26	25	26	27	19	16	31	22	30	26	33	31	34	37	36	31	42	33
	7	189	28	25	28	28	30	34	26	23	37	28	31	31	36	34	36	40	38	36	45	36
	10	272	32	27	31	33	34	39	31	33	42	33	34	33	38	37	39	44	38	42	48	39
125	1	43	18	<15	<15	21	24	23	<15	<15	28	19	23	<15	<15	23	33	35	25	17	38	29
	4	172	33	23	24	26	27	29	19	<15	33	24	35	28	30	31	34	36	41	37	44	36
	7	299	37	29	29	31	33	33	27	25	38	29	39	36	36	36	38	40	41	40	47	38
	10	428	37	30	32	35	38	37	31	26	42	33	42	37	39	40	42	43	40	37	48	39
160	1	71	29	<15	20	23	25	20	<15	16	27	19	28	16	25	26	35	33	26	30	38	30
	4	284	35	24	27	27	29	26	16	16	32	23	38	28	34	33	36	36	26	24	40	32
	7	494	41	31	34	34	35	34	27	26	39	31	44	37	40	38	40	41	34	34	45	37
	10	706	44	34	37	38	40	39	32	30	44	35	48	40	44	42	44	45	38	39	49	41
200	1	111	28	<15	22	25	23	17	<15	<15	26	17	31	17	27	30	33	30	22	19	36	27
	4	444	40	27	30	28	27	24	16	<15	31	22	45	32	35	32	31	31	25	24	37	28
	7	776	48	34	36	35	35	31	26	28	39	30	52	40	43	39	37	37	33	39	44	35
	10	1108	55	41	44	42	41	39	34	45	48	39	56	44	47	43	42	41	36	47	50	41
250	1	174	27	19	27	27	22	18	<15	16	28	19	28	22	30	34	33	31	23	21	37	28
	4	696	42	30	34	28	24	23	16	18	31	22	45	35	39	33	30	30	26	25	37	28
	7	1217	54	39	42	39	35	35	30	29	42	33	58	45	48	42	38	39	36	39	47	38
	10	1739	57	44	46	42	39	39	38	41	47	38	62	50	52	48	44	45	43	47	53	44
315	1	277	34	24	28	30	26	21	16	24	31	22	35	28	32	35	35	34	26	26	39	31
	4	1108	44	31	33	30	27	28	21	24	34	25	49	37	41	38	35	36	33	30	42	33
	7	1939	55	39	40	39	37	37	33	30	43	34	62	46	47	44	40	42	41	39	49	40
	10	2770	-	-	-	-	-	-	-	-	-	-	65	49	50	47	45	46	43	45	52	44
400	1	448	34	24	29	34	31	24	20	32	36	27	37	31	33	39	39	38	30	31	43	35
	4	1792	46	32	32	34	31	33	25	32	38	29	50	38	41	42	38	40	37	35	46	37
	7	3135	56	39	40	43	40	39	36	35	46	37	65	48	47	47	44	45	45	40	52	43
	10	4479	-	-	-	-	-	-	-	-	-	-	67	49	49	51	47	47	43	44	54	45

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.

Legend

- Δp_{ges} - 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

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Variable flow rate controllers VREactive

Casing sound emission with 50 mm insulating case

Nominal size	Air speed. [m/s]	Flow rate [m³/h]	Δp _{ges} = 100 Pa										Δp _{ges} = 200 Pa									
			f _m [Hz]								Sum		f _m [Hz]								Sum	
			63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L _{WA} [dB(A)]	L _{pA} [dB(A)]
			L _W [dB/Okt]										L _W [dB/Okt]									
100	1	27	19	<15	18	19	19	<15	<15	<15	21	12	21	<15	19	17	22	<15	<15	<15	23	14
	4	108	25	24	26	19	17	<15	<15	<15	22	13	29	26	33	25	25	16	16	<15	29	20
	7	189	27	25	28	22	21	<15	<15	<15	25	16	30	31	36	28	27	19	18	16	32	23
	10	272	31	27	31	27	25	18	<15	<15	29	20	33	33	38	31	30	23	18	22	35	26
125	1	43	17	<15	18	17	16	<15	<15	<15	19	9	22	<15	<15	17	24	<15	<15	<15	25	15
	4	172	32	23	24	20	18	<15	<15	<15	22	13	34	28	30	25	25	15	21	17	29	20
	7	299	36	29	29	25	24	<15	<15	<15	28	18	38	36	36	30	29	19	21	20	34	25
	10	428	36	30	32	29	29	16	<15	<15	32	23	41	37	39	34	33	22	20	17	37	28
160	1	71	28	<15	20	17	16	<15	<15	<15	19	10	27	16	25	20	26	<15	<15	<15	27	18
	4	284	34	24	27	21	20	<15	<15	<15	24	15	37	28	34	27	27	<15	<15	<15	30	21
	7	494	40	31	34	28	26	<15	<15	<15	30	21	43	37	40	32	31	20	<15	<15	35	27
	10	706	43	34	37	32	31	18	<15	<15	34	26	47	40	44	36	35	24	18	17	39	31
200	1	111	25	<15	20	22	20	<15	<15	<15	23	14	28	15	25	27	30	24	<15	<15	32	23
	4	444	37	25	28	25	24	18	<15	<15	28	19	42	30	33	29	28	25	<15	<15	32	23
	7	776	45	32	34	32	32	25	<15	<15	35	26	49	38	41	36	34	31	<15	18	39	30
	10	1108	52	39	42	39	38	33	<15	24	42	33	53	42	45	40	39	35	<15	26	43	35
250	1	174	24	17	25	24	19	<15	<15	<15	24	15	25	20	28	31	30	25	<15	<15	33	24
	4	696	39	28	32	25	21	17	<15	<15	28	19	42	33	37	30	27	24	<15	<15	33	24
	7	1217	51	37	40	36	32	29	<15	<15	38	29	55	43	46	39	35	33	<15	18	42	33
	10	1739	54	42	44	39	36	33	16	20	42	33	59	48	50	45	41	39	21	26	47	38
315	1	277	31	22	26	24	20	<15	<15	<15	25	16	32	26	30	29	29	<15	<15	<15	33	22
	4	1108	41	29	31	24	21	20	<15	<15	28	19	46	35	39	32	29	<15	<15	<15	35	26
	7	1939	52	37	38	33	31	29	<15	<15	36	28	59	44	45	38	34	17	17	17	42	32
	10	2770	-	-	-	-	-	-	-	-	-	-	62	47	48	41	39	19	19	23	45	35
400	1	448	31	22	27	24	21	<15	<15	<15	25	16	34	29	31	29	29	<15	<15	<15	31	22
	4	1792	43	30	30	24	21	24	<15	<15	29	20	47	36	39	32	28	<15	<15	<15	34	25
	7	3135	53	37	38	33	30	30	<15	<15	37	28	62	46	45	37	34	20	20	<15	43	33
	10	4479	-	-	-	-	-	-	-	-	-	-	64	47	47	41	37	18	18	19	45	35

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. Both the flow rate controller and the duct are provided with a 50 mm insulating case.

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

Legend

- Δp_{ges} - 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

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Variable flow rate controllers *VREactive*

Room sound pressure level calculation from controller sound transmission (excluding flow noise from the air diffusers)

System attenuation according to VDI 2081

f_m	[Hz]	63	125	250	500	1000	2000	4000	8000
Deflection $\Delta L_{W \text{ Okt}}$	[dB/Okt]	0	0	1	2	3	3	3	3
Room attenuation $\Delta L_{W \text{ Okt}}$	[dB/Okt]	5	5	5	5	5	5	5	5
Outlet reflection $\Delta L_{W \text{ Okt}}$	[dB/Okt]	10	5	2	0	0	0	0	0

Branching attenuation for distributing the sound power over multiple rooms, $V_{\text{room}} = 540 \text{ m}^3/\text{h}$

V	[m ³ /h]	540	1080	2160	5400	10800	16200	21600	25200	28800	32400	36000
$\Delta L_{W \text{ Okt}} = 10 \times Lg \frac{V}{540 \text{ m}^3/\text{h}}$	[dB/Okt]	0	3	6	10	13	14	16	17	17	18	19

Sample calculation sound transmission

Given: *VREactive* 200 with silencer type SDE-SO 900 mm long
 $V_{\text{max}} = 444 \text{ m}^3/\text{h}$, equates to 4 m/s
 $\Delta p_{\text{ges}} = 200 \text{ Pa}$
 $L_{WA} = 34 \text{ dB(A)}$

Required: Room sound pressure level L_{pA} from controller sound transmission

Solution: f_m	[Hz]	63	125	250	500	1000	2000	4000	8000	Source
Sound power level $L_{W \text{ Okt}}$	[dB/Okt]	48	41	38	31	20	18	25	26	p. 9
Deflection $\Delta L_{W \text{ Okt}}$	[dB/Okt]	0	0	-1	-2	-3	-3	-3	-3	p. 12
Deflection $\Delta L_{W \text{ Okt}}$	[dB/Okt]	-5	-5	-5	-5	-5	-5	-5	-5	p. 12
Outlet reflection $\Delta L_{W \text{ Okt}}$	[dB/Okt]	-10	-5	-2	0	0	0	0	0	p. 12
Branching attenuation $\Delta L_{W \text{ Okt}} = 10 \times Lg \frac{444 \text{ m}^3/\text{h}}{540 \text{ m}^3/\text{h}}$	[dB/Okt]	0	0	0	0	0	0	0	0	p. 12
A-weighted $\Delta L_{W \text{ Okt}}$	[dB/Okt]	-26	-16	-9	-3	0	1	1	-1	
A-weighted sound pressure level $L_{pA \text{ Okt}}$	[dB(A)/Okt]	<15	<15	20	21	<15	<15	17	16	
A-weighted sum sound pressure level $L_{pA} = 26 \text{ dB(A)}$										

Room sound pressure level calculation from controller radiation

f_m	[Hz]	63	125	250	500	1000	2000	4000	8000
Ceiling attenuation $\Delta L_{W \text{ Okt}}$	[dB/Okt]	4	4	4	4	4	4	4	4
Room attenuation $\Delta L_{W \text{ Okt}}$	[dB/Okt]	5	5	5	5	5	5	5	5

Sample calculation radiation

Given: *VREactive* 200 without insulating case
 $V_{\text{max}} = 444 \text{ m}^3/\text{h}$, equates to 4 m/s
 $\Delta p_{\text{ges}} = 200 \text{ Pa}$
 $L_{WA} = 37 \text{ dB(A)}$

Required: Room sound pressure level L_{pA} from controller radiation

Solution: f_m	[Hz]	63	125	250	500	1000	2000	4000	8000	Source
Sound power level $L_{W \text{ Okt}}$	[dB/Okt]	45	32	35	32	31	31	25	24	p. 10
Ceiling attenuation $\Delta L_{W \text{ Okt}}$	[dB/Okt]	-4	-4	-4	-4	-4	-4	-4	-4	p. 12
Room attenuation $\Delta L_{W \text{ Okt}}$	[dB/Okt]	-5	-5	-5	-5	-5	-5	-5	-5	p. 12
A-weighted $\Delta L_{W \text{ Okt}}$	[dB/Okt]	-26	-16	-9	-3	0	1	1	-1	
A-weighted sound pressure level $L_{pA \text{ Okt}}$	[dB(A)/Okt]	<15	<15	17	20	22	23	17	<15	
A-weighted sum sound pressure level $L_{pA} = 28 \text{ dB(A)}$										

Technical brochure

Variable flow rate controllers *VREactive*

Nomenclature, ordering code

VREactive 100 / S / D / – / B 671

(1) (2) (3) (4) (5) (6) (7) (8)

(1) Type	VREactive	= Flow rate controller, round, short, with map control
(2) Measuring principle		= dynamic
	-S	= static
(3) Size	100	= 100
	125	= 125
	160	= 160
	200	= 200
	250	= 250
	315	= 315
	400	= 400
(4) Version	S	= Galvanized steel
	E	= Stainless steel V4A
	K	= Coated
(5) Insulating case	D	= with
	–	= without
(6) Connection	–	= plug-in end pieces without lip seal gasket
	L	= plug-in end pieces with lip seal gasket
	F	= flanges acc. to DIN 24154 R1
	B	= Bord
(7) Compact controller (make)	B	= Belimo
	G	= Gruner
(8) Compact controller (type)	671	= Belimo LMV-D3W-MF-F (standard)
	670	= Belimo LMV-D3W-MP-F (compatible with MP-Bus)
	802	= Belimo LMV-D3W-LON-F (compatible with LON)
	227-05	= Gruner 227VMZ-024-05-DS6 (static)

Additional ordering specifications

- $V_{\min}$ [m³/h]
- $V_{\max}$ [m³/h]
- Mode 0...10 V or 2...10 V

Please notice : V_{nenn} see page 5
 $V_{\min} \geq 0$
 $V_{\min} \leq V_{\max}$
 $V_{\max} \leq V_{\text{nenn}}$
 $V_{\max} \geq 0.2 \times V_{\text{nenn}}$

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

- $V_{\min} = 0 \text{ m}^3/\text{h}$
- $V_{\max} = V_{\text{nenn}}$
- Mode 0...10 V

Ordering example

VREactive 100/S/D/-/B671, $V_{\min} = 100 \text{ m}^3/\text{h}$, $V_{\max} = 200 \text{ m}^3/\text{h}$, Mode 2...10 V

Product Overview

LTG Air Distribution

Flow Rate Controllers

Round			Square		
Variable		VRE _{active}	Variable		VRF _{active}
		VRD _{active}			
		VRE			VRF
		VRD			
Constant		VRW	Constant		VRX

All variable flow rate controllers are available with dynamic or static measuring principle

Pressure Controllers

Round			Square		
	DRE	To balance extreme pressure level differences		DRF	To balance extreme pressure level differences

Special Products

	SDE/SDF	Inline, cross-talk, and splitter silencers
	VRC+NE	Variable flow rate controller with silencer and reheating register
	VRW-A	Constant control and shut-off unit
	KLB	Ultra-tight shut-off damper (airtight acc. to DIN EN 1751: Class 4)
	ARE / ARF	Airtight shut-off damper (airtight acc. to DIN EN 1751: Class 4)

Engineering Services

	LTG Engineering Services Comfort Air Technology
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