Let's realize
the potential of air
for a sustainable world

LTG® **ActiveControl**

AIR TECH SYSTEMS



Technical brochure

Variable Airflow Controller

VRE*active*

The VREactive air flow rate controller enables precise, inlet pressure-independent control of constant or variable air flow rates.

Thanks to its compact design, it is also ideal for renovations and retrofits in confined spaces.

- **Constant airflow: Fully automatic regulation, unaffected by pressure changes in the duct system**
- **High precision: Thanks to a special flow guidance system, the controller delivers a strong and precise measurement signal even at very low air flow rates**
- **Energy efficiency: The optimised design ensures minimal pressure loss in the system**
- **Flexible communication: MP-Bus, Modbus, KNX, BACnet**
- **Various special versions are available, including stainless steel components, an NFC interface for diagnostic purposes, an insulation shell, and a silencer**

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Notes

The dimensions in this technical brochure are given in mm.
The general tolerances according to DIN ISO 2768-vL apply to the dimensions specified in this brochure.
The current tender documents are available in Word format from your local branch or at www.LTG-AG.com.
The VRE, VRF, VREactive, and VRFactive flow rate controllers are designed for installation in ventilation systems in accordance with VDI 6022 Parts 1+2 and DIN 1946 Part 2.
The aforementioned guidelines refer to DIN EN 13779, which in turn refers to the guidelines DIN EN 12237 and DIN EN 1507. The tightness classes specified there must be requested depending on the product variant.

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Applications

The round VREactive air flow rate controller enables precise, inlet pressure-independent control of constant or variable air flow rates. Thanks to its flexible control technology, the air flow rate can be adjusted to meet requirements and, if necessary, regulated right down to a complete shut-off.

- Suitable for constant and variable – air flow rates
- For demand-controlled ventilation and energy-efficient systems
- Ideal for refurbishments and retrofits in confined spaces thanks to its compact design
- Operates even at low air velocities from 1 m/s
- Systems with fluctuating pressure conditions
- Applications with unfavourable flow conditions
- Modern building automation with MP-Bus, Modbus, KNX or BACnet
- Applications where complete shut-off of the air flow is requiredt

Design

- Round casing made of galvanised sheet steel
- Integrated damper blade for controlling the air flow rate
- Damper shaft with low-maintenance damper bearing
- Direct differential pressure measurement in the vicinity of the damper blade via a cup-shaped measuring element
- Factory-fitted with hoses and wiring
- Plug-in ends fitted with lip seals as standard
- Suitable for air ducts in accordance with DIN EN 1506
- Various controller and communication options available
- Optionally available with an NFC interface for diagnostics and parameterisation (with Belimo drives)
- Optionally available with insulation shell and silencer!

Features and benefits

- Differential pressure measurement directly at the damper blade – without an upstream measuring orifice or measuring cross
- The damper position creates a nozzle effect and accelerates the air flow in the measurement area
- The controller calculates the air flow rate from the differential pressure and damper position
- The actuator automatically adjusts the damper position to the specified setpoint
- Pressure-independent control for constant and variable air flow rates
- High control accuracy even at low flow velocities
- Good control stability even under unfavourable flow conditions
- Optional complete shut-off of the air flow is possible

Materials and finishes

- Casing, damper blade, shaft: galvanised steel
- Damper bearings: POM plastic
- Seals: EPDM

Optional versions and accessories

Various special versions are available for optimum application:

- Stainless steel components in the airflow
- Insulation shell for sound and thermal insulation, can also be retrofitted
- Flanges to DIN 24154 R1, on both sides
- Separate mating flanges
- Pipe ends with flanges on both sides (flanged borders)
- Clamping rings with ring seal
- SDE-A0 silencer made of aluminium
- SDE-S0 silencer made of galvanised sheet steel
- Compact controller with MP-Bus, Modbus, KNX or BACnet
- Integrated NFC interface for diagnostics and parameterisation via smartphone/app (Belimo drive only)
- ZTH service tool for diagnostics and adjustment (Belimo drive only))

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How does the VREactive work?

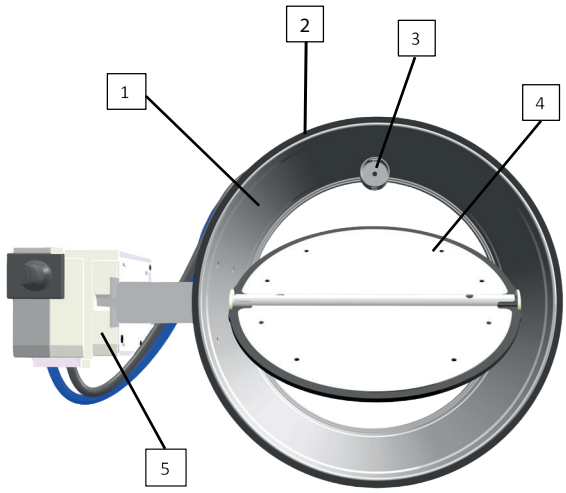
The LTG VRE*active* is a variable air volume controller that automatically maintains the air flow in ventilation ducts at a constant, pre-set setpoint, regardless of pressure fluctuations.

Operating principle of the VRE*active*

- Actual value measurement: Integrated sensors continuously measure the actual air flow based on the resulting pressure difference.
- Continuous adjustment: The integrated control unit constantly compares the measured actual value with the defined setpoint.
- Automatic adjustment: In the event of deviations, an electric actuator adjusts the damper blade until the desired air flow rate is precisely achieved.

Key benefits

- Constant airflow: Fully automatic regulation, unaffected by pressure changes in the duct system.
- High precision: Thanks to a special flow guidance system, the controller delivers a strong and precise measurement signal even at very low air flow rates.
- Energy efficiency: The optimised design ensures minimal pressure loss in the system.



Internal view in the direction of airflow:
(1) Casing / Insulation shell
(2) Lip seal
(3) Measuring cup
(4) Control damper
(5) Airflow regulator/drive

Flow rate ranges, minimum pressure differences

	At 1 m/s	At 2 m/s		At 4 m/s		At 7 m/s		At 10 m/s (nominal flow rate)	
Nominal size Ø D [mm]	V_{min} [m³/h]	V [m³/h]	Δp_{min} [Pa]	V [m³/h]	Δp_{min} [Pa]	V [m³/h]	Δp_{min} [Pa]	V [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	10	282	15	494	20	706	40
200	111	222	10	443	15	776	20	1108	40
250	174	348	10	696	15	1217	20	1739	25
315	277	554	10	1108	15	1939	20	2770	25
400	448	896	10	1792	15	3135	20	4479	25

V - Air flow rate
V_{min} - Minimum flow rate = lower control limit
V_{nom} - Nominal flow rate
Δp_{min} - Minimum pressure drop

Installation, positioning

Required straight flow paths

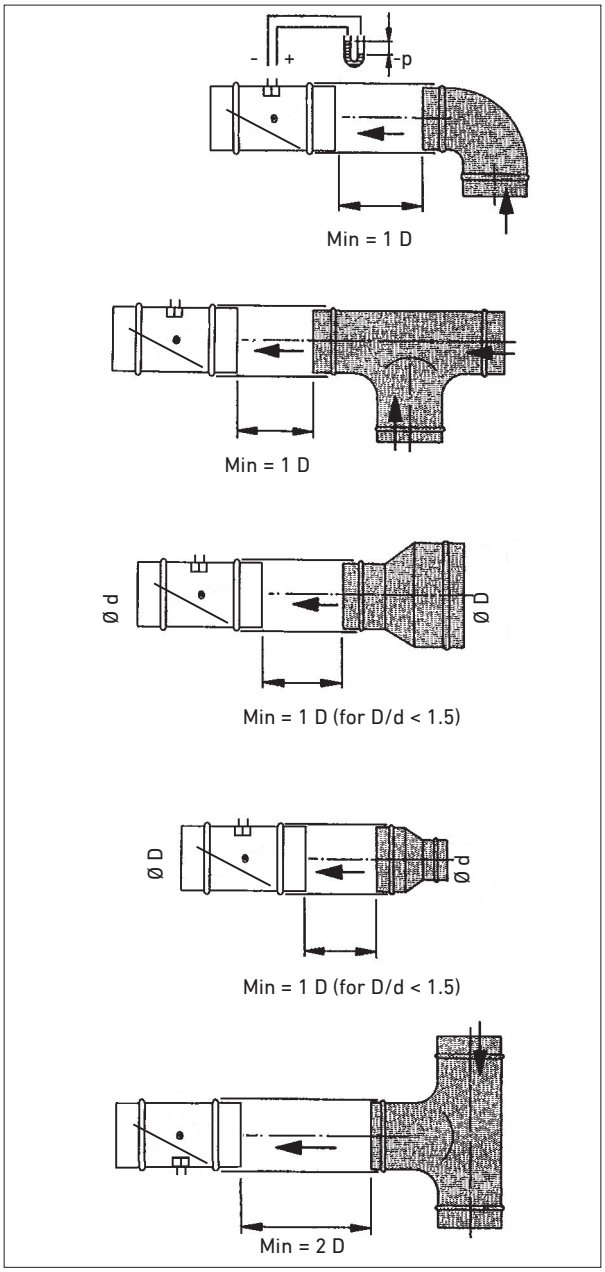
When installing theVREactive, it is essential to observe the airflow direction marking on the casing. Only when correctly aligned can the integrated air flow rate measuring device operate precisely and ensure reliable control.

To ensure accurate measurement, a straight flow path of approx. 0.5 to 3 x D (corresponding to the duct diameter) must be maintained upstream of the VREactive. This flow-stabilised flow path is necessary to minimise turbulence and ensure a stable air flow rate is measured.

The pressure tap for control purposes should only be taken at a straight section of the air duct where the flow is smooth. Particular care must be taken to ensure that the measuring nipples are not positioned in areas where the flow separates or where turbulence occurs. Such disturbances frequently occur at the inner radius following bends or directly behind T-branches and can adversely affect the measurement results.

Only by following these installation instructions can it be ensured that the VREactive measures the air flow rate correctly and that the connected control unit functions optimally. This prevents operational faults and improves the efficiency of the entire system.

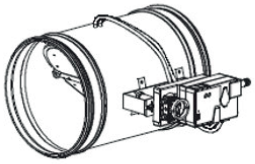
Minimum approach lengths for the VREactive

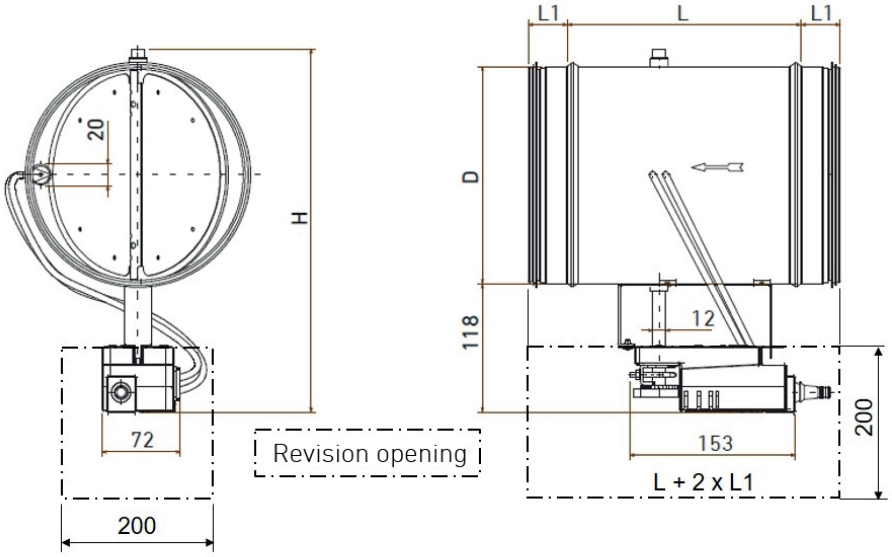


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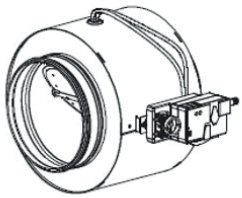
Dimensions, weight

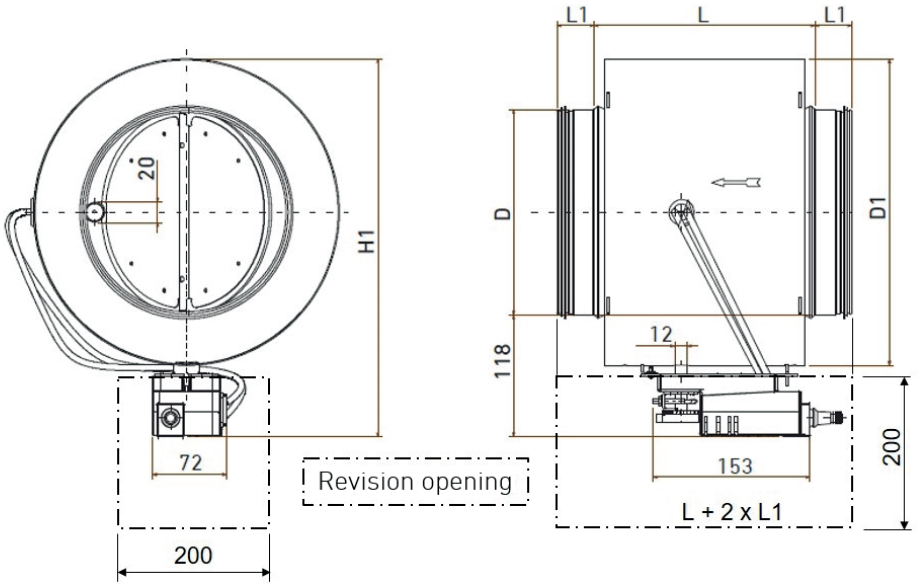
Without insulating shell





With insulating shell
(retrofit)





Nominal size Ø D	L [mm]	L1 [mm]	D [mm]	D1 [mm]	H [mm]	H1 [mm]	Flap angle [°]	Weight without | with insulation shell [kg]	
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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Airborne sound transmission without silencer

Nominal size Ø D	Air velocity [m/s]	Flow rate [m³/h]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total	
			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/Oct]										L_W [dB/Oct]									
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**

Δp_{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

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

Nominal size Ø D	Air velocity [m/s]	Flow rate [m³/h]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total	
			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/Oct]										L_W [dB/Oct]									
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**

Δp_{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

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Structure-borne sound radiation without insulation shell

Nominal size Ø D	Air velocity [m/s]	Flow rate [m³/h]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total	
			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/Oct]										L_W [dB/Oct]									
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**

The values given for structure-borne sound radiation refer to the radiating outer surface of an air duct including a built-in flow rate controller made of galvanized sheet steel with a total length of 6 m. Due to resonance effects, deviations of max. +/- 6 dB may occur in the frequency-dependent sound power levels.

Δp_{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

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Structure-borne sound radiation with 50 mm insulation shell

Nominal size Ø D	Air velocity [m/s]	Flow rate [m³/h]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total	
			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/Oct]										L_W [dB/Oct]									
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**

The values given for structure-borne sound radiation refer to the radiating outer surface of an air duct including a built-in flow rate controller made of galvanized sheet steel with a total length of 6 m. Both the flow rate controller and the air duct are encased in a 50 mm thick insulation shell. Due to resonance effects, deviations of max. sound power level values by a maximum of +/- 6 dB may occur.

Δp_{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

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Estimation of the sound pressure level in the room due to transmission noise from the controller (without flow noise from the air diffusers)

System attenuation according to VDI 2081

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

Branch attenuation for distribution of sound power across multiple rooms, V_{room} = 540 m³/h

V	[m³/h]	540	1080	2160	5400	10800	16200	21600	25200	28800	32400	36000
$\Delta L_{W\,oct} = 10 \times Lg \frac{V}{540\ m^3/h}$	[dB/oct]	0	3	6	10	13	14	16	17	17	18	19

Calculation example: Transmission

Given: VRE*active* 200 with SDE-SO silencer, 900 mm long
V_{max} = 444 m³/h, corresponds to 4 m/s
Δp_{tot} = 200 Pa
L_{WA} = 34 dB(A)

Required: Sound pressure level L_{pA} in the room due to radiation noise from the controller

Solution:

f_m		[Hz]	63	125	250	500	1000	2000	4000	8000	Source
Sound power level	$L_{W\,oct}$	[dB/oct]	48	41	38	31	20	18	25	26	p. 8
Deflection	$\Delta L_{W\,oct}$	[dB/oct]	0	0	-1	-2	-3	-3	-3	-3	p. 11
Room attenuation	$\Delta L_{W\,oct}$	[dB/oct]	-5	-5	-5	-5	-5	-5	-5	-5	p. 11
Mouth reflection	$L_{W\,oct}$	[dB/oct]	-10	-5	-2	0	0	0	0	0	p. 11
Branch attenuation $\Delta L_{W\,oct} = 10 \times Lg \frac{444\ m^3/h}{540\ m^3/h}$		[dB/oct]	0	0	0	0	0	0	0	0	p. 11
A-rating	$\Delta L_{W\,oct}$	[dB/oct]	-26	-16	-9	-3	0	1	1	-1	
A-weighted sound pressure level	$L_{pA\,oct}$	[dB(A)/oct]	<15	<15	20	21	<15	<15	17	16	
A-weighted total sound pressure level L_{pA} = 26 dB(A)											

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Estimation of the sound pressure level in the room due to noise emitted by the controller

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

Calculation example: Radiation

Given: VREactive 200 without insulation shell
V_{max} = 444 m^3/h, corresponds to 4 m/s
Δp_{tot} = 200 Pa
L_{WA} = 37 dB(A)

Required: Sound pressure level L_{pA} in the room due to radiation noise from the controller

Solution:

f_m		[Hz]	63	125	250	500	1000	2000	4000	8000	Source
Sound power level	$L_{W\,oct}$	[dB/Oct]	45	32	35	32	31	31	25	24	p. 9
Ceiling attenuation	$\Delta L_{W\,oct}$	[dB/Oct]	-4	-4	-4	-4	-4	-4	-4	-4	p. 11
Room attenuation	$\Delta L_{W\,oct}$	[dB/Oct]	-5	-5	-5	-5	-5	-5	-5	-5	p. 11
A-rating	$\Delta L_{W\,oct}$	[dB/Oct]	-26	-16	-9	-3	0	1	1	-1	
A-weighted sound pressure level	$L_{pA\,oct}$	[dB(A)/Oct]	<15	<15	17	20	22	23	17	<15	
A-weighted total sound pressure level L_{pA} = 28 dB(A)											

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Nomenclature, order code

VREactive	100 / S / D / L / A / B	671
(1)	(2) (3) (4) (5) (6) (7) (8)	(9)

(1)	**Type**	**VREactive**	=	Round, short flow rate controller with characteristic map
(2)	**Measuring principle**		=	Dynamic (standard)
(3)	**Size**	**100**	=	100
		125	=	125
		160	=	160
		200	=	200
		250	=	250
		315	=	315
		400	=	400
(4)	**Version**	**S**	=	Steel, galvanized
		E	=	V4A stainless steel
		K	=	Coated
(5)	**Insulation shell**	**D**	=	With
		–	=	Without
(6)	**Connection**	**–**	=	Plug-in end without lip seal
		L	=	Plug-in end with lip seal
		F	=	Flanges according to DIN 24154 R1
		B	=	Bord
(7)	**Casing tightness**	**C**	=	Class C according to DIN EN 1751
(8)	**Manufacturer controller component**	**B**	=	Belimo
		G	=	Gruner
(9)	**Type controller component**	**671**	=	Belimo LMV-D3W-MF-F (standard, analog/continuous control)
		670	=	Belimo LMV-D3W-MP-F (MP-Bus-compatible, with NFC interface)
		672	=	Belimo LMV-D3W-MOD-F (Modbus and BACnet compatible))
		673	=	Belimo LMV-D3WKNX-F (KNX-compatible)
		710	=	Gruner 327VMZ-024-05-MB (Modbus-compatible)
		720	=	Gruner 327VMZ-024-05-BN (BACnet-compatible)

Additional ordering information

Please specify this when ordering		**Without this information, the following factory setting will be delivered**
V_{min} [m^3/h]	Please note:	V_{min} = 0 m^3/h
V_{max} [m^3/h]	V_{nom} see page 4	V_{max} = V_{nom}
Mode: 0...10 V or 2...10 V	$V_{min} \geq 0$ m^3/h	Mode = 0...10 V
	$V_{min} \leq V_{max}$	
	$V_{max} \leq V_{nom}$	
	$V_{max} \geq 0.2$ V_{nom}	

Ordering example

VRE*active* 100/S/D/–/A/B671, V_{min} = 100 m^3/h, V_{max} = 200 m^3/h, Mode 2...10 V

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Product range LTG Air Distribution

Design	Type	Brief description, application
Variable air flow controllers (VAV) with electric variable-flow (VVS) drives		
round	VREactive	Compact VAV controller for room air applications, map-based control
	VRDactive	Compact VAV controller for room air applications, map-based control, double-pipe design
	VRE, steel	For special requirements such as custom drives, static measurement, spring return or high-speed models
	VRE-PPs	With a plastic housing for laboratories and pharmaceutical industries
rectangular	VRFactive	Compact VAV controller for room air applications, map-based control
	VRFvent	For special requirements such as custom drives, static measurement, spring return or high-speed models
	VRF-PPs	With a plastic housing for laboratories and pharmaceutical industries
Constant air flow controllers, mechanically self-acting for constant air flow (KVS)		
round	VRW	Mechanically self-acting for constant air flow (KVS)
rectangular	VRX	Mechanically self-acting for constant air flow (KVS)
Pressure controllers		
round	DRE	Duct pressure control without a flow path
	DREactive	Duct pressure control with flow rate display/feedback
rectangular	DRF	Duct pressure control without a flow path
	DRFactive	Duct pressure control with flow rate display/feedback
	DRFvent	Duct pressure control with flow rate display/feedback for special requirements such as custom drives, static measurement, spring return or high-speed models
Silencers		
round	SDE	Cross talk and circular silencer
rectangular	SDF	Splitter silencer
Highly airtight shut-off dampers		
round	KLB	Highly airtight shut-off dampers for laboratories, vessels

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