Lindab **VRU**

Volume flow regulator - circular

Volume flow regulator - circular VRU

Description - Compact

VRU is a circular VAV unit with combined regulating damper and airflow measurement in one unit, used for pressure independent volume air flow rate regulation.

VRU Compact is available with actuators for different communication platforms; analogue MF, Belimo MP, Modbus/BACnet or KNX. (For VRU Universal see details on next page).

VRU is equipped with Lindab Safe for connection to the duct and is prepared for insulation up to 50 mm.

VRU can be installed in any position without adjustment required.

To avoid clogging of the measuring cross, it is recommended to use VRU only in applications with clean air, meaning free of dust, particles and similar.

- Pressure independent VAV regulation
- Analogue MF, Belimo MP, Modbus/BACnet or KNX
- Integrated NFC interface, compatible with Belimo Assistant App (only MP)
- Damper tightness class 4 according to EN 1751
- Tightness class C according to EN 1751
- Can be supplied with attenuation shield

Note:
In Pascal systems VRU-MF is used and V_{max} and V_{min} settings has to be 100% and 0% respectively. Airflows are set in Regula Combi room controller.

Order code

Product	**VRU**	**bbb**	**ccc**	**d**
Type				
VRU				
Dimension				
Ød 100 - 630				
Motor type				
MF, MP, MOD, KNX				
Attenuation shield				
- Without attenuation shield				
D With attenuation shield				

Example: VRU - 250 - MF

Factory settings

	Standard
Min. Air flow	0
Max. Air flow	V_{nom} (7 m/s)
Control signal	2 - 10 V
Feedback signal	Damper position *

* Valid for MP.

Dimensions

VRU (MF, MP, MOD, KNX)
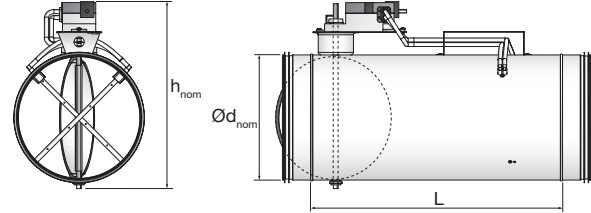
Dimension table

Ød$_{nom}$ mm	L mm	h$_{nom}$ MF / MP / MOD / KNX mm	Weight Kg
100	400	225	1.7
125	400	250	1.9
160	400	285	2.2
200	400	325	2.6
250	500	375	3.5
315	500	440	4.1
400	510	526	5.5
500	610	626	8.1
630	660	756	10.7

VRU (MF-D, MP-D, MOD-D, KNX-D)
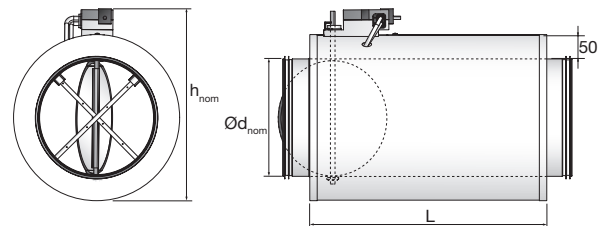
Dimension table

Ød$_{nom}$ mm	L mm	h$_{nom}$ MF-D/MP-D/MOD-D/KNX-D mm	Weight Kg
100	400	275	3.5
125	400	300	4.0
160	400	335	4.6
200	400	375	5.4
250	500	425	7.5
315	500	490	8.8
400	510	576	11.3
500	610	676	16.3
630	660	806	21.4

Motor type table

Motor		
Type	**Ød 100 - 315**	**Ød 400 - 630**
MF	LMV-D3-MF-F	NMV-D3-MF-F
MP	LMV-D3-MP-F	NMV-D3-MP-F
MOD	LMV-D3-MOD-F	NMV-D3-MOD-F
KNX	LMV-D3-KNX-F	NMV-D3-KNX-F

Belimo documentation

For Belimo motor documentation, visit and read more on Belimo's homepage:

Type	Dokumentation
MF	LMV-D3-MF-F
MP/MOD/KNX	Compact VAV controllers

Volume flow regulator - circular   VRU

Description - Universal

VRU is a circular VAV unit with combined regulating damper and airflow measurement in one unit, used for pressure independent volume flow regulation.

VRU Universal is equipped with regulator and rotary actuator.

Regulators comes with either flow sensor (D3) for clean air or membrane sensor (M1) for contaminated air.

Actuators are available as standard universal (UNI), spring-return (SPR) or fast-running version (FAS).

(For VRU Compact see details on previous page).

VRU is equipped with Lindab Safe for connection to the duct and is prepared for insulation up to 50 mm.

VRU can be installed in any position without adjustment required.

To avoid clogging of the measuring cross, it is recommended to use VRU only in applications with clean air, meaning free of dust, particles and similar.

- Belimo MP, Modbus, BACnet & analogue control 0(2)-10V
- Integrated NFC interface, compatible with Belimo Assistant App
- Damper tightness class 4 according to EN 1751
- Tightness class C according to EN 1751

Order code

Product	VRU	bbb	ccc	d

Type
VRU

Dimension
Ød 100 - 630

Motor type
UNI   Universal rotary actuator
SPR   Spring return actuator
FAS   Fast running actuator

Regulator type
D   D3 dynamic flow sensor
M   M1 membrane sensor

Example: VRU - 250 - UNI - D

Factory settings

	Standard
Min. Air flow	0
Max. Air flow	V_{nom} (7 m/s)
Control signal	2 - 10 V
Feedback signal	Flow

Dimensions
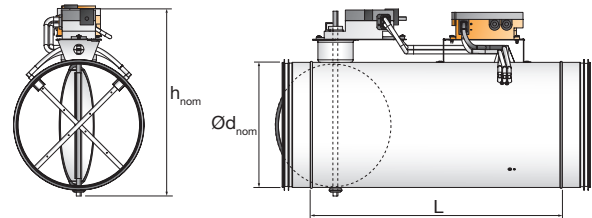
Dimension table

Ød_{nom} mm	L mm	h_{nom} UNI mm	Weight Kg
100	400	225	2.0
125	400	250	2.2
160	400	285	2.5
200	400	325	2.9
250	500	375	3.8
315	500	440	4.4
400	510	526	5.9
500	610	626	8.5
630	660	756	11.1

h_{nom} and Weight is shown in the table for VRU-UNI.
SPR: h_{nom} + 20 mm and weight + 1.5 kg
FAS: h_{nom} + 15 mm and weight + 0.4 kg

Motor type table

Type	Regulator	Motor Ød 100-315	Ød 400-630
UNI	VRU-D3-BAC	LM24A-VST	NM24A-VST
UNI-M	VRU-M1-BAC	LM24A-VST	NM24A-VST
SPR	VRU-D3-BAC	LF24A-VST	NF24A-VST
SPR-M	VRU-M1-BAC	LF24A-VST	NF24A-VST
FAS	VRU-D3-BAC	LMQ24A-VST	NMQ-24A-VST
FAS-M	VRU-M1-BAC	LMQ24A-VST	NMQ-24A-VST

Belimo documentation

For Belimo motor documentation, visit and read more on Belimo's homepage:

Type	Documentation
All	Belimo Universal

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Technical data

Air flow measurement

The accuracy of air flow measurement depends on the flow conditions in front of the measuring cross. It is preferable to have a long straight duct section in front of the measuring point, according to the table below.

If these recommendations are not followed, it will cause an unstable flow measurement and therefore higher inaccuracy in the regulation of the required air flow.

Components	Recommended straight duct before unit
Bend	3 x Ød
Tee-piece	4 x Ød
Damper	6 x Ød

With recommended straight duct in front of the unit, the air flow accuracy will be according to the table below.

Duct velocity	Air flow accuracy
> 3 m/s	+/- 5%
1.2 - 3 m/s	+/- 10%
0.7 - 1.2 m/s	+/- 25%

Example:
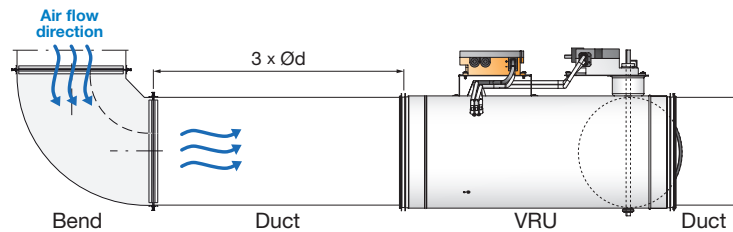
Example above showing top view of recommended straight duct distance between duct bend and a VRU.

Settings

V_{nom} indicates the measuring range for the actuator. A standard VRU is calibrated to a V_{nom} of 7 m/s according to the table below.

In special cases the VRU can be set to a higher V_{nom}, e.g. 10 m/s.

For VRU, V_{max} and V_{min} indicate the limits for the actuators working range.

There is linearity between V_{min} to V_{max} and the input signal. V_{max} can be set in the range 20 - 100% of V_{nom}, V_{min} in the range of 0 - 100% of V_{nom} (< V_{max}); however, there is no regulation between 0.7 m/s and closed position.

VRU nominal air flow (V_{nom}) and measuring limit

Size Ød mm	Measuring limit (0.7m/s) m³/h	l/s	(Standard) V_{nom} (7m/s) m³/h	l/s	V_{nom} (10m/s) m³/h	l/s
100	20	6	198	55	283	79
125	31	9	309	86	442	123
160	51	14	506	141	723	201
200	79	22	791	220	1130	314
250	124	34	1236	343	1766	491
315	196	54	1963	545	2804	779
400	317	88	3165	879	4522	1256
500	495	138	4946	1374	7065	1963
630	785	218	7851	2181	11216	3116

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Sound data

Below sound power levels for ducts (flow noise) with reference to ISO 5135 as a function of air flow and pressure difference.

Dim. Ød [mm]	Pressure drop [Pa]	Velocity app. 1 [m/s] Centre frequency [Hz]								L$_{WA}$	Velocity app. 3 [m/s] Centre frequency [Hz]								L$_{WA}$	Velocity app. 6 [m/s] Centre frequency [Hz]								L$_{WA}$
		63	125	250	500	1k	2k	4k	8k	[dB(A)]	63	125	250	500	1k	2k	4k	8k	[dB(A)]	63	125	250	500	1k	2k	4k	8k	[dB(A)]
100		**Flow 8 [l/s] / 29 [m³/h]**									**Flow 24 [l/s] / 86 [m³/h]**									**Flow 47 [l/s] / 169 [m³/h]**								
	500	39	29	35	43	48	47	41	29	52	43	38	47	54	56	52	46	34	60	46	49	58	62	61	56	48	37	66
	200	34	27	33	41	44	42	36	26	48	38	38	46	50	50	47	40	30	55	43	50	57	58	55	50	42	32	62
	100	30	25	32	38	40	38	33	23	44	34	38	44	47	46	42	35	26	51	40	49	54	53	49	44	36	26	58
	50	26	23	30	34	35	33	28	20	40	31	36	41	42	40	36	30	22	47	37	46	50	48	43	38	30	21	54
	20	20	21	25	28	28	26	22	15	34	26	33	36	35	32	28	22	16	41	35	35	42	44	41	36	28	18	48
125		**Flow 12 [l/s] / 43 [m³/h]**									**Flow 37 [l/s] / 133 [m³/h]**									**Flow 74 [l/s] / 266 [m³/h]**								
	500	52	44	39	46	53	55	50	38	59	48	40	47	55	58	56	52	43	62	52	53	60	63	61	56	50	41	67
	200	42	33	35	42	48	49	45	35	53	42	40	47	51	51	48	44	35	56	47	53	57	56	52	46	38	30	61
	100	36	29	33	39	43	43	40	32	48	38	40	45	47	45	41	35	28	51	42	49	52	50	45	39	30	23	56
	50	30	26	31	36	38	37	34	27	43	33	37	41	40	37	32	26	20	46	37	43	46	45	42	38	29	20	51
	20	23	22	26	28	28	26	23	18	34	26	31	32	31	28	24	18	12	37	34	34	39	41	41	38	32	20	46
160		**Flow 20 [l/s] / 72 [m³/h]**									**Flow 60 [l/s] / 216 [m³/h]**									**Flow 121 [l/s] / 436 [m³/h]**								
	500	50	41	43	50	58	63	64	53	67	38	37	45	52	56	56	53	44	61	41	46	55	59	59	58	53	43	65
	200	38	32	37	44	50	52	51	42	56	33	35	43	47	48	48	44	36	54	39	47	55	57	55	51	45	35	61
	100	30	27	33	39	43	44	42	34	48	30	34	41	44	43	42	38	30	49	37	45	52	54	51	46	38	28	58
	50	23	23	28	33	35	35	33	27	41	27	33	39	40	39	37	32	24	45	34	39	47	49	46	40	30	20	53
	20	16	18	22	25	26	25	23	18	32	24	29	34	35	33	29	23	16	40	32	31	38	40	38	33	25	16	45
200		**Flow 31 [l/s] / 112 [m³/h]**									**Flow 94 [l/s] / 338 [m³/h]**									**Flow 188 [l/s] / 677 [m³/h]**								
	500	40	36	43	54	61	61	55	41	65	34	38	48	54	58	57	52	40	62	44	49	55	57	58	59	57	47	65
	200	29	29	39	47	52	51	45	33	56	34	38	45	48	50	50	48	38	56	46	51	55	53	52	52	50	41	60
	100	24	27	35	42	45	45	40	29	50	35	38	43	44	44	45	43	35	51	43	49	52	49	46	45	41	32	56
	50	22	25	32	36	39	38	35	26	44	33	37	40	39	38	38	37	30	47	36	43	46	45	41	36	30	20	51
	20	20	22	27	29	30	30	28	22	36	27	32	34	32	30	28	24	18	39	30	35	38	38	36	32	24	14	44
250		**Flow 49 [l/s] / 176 [m³/h]**									**Flow 147 [l/s] / 529 [m³/h]**									**Flow 295 [l/s] / 1062 [m³/h]**								
	500	-	-	-	-	-	-	-	-	-	38	38	48	54	59	62	58	45	65	44	52	57	59	60	62	59	48	67
	200	37	32	39	49	55	56	52	41	60	35	41	47	49	52	54	51	40	58	44	51	54	53	52	50	47	39	60
	100	31	29	37	44	49	51	47	36	55	34	40	43	44	45	45	43	35	52	39	45	46	46	44	40	35	29	52
	50	27	28	35	40	43	45	43	32	49	29	34	36	36	35	34	31	26	43	33	36	39	40	38	34	27	20	45
	20	22	26	30	31	33	34	32	25	40	19	23	24	24	22	20	17	13	30	32	31	35	36	35	32	26	16	42
315		**Flow 78 [l/s] / 281 [m³/h]**									**Flow 234 [l/s] / 842 [m³/h]**									**Flow 468 [l/s] / 1685 [m³/h]**								
	500	30	30	42	53	59	60	53	37	63	37	40	48	55	60	62	59	47	66	50	51	56	62	64	63	58	49	69
	200	25	27	36	43	49	51	47	34	54	36	37	42	47	50	50	47	39	56	47	47	50	53	54	50	44	38	59
	100	22	24	31	37	41	43	40	30	47	33	33	37	40	41	40	36	31	47	42	43	44	46	45	41	36	30	52
	50	19	20	25	29	32	33	31	24	38	28	28	30	32	32	30	26	22	38	37	37	39	40	39	35	30	23	46
	20	12	13	15	17	18	18	17	13	25	20	20	21	22	21	19	16	12	29	32	32	35	35	34	32	27	18	42
400		**Flow 126 [l/s] / 454 [m³/h]**									**Flow 377 [l/s] / 1357 [m³/h]**									**Flow 754 [l/s] / 2714 [m³/h]**								
	500	-	-	-	-	-	-	-	-	-	47	50	63	69	65	55	43	34	71	44	50	60	65	63	55	45	37	68
	200	47	43	61	70	69	61	47	32	73	35	40	48	52	50	43	34	28	56	38	44	50	54	54	48	39	32	59
	100	36	36	48	53	51	43	33	24	56	28	33	39	42	41	36	29	24	46	36	40	45	49	48	42	34	27	53
	50	25	27	35	38	36	30	23	18	42	23	26	31	33	33	29	23	19	38	36	37	41	43	41	36	29	21	48
	20	-	-	-	-	-	-	-	-	-	18	19	22	24	23	20	15	11	29	35	34	36	36	34	30	23	14	43
500		**Flow 196 [l/s] / 706 [m³/h]**									**Flow 589 [l/s] / 2120 [m³/h]**									**Flow 1178 [l/s] / 4241 [m³/h]**								
	500	-	-	-	-	-	-	-	-	-	28	38	49	58	63	62	55	39	67	41	49	57	64	66	62	52	37	69
	200	19	26	39	50	56	57	51	36	61	35	43	49	51	49	41	29		55	43	46	51	55	56	51	42	31	60
	100	16	23	32	40	44	44	39	27	48	28	32	38	42	43	40	33	23	47	44	45	47	49	49	45	38	30	55
	50	13	19	25	30	33	32	28	19	37	26	29	32	35	35	32	26	19	40	45	44	44	44	43	40	36	31	52
	20	-	-	-	-	-	-	-	-	-	25	25	26	27	27	25	20	16	34	45	43	41	39	36	34	33	32	49
630		**Flow 312 [l/s] / 1123 [m³/h]**									**Flow 935 [l/s] / 3366 [m³/h]**									**Flow 1870 [l/s] / 6732 [m³/h]**								
	500	-	-	-	-	-	-	-	-	-	34	41	54	64	68	65	54	41	71	37	47	60	68	70	64	53	40	73
	200	25	29	43	56	62	59	49	34	65	29	36	46	54	56	52	43	32	59	34	42	53	59	60	54	43	31	64
	100	21	25	35	43	47	44	37	26	50	25	32	41	47	47	43	35	26	51	33	39	48	53	52	47	37	26	57
	50	16	20	27	32	35	32	27	19	39	22	27	35	39	40	35	28	20	44	32	37	42	46	46	41	31	22	51
	20	10	13	18	21	22	20	16	11	27	18	21	26	29	29	25	19	13	34	31	33	36	39	39	34	26	17	44

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Technical data

Adjustment and simulation tool

- Graphical display of setpoint and actual values
- Create and print trend evaluations
- Useful tool for troubleshooting on the MP-Bus®
- Access levels can be defined and managed via release code
- Specialised software for OEMs to make efficient use of the tool in the production process

ZTH EU Service Tool

- The handy ZTH EU Service Tool is connected directly to the actuator for parameterisation
- Reliable and proven connection via the tool socket
- Supply via actuator – always ready
- MP-Bus® tester integrated (packet counter, signal level)
- ZIP level converter to USB for connecting the actuator with the PC Tool

You can find further information about the possible connections ofthe ZTH EU Service Tool on your local Belimo website or by scanning the QR code.

Belimo Assistant App
- Belimo devices marked with the NFC logo can be parameterised using the Assistant App
- Can be installed on all Android mobile phones and iPhones
- Can be operated with ease using the smartphone's touch display
- The actuator can be parameterised while de-energised
- Updates are undertaken automatically via the Google Play or Apple App store

ZIP-BT-NFC Bluetooth to NFC converter
- Allows for simple use of the Belimo Assistant App via Bluetooth with Android mobile phones and i Phones in order to parameterise NFC enabled devices
- Safe to attach to the actuator thanks to countless micro suction cups attached to the bottom

Most of us spend the majority of our time indoors. Indoor climate is crucial to how we feel, how productive we are and if we stay healthy.

We at Lindab have therefore made it our most important objective to contribute to an indoor climate that improves people's lives. We do this by developing energy-efficient ventilation solutions and durable building products. We also aim to contribute to a better climate for our planet by working in a way that is sustainable for both people and the environment.

Lindab | For a better climate

Lindab®
For a better climate