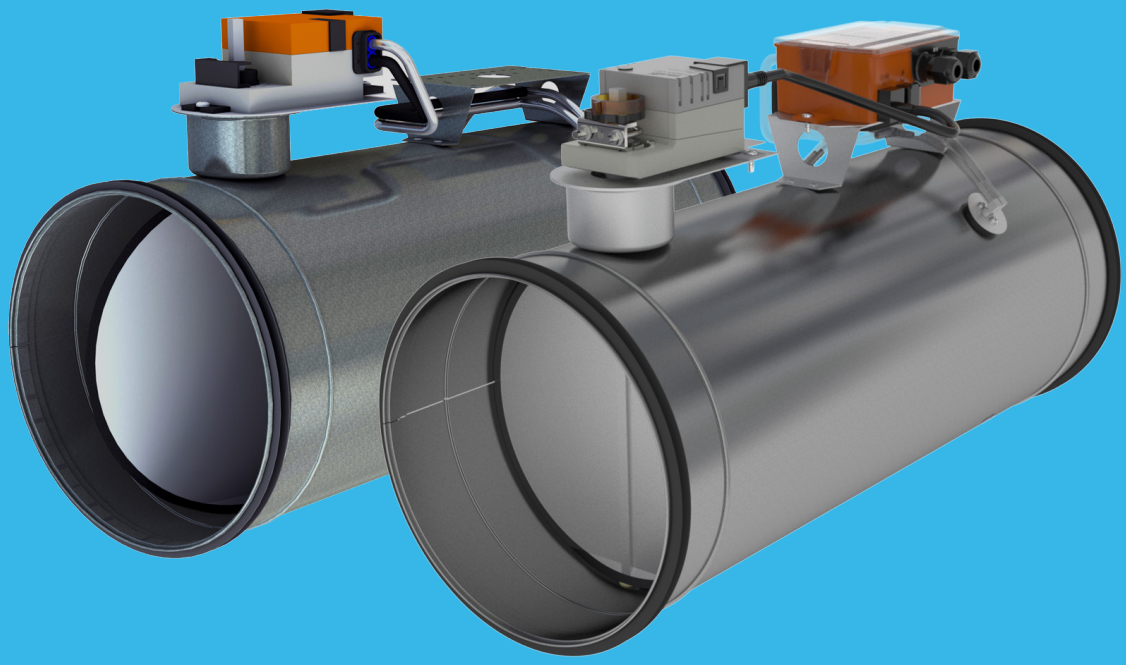


Lindab **VRU**

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 ATC 3 according to EN 1751 (formerly class C).
- 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

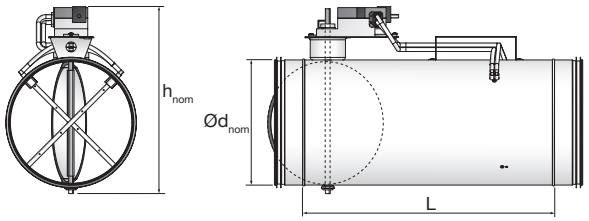
Factory settings

	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 and MF.*

Dimensions

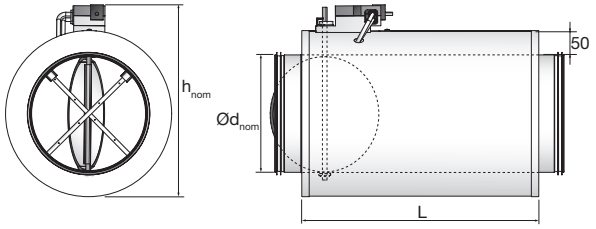
VRU (MF, MP, MOD, KNX)



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 ATC 3 according to EN 1751 (formerly class C).

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

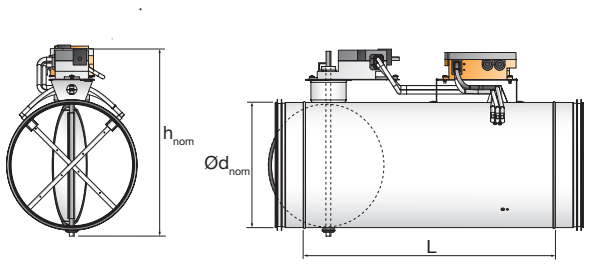
Regulator type
D D3 dynamic flow sensor
M M1 membrane sensor

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

		Motor	
Type	Regulator	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

Volume flow regulator - circular VRU

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.

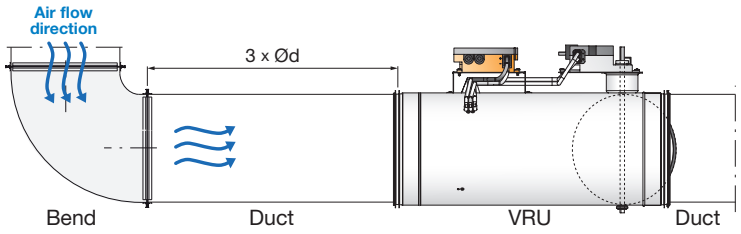
If these recommendations are not followed, it will cause an unstable flow measurement and therefore higher inaccuracy in the regulation of the required air flow.

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

Volume flow regulator - circular VRU

Technical data

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									Velocity app. 3 m/s									Velocity app. 6 m/s								
		Centre frequency Hz								L_{WA}	Centre frequency Hz								L_{WA}	Centre frequency Hz								L_{WA}
		63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k		63	125	250	500	1k	2k	4k	8k	
		Flow 8 l/s / 29 m³/h								dB(A)	Flow 24 l/s / 86 m³/h								dB(A)	Flow 47 l/s / 169 m³/h								dB(A)
100	500	69	45	43	46	48	46	40	29	52	72	54	55	57	56	51	44	34	60	75	64	66	65	61	55	47	37	66
	200	64	43	41	44	44	41	35	27	48	67	54	54	54	51	46	39	31	55	70	65	65	61	55	48	41	32	62
	100	60	41	40	41	40	37	31	24	44	63	53	53	50	46	40	34	27	51	66	65	63	57	49	43	35	28	58
	50	55	40	38	37	35	32	27	21	40	58	52	50	46	40	35	29	23	47	63	62	59	52	44	37	29	23	54
	20	48	37	34	31	28	24	20	16	34	52	49	45	38	32	27	21	17	41	64	51	51	47	41	35	27	18	48
		Flow 12 l/s / 43 m³/h								L_{WA}	Flow 37 l/s / 133 m³/h								L_{WA}	Flow 74 l/s / 266 m³/h								L_{WA}
125	500	79	62	48	48	53	54	49	38	59	77	56	55	58	58	55	51	43	62	80	68	68	66	61	55	49	41	67
	200	70	51	43	45	48	48	44	36	53	71	56	55	55	51	47	43	36	56	74	69	66	60	52	45	37	31	61
	100	65	45	41	42	43	42	39	32	48	66	56	54	50	45	39	34	29	51	68	65	61	53	45	38	29	24	56
	50	59	42	39	39	38	36	33	27	43	60	53	49	43	37	31	25	21	46	64	59	55	48	42	37	28	21	51
	20	51	38	35	32	29	26	23	19	35	52	47	41	34	28	23	17	14	37	63	50	47	44	41	37	31	21	46
		Flow 20 l/s / 72 m³/h								L_{WA}	Flow 60 l/s / 216 m³/h								L_{WA}	Flow 121 l/s / 436 m³/h								L_{WA}
160	500	79	58	51	53	57	62	63	53	67	67	53	54	55	56	55	52	45	61	70	61	64	63	60	57	52	44	65
	200	67	49	45	47	50	51	50	43	56	61	51	51	50	48	46	43	37	54	67	62	63	60	55	50	44	36	61
	100	59	43	41	42	43	42	41	35	48	58	50	50	47	44	41	37	31	49	65	60	61	57	51	45	37	28	58
	50	52	39	37	36	35	34	32	27	41	55	48	48	44	39	35	31	25	45	63	55	56	52	46	39	29	21	53
	20	44	34	31	28	26	24	22	19	32	51	44	43	39	33	28	22	17	40	62	47	47	44	38	32	24	17	45
		Flow 31 l/s / 112 m³/h								L_{WA}	Flow 94 l/s / 338 m³/h								L_{WA}	Flow 188 l/s / 677 m³/h								L_{WA}
200	500	69	52	51	57	61	60	54	42	65	62	53	56	57	58	56	51	41	62	73	65	64	61	58	58	56	47	65
	200	58	45	47	50	52	50	44	34	56	62	54	53	51	50	49	47	38	56	73	67	64	57	52	51	49	42	60
	100	53	42	43	45	45	44	39	30	50	63	54	52	47	44	44	42	36	51	70	65	61	53	47	43	40	33	56
	50	50	40	40	40	39	37	34	27	44	61	53	49	43	38	37	36	31	47	62	59	56	48	41	35	29	21	51
	20	48	38	35	32	30	29	27	23	36	54	48	43	36	30	27	23	19	39	57	51	47	42	36	31	23	15	44
		Flow 49 l/s / 176 m³/h								L_{WA}	Flow 147 l/s / 529 m³/h								L_{WA}	Flow 295 l/s / 1062 m³/h								L_{WA}
250	500	-	-	-	-	-	-	-	-	-	67	54	56	57	59	61	57	45	65	71	68	66	62	60	60	58	48	67
	200	66	48	47	52	55	55	51	41	60	63	56	55	53	52	53	50	41	58	69	67	63	56	52	49	46	40	60
	100	60	44	45	47	49	50	46	36	55	60	56	52	47	45	44	42	36	52	64	61	55	50	44	39	34	30	52
	50	56	44	43	43	43	44	42	33	49	55	51	45	39	35	33	30	27	43	60	53	48	44	38	32	26	21	45
	20	49	42	38	35	33	33	31	26	40	46	39	33	27	23	19	16	14	30	61	47	44	39	35	31	25	17	42
		Flow 78 l/s / 281 m³/h								L_{WA}	Flow 234 l/s / 842 m³/h								L_{WA}	Flow 468 l/s / 1685 m³/h								L_{WA}
315	500	59	46	50	55	59	59	52	37	63	65	55	56	58	60	61	58	47	66	77	67	65	65	64	62	57	50	69
	200	54	42	44	46	49	50	46	35	54	63	53	51	51	50	49	46	39	56	74	64	59	57	54	49	43	39	59
	100	51	40	39	40	41	42	39	30	47	60	50	45	43	42	39	35	32	47	70	59	53	49	45	40	35	31	52
	50	47	37	34	32	32	32	30	24	38	55	45	38	35	32	29	25	23	38	65	54	48	43	39	34	29	24	46
	20	40	29	24	21	19	17	16	14	25	47	37	30	25	21	18	15	13	29	60	49	44	39	35	31	26	18	42
		Flow 126 l/s / 454 m³/h								L_{WA}	Flow 377 l/s / 1357 m³/h								L_{WA}	Flow 754 l/s / 2714 m³/h								L_{WA}
400	500	-	-	-	-	-	-	-	-	-	77	64	71	72	65	54	42	35	71	71	66	68	68	63	54	44	38	68
	200	78	57	69	73	69	60	46	32	73	63	55	57	56	50	42	33	29	56	65	59	59	58	54	47	38	33	59
	100	66	51	56	57	51	42	32	25	56	55	48	47	45	41	35	28	25	46	64	56	54	52	48	41	33	28	53
	50	54	42	43	41	36	29	22	19	42	50	42	39	37	33	28	22	20	38	64	53	50	47	42	35	28	22	48
	20	40	30	27	23	19	15	11	10	25	45	36	31	27	23	19	14	12	29	63	51	45	40	35	29	22	15	43
		Flow 196 l/s / 706 m³/h								L_{WA}	Flow 589 l/s / 2120 m³/h								L_{WA}	Flow 1178 l/s / 4241 m³/h								L_{WA}
500	500	-	-	-	-	-	-	-	-	-	55	53	57	61	63	61	53	40	67	68	64	65	67	66	61	51	37	69
	200	47	41	47	53	56	56	50	37	61	55	51	51	52	52	48	40	30	55	70	63	60	59	56	50	41	32	60
	100	43	38	40	43	44	43	38	28	48	54	48	46	45	43	39	32	24	47	71	61	56	53	49	44	37	31	55
	50	41	34	34	33	33	31	27	19	37	53	45	41	38	35	31	25	20	40	72	61	53	48	44	39	35	32	52
	20	36	28	24	22	20	17	14	10	25	52	42	35	31	27	23	19	17	34	73	60	50	42	37	33	32	34	49
		Flow 312 l/s / 1123 m³/h								L_{WA}	Flow 935 l/s / 3366 m³/h								L_{WA}	Flow 1870 l/s / 6732 m³/h								L_{WA}
630	500	-	-	-	-	-	-	-	-	-	61	57	62	67	68	63	53	41	71	64	62	68	71	70	63	52	40	73
	200	53	44	51	59	62	58	48	34	65	56	51	54	57	56	50	42	33	59	61	58	61	63	60	53	42	32	64
	100	49	41	43	46	47	43	36	27	50	52	47	49	50	48	42	34	27	51	60	55	56	56	53	46	36	27	57
	50	43	36	35	36	35	31	26	20	39	49	43	43	43	40	34	27	21	44	59	53	51	49	46	39	30	22	51
	20	37	29	26	25	22	19	15	12	27	45	38	35	32	29	24	18	14	34	58	50	45	42	39	33	25	18	44

Volume flow regulator - circular VRU

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 of the ZTH EU Service Tool at Belimo.com

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

GET IT ON Google Play

Download on the 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