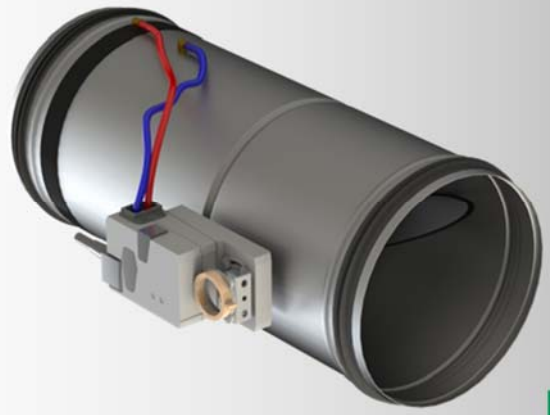

VLV55 | VLV65

Volumetric flow controller

PERFORMANCE DATA

- Operating temperature: 10 - 50 °C
- Differential pressure range: 20 - 750 Pa
- Volumetric flow measurement range from 13 m^3/h to 2195 m^3/h
- Minimum pressure difference 5 to 150 Pa

VLV55
- for air velocity 0.5 to 5 m/s

VLV65
- for air velocity 1 to 8 m/s

TESTS AND STANDARDS

- **VDI 6022, Sheet 1**: Hygienic requirements of ventilation and air-conditioning systems
- **DIN EN 13779 (2007):** Ventilation of non-residential buildings
- **Leakage air: EN 1751 (2014-06)**
- **DIN EN 1751, class 4:** Leakage with damper blade closed
- **DIN EN 1751, class C**: Housing leakage

SPECIAL FEATURES

- after moulded parts no inflow area required
- optimised for air velocities from 0.5 m/s
- high control accuracy at low pressures and air velocities
- position-independent installation
- resistant to pollution due to the design

APPROVALS AND CERTIFICATES

- RoHS 2002/95/EC
- EMC 2004/108/EC
- Low voltage 2006/95/EC

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OVERVIEW OF PRODUCT VERSIONS

VLV55|VLV65 with rubber lip seal

Round volumetric flow controller
- Volumetric flow range 0,5-5 m/s (VLV55) or 1-8 m/s (VLV65)
- With rubber lip seal (-GD1)

VLV55|VLV65 with flat flange

Round volumetric flow controller
- Volumetric flow range 0,5-5 m/s (VLV55) or 1-8 m/s (VLV65)
- With flat flange according to DIN 24154, class 5 (-FF1)

VLV55|VLV65 with METU flange

Round volumetric flow controller
- Volumetric flow range 0,5-5 m/s (VLV55) or 1-8 m/s (VLV65)
- With METU flange type AF, without tension ring (-MF1)

FUNCTION

A volumetric flow controller is used for pressure-independent volumetric flow regulation in ventilation and air-conditioning systems. It serves to keep the volumetric flow either constant within specified limits (CAV) or to control it variably (VAV).

The housing, measuring nozzle and the controller with pressure sensor form a closed control loop with feedback, allowing demand-dependent, energy-saving air-conditioning of the single rooms or areas of air-conditioning systems also at low duct pressures and air velocities. When suitable controller types are used, room or duct pressure regulation can be achieved.

For the measurement of the effective pressure, SCHAKO is using its measuring method by means of a standardised Venturi nozzle made of aluminium to DIN EN ISO 5167. In front of the Venturi nozzle and in the nozzle neck, the volumetric flow controller is fitted with openings for pressure take-off. The resulting differential pressure (effective pressure) is measured and evaluated by a universal or compact controller. The VLV measurement principle allows measurement of small volumetric flows. In comparison with measuring rods, measuring crosses or measuring orifices having fewer measuring points, this gives higher accuracy, allowing the inflow area required in front of the volumetric flow controller to be omitted. In comparison with measuring rods, measuring crosses or measuring orifices having fewer measuring points, this gives higher accuracy, allowing the inflow area required in front of the volumetric flow controller to be omitted. This also allows smaller measurement tolerances to be achieved.

The volumetric flow controllers of the VLV type are insensitive to dirt caused by dust and can be installed and used independently of their position. The mounting instructions documented by the manufacturer must be adhered to, as otherwise the correct functioning of the volumetric flow controller is not guaranteed. The volumetric flow controllers' type VLV are not suitable for air containing sticky and greasy particles (e.g. kitchen exhaust air).

AREAS OF APPLICATION

- for supply and return air systems with low pressures and low air velocity
- for constant CAV or variable VAV installations
- for positive control V_{min}, V_{mid}, V_{max}, "OPEN" or "CLOSED"
- For volumetric flow and linear pressure control
- at ambient temperatures 0° to +50°C, requirement: measuring air 0...+50°C/5...95% rH, non-condensing
- for regulating the air velocity in the duct in the range of 0,5...8 m/s
- VLV55 for air velocity 0,5 - 5 m/s
- VLV65 for air velocity 1 - 8 m/s
- Minimum pressure difference of 5 - 150 Pa

When using volumetric flow controllers in roof central units, in extreme cases, condensation can build up in the measuring pipes of the volumetric flow controller as a result of the large temperature differences between the air flowing through the volumetric flow controller and the surrounding air. This condensation may affect or damage the sensor. This is why for this field of application care must be taken to insulate the housings of the volumetric flow controllers and the measuring hoses (to prevent condensation) and to mount the controllers in such a way that any condensate formed on the outside of the measuring hoses can run downward and be drained (without entering the sensor).

When connecting SCHAKO components to customer installations, any compatibility problems are beyond our scope of responsibility and must be solved on site.

Tests and standards

The volumetric flow controller VLV-… has been tested by the designated body in accordance with the following regulations:

Completed tests
- VDI 6022, Sheet 1: Hygienic requirements of ventilation and air-conditioning systems
- DIN EN 1751: Ventilation for buildings - Air terminal devices - Aerodynamic testing of damper and valves
- DIN EN 13779 (2007): Ventilation of non-residential buildings

Applied standards
- Leakage classification: DIN EN 1751 (2014-06)
- RoHS 2002/95/EC
- EMC 2004/108/EC

PROCESSING

Housing

- Galvanised sheet steel (-SV)
- Galvanised sheet steel with DD coating (-DD)
- Housing leakage according to DIN EN 1751, class C

Damper blade

- Galvanised sheet steel (-SV)
- Galvanised sheet steel with DD coating (-DD)

Damper axle

- Passivated steel
- Brass

Damper blade seal

- made of EPDM, silicone-free, halogen-free
- airtight sealing design to DIN-EN 1751, class 4

Ring chamber sealing

- made of EPDM, silicone-free, halogen-free

Damper bearing

- Plastic bearing

Measuring sensor

- round Venturi nozzle made of aluminium to DIN EN ISO 5167 (-SV)
- round Venturi nozzle made of aluminium to DIN EN ISO 5167 with DD coating (-DD)

Model

round model, for round ductwork connection to DIN EN 1506, with damper blade seal for airtight sealing to DIN EN 1751, class 4

- VLV55 for air velocity 0,5 to 5 m/s
- VLV65 for air velocity 1 to 8 m/s

Controller

- LMV-D3-MP-SO, 5 Nm (-A001)
- LMV-D3-MF-SO, 5 Nm (-A006)
- 227VM-024-05, 5 Nm (-A061)

Other controllers available on request

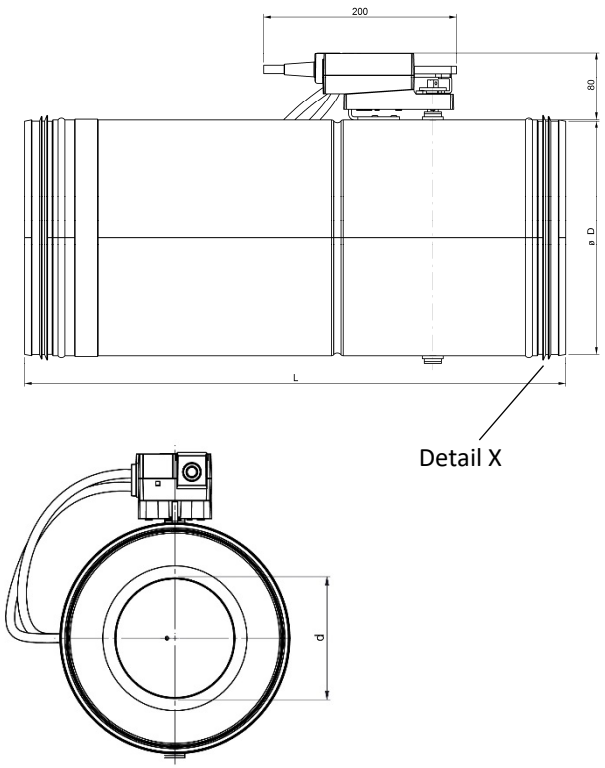
AVAILABLE SIZES

NW [mm]	øD [mm]	d (55) [mm]	d (65) [mm]	L [mm]	Weight [kg]
100	98	53	63	330	1,5
125	123	67	79	370	1,9
160	158	86	102	420	2,5
200	198	108	128	480	3,4
250	248	136	160	570	4,8
315	313	171	203	690	7,0

NW 100 - NW 315 sealing airtight to DIN-EN 1751, class 4.

Dimensions

VLV55 / VLV65



USEABLE VOLUMETRIC FLOW RANGES

		VLV55		VLV65	
NW	**V**	**V_{min}**	**V_{max}**	**V_{min}**	**V_{max}**
(mm)		**(0.5 m/s)**	**(5 m/s)**	**(1 m/s)**	**(8 m/s)**
100	m³/h	13	132	26	211
	l/s	4	37	7	59
125	m³/h	21	210	42	334
	l/s	6	58	12	93
160	m³/h	35	346	69	554
	l/s	10	96	19	154
200	m³/h	55	546	109	874
	l/s	15	152	30	243
250	m³/h	86	859	172	1374
	l/s	24	239	48	382
315	m³/h	137	1372	274	2195
	l/s	38	381	76	610

ATTENTION: Important for parameterisation of the VLV

- The table corresponds to the complete measuring range.
- When the air volume drops below $V_{min,}$ the correct functioning of the volumetric flow controller is no longer guaranteed.
- If only V_{max} is specified in the order, a variable volumetric flow controller will be delivered. The V_{min} value will be set to the value specified in the catalogue.
- If only one air volume is specified in the order (as V_{min} or $V_{konstant}$), then the volumetric flow controller will be delivered as a constant volumetric flow controller. The volume specified in the order is set to the V_{min} value, and the V_{max} value is set to 100%.
- The air volumes V_{min} and V_{max} and the operating mode 0/2-10 V can be changed directly at the controller within the nominal volumetric flow.
- For the parameter setting of the control components, an air density of 1,2 kg/m³ has been taken into account.
- If no values are specified in the order, the controller will be programmed with the values of the complete measuring range. The following calibration curves are taken into account:
  --- VLV55 ... 5 m/s;
  --- VLV65 ... 8 m/s.

The first adjustment of the V_{min}, V_{max} and V_{nenn} operating volumetric flows is done prior to delivery ex works in accordance with customer specifications (calibration for delivery address).

When these values are set, the functions of all volumetric flow controllers are also checked.

ACCESSORIES

METU flange (-MF1)

- on both sides, duct flange type AF

Flat flange (-FF1)

- on both sides, according to DIN 24154/5.

Rubber lip seal (-GD1)

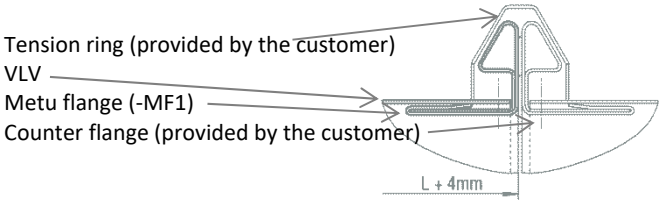
- on both sides, special rubber.

Duct silencer (-RS)

- Rigid model
- Outer jacket and perforated sheet made of galvanised sheet steel.
- mineral wool filling

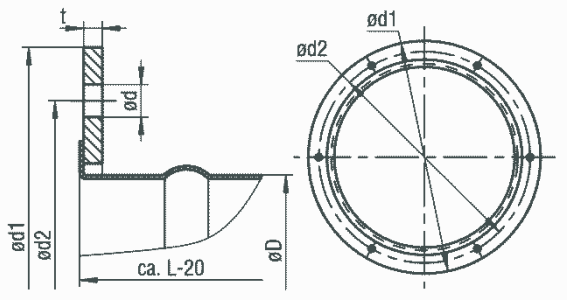
ACCESSORIES - DIMENSIONS

METU flange (-MF1)



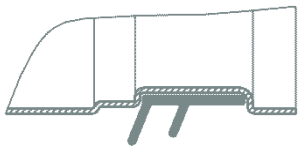
Flat flange (-FF1), on both sides

to DIN 24154/5

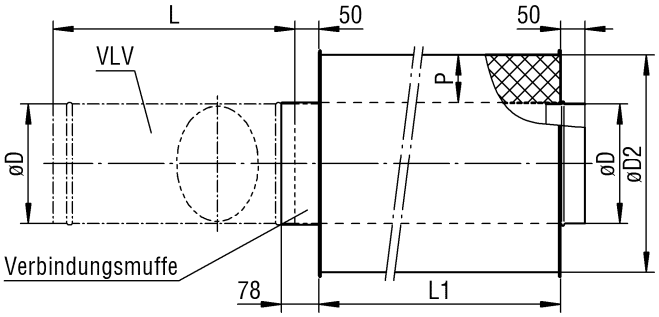


Rubber lip seal (-GD1)

Detail X



Duct silencer (-RS)



AVAILABLE SIZES OF ACCESSORIES

-FF - Flat flange

NW	øD	ød1	ød2	ød	L	LOA	t
100	98	154	129	7	340	4	3
125	123	177	155	7	360	4	3
160	158	222	194	7	410	6	4
200	198	263	235	7	450	6	4
250	248	313	286	7	500	6	4
315	313	388	356	9.5	600	8	5

-RS - Duct silencer

NW	L	øD	øD2 P (mm)	
			50	100
100	340	98	200	300
125	360	123	225	325
160	410	158	260	360
200	450	198	300	400
250	500	248	350	450
315	600	313	415	515

STATIC MINIMUM PRESSURE DIFFERENCE

	VLV55				
NW	v_k	V	V	$\Delta p_{t\,min}$	ΔV
	(m/s)	(m^3/h)	[l/s]	(Pa)	±%
100	0.5	13	4	5	15
	2	53	15	15	10
	4	105	29	75	7
	5	132	37	100	5
125	0.5	21	6	5	15
	2	84	23	20	10
	4	167	46	75	7
	5	209	57	110	5
160	0.5	35	10	5	15
	2	139	38	15	10
	4	277	77	60	7
	5	346	96	100	5
200	0.5	55	15	5	15
	2	218	61	20	10
	4	436	121	60	7
	5	546	152	100	5
250	0.5	86	24	5	15
	2	344	96	20	10
	4	687	191	60	7
	5	859	239	90	5
315	0.5	137	38	5	15
	2	549	153	20	10
	4	1097	305	65	7
	5	1372	381	90	5

	VLV65				
NW	v_k	V	V	$\Delta p_{t\,min}$	ΔV
	(m/s)	(m^3/h)	[l/s]	(Pa)	±%
100	1	26	7	5	15
	3	79	22	25	10
	6	158	44	90	7
	8	210	58	150	5
125	1	42	12	5	15
	3	125	35	25	10
	6	250	70	90	7
	8	334	93	140	5
160	1	69	19	5	15
	3	208	58	20	10
	6	416	116	50	7
	8	554	154	90	5
200	1	109	30	5	15
	3	328	91	20	10
	6	655	182	65	7
	8	874	243	100	5
250	1	172	48	5	15
	3	515	143	15	10
	6	1031	286	55	7
	8	1374	382	85	5
315	1	274	76	5	15
	3	823	229	20	10
	6	1646	457	55	7
	8	2195	610	90	5

VLV55 - FLOW GENERATED NOISE

VLV55 NW	V_K (m/s)	V (m^3/h)	V [l/s]	Δp_t = 50 Pa L_{WA} [dB(A)]	Δp_t = 100 Pa L_{WA} [dB(A)]	Δp_t = 150 Pa L_{WA} [dB(A)]	Δp_t = 200 Pa L_{WA} [dB(A)]	Δp_t = 250 Pa L_{WA} [dB(A)]
100	0.5	13	4	29	33	36	41	43
	2	53	15	44	50	54	56	58
	4	105	29	44	54	59	62	64
	5	132	37	---	56	61	65	67
125	0.5	21	6	35	38	43	45	48
	2	84	23	49	54	58	59	61
	4	167	46	47	58	63	65	67
	5	209	57	---	56	63	67	69
160	0.5	35	10	38	45	46	50	51
	2	139	38	51	57	60	62	63
	4	277	77	50	60	64	67	68
	5	346	96	---	58	65	68	71
200	0.5	55	15	41	45	47	49	51
	2	218	61	49	59	59	66	68
	4	436	121	49	59	64	67	70
	5	546	152	---	59	65	68	71
250	0.5	86	24	42	50	56	60	62
	2	344	96	50	59	63	66	69
	4	687	191	51	60	64	67	70
	5	859	239	---	63	65	68	71
315	0.5	137	38	44	48	52	54	57
	2	549	153	52	60	64	66	69
	4	1097	305	53	61	65	69	71
	5	1372	381	---	63	67	70	72

--- = value below the static minimum pressure difference

VLV55 - FLOW GENERATED NOISE - RELATIVE SOUND SPECTRUM

	NW100							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-6	-8	-6	-1	-4	-13	-18	-25

	NW125							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-8	-9	-5	-1	-3	-12	-19	-26

	NW160							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-6	-7	-3	-1	-4	-9	-17	-27

	NW200							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-6	-5	-1	0	-7	-11	-18	-26

	NW250							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-1	-2	1	-1	-7	-10	-18	-28

	NW315							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-3	-1	3	-1	-6	-10	-18	-28

Differential pressure range: 0 - 300 Pa
Air velocity: 0,5 – 5,0 m/s
K_L= correction value; relative sound power level, relative to L_{WA}
$K_{LW} = L_{WA} + \{K_L\}$

CALCULATION EXAMPLE

VLV55 design data
NW 160 mm | V=247 m³/h |
Δp=100 Pa | L_{WA} = 60 dB(A)

Hz	63	125	250	500	1000	2000	4000	8000
K_L	-6	-7	-3	-1	-4	-9	-17	-27

Sound values calculated according to formula
$K_{LW(relativ)} = L_{WA} + \{K_L\}$

gives

Hz	63	125	250	500	1000	2000	4000	8000
L_{WA}	60	60	60	60	60	60	60	60
K_L	-6	-7	-3	-1	-4	-9	-17	-27
K_{LW}	54	53	57	59	56	51	43	33

VLV55 - RADIATED NOISE

VLV55 NW	V_K (m/s)	V (m^3/h)	V [l/s]	Δp_t = 50 Pa L_{WA} [dB(A)]	Δp_t = 100 Pa L_{WA} [dB(A)]	Δp_t = 150 Pa L_{WA} [dB(A)]	Δp_t = 200 Pa L_{WA} [dB(A)]	Δp_t = 250 Pa L_{WA} [dB(A)]
100	0.5	13	4	---	---	---	---	---
	2	53	15	---	---	25	28	30
	4	105	29	---	27	30	33	34
	5	132	37	---	32	34	36	38
125	0.5	21	6	---	---	---	---	---
	2	84	23	---	25	---	29	30
	4	167	46	25	28	32	33	36
	5	209	57	---	33	35	38	42
160	0.5	35	10	---	---	---	---	25
	2	139	38	---	28	31	33	36
	4	277	77	---	34	37	39	40
	5	346	96	---	38	40	42	44
200	0.5	55	15	---	---	---	25	26
	2	218	61	---	33	36	39	41
	4	436	121	---	41	45	47	49
	5	546	152	---	43	46	49	52
250	0.5	86	24	---	---	---	27	31
	2	344	96	---	34	36	39	41
	4	687	191	---	40	43	45	47
	5	859	239	---	41	43	46	48
315	0.5	137	38	---	33	35	38	40
	2	549	153	---	45	46	48	50
	4	1097	305	---	45	47	48	50
	5	1372	381	---	44	46	50	52

--- = values below 25 dB(A)

VLV55 - RADIATED NOISE - RELATIVE SOUND SPECTRUM

	NW100							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	1	-1	-9	-8	-7	-5	-9	-11

	NW125							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	4	2.4	-7	-3	-7	-7	-9	-14

	NW160							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	3	2	-3	-5	-6	-8	-9	-10

	NW200							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-3	-4	-8	-6	-7	-6	-7	-9

	NW250							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	2	0	-2	-5	-8	-6	-8	-11

	NW315							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-3	-4	-2	-4	-8	-7	-7	-18

Differential pressure range: 0 - 300 Pa
Air velocity: 0,5 – 5,0 m/s
K_L= correction value; relative sound power level, relative to L_{WA}
$K_{LW} = L_{WA} + \{K_L\}$

CALCULATION EXAMPLE

VLV55 design data
NW 160 mm | V=247 m³/h |
Δp=100 Pa | L_{WA} = 34 dB(A)

Hz	63	125	250	500	1000	2000	4000	8000
K_L	3	2	-3	-5	-6	-8	-9	-10

Sound values calculated according to formula
$K_{LW(relativ)} = L_{WA} + \{K_L\}$

gives

Hz	63	125	250	500	1000	2000	4000	8000
L_{WA}	34	34	34	34	34	34	34	34
K_L	3	2	-3	-5	-6	-8	-9	-10
K_{LW}	37	36	31	29	28	26	25	24

VLV65 - FLOW GENERATED NOISE

VLV65 NW	V_K (m/s)	V (m^3/h)	V [l/s]	Δp_t = 50 Pa L_{WA} [dB(A)]	Δp_t = 100 Pa L_{WA} [dB(A)]	Δp_t = 150 Pa L_{WA} [dB(A)]	Δp_t = 200 Pa L_{WA} [dB(A)]	Δp_t = 250 Pa L_{WA} [dB(A)]
100	1	26	7	38	43	46	48	51
	3	79	22	48	53	57	59	61
	5	130	35	48	57	62	65	66
	8	210	58	---	---	62	66	69
125	1	42	12	41	45	49	51	53
	3	125	35	50	58	61	63	64
	5	210	60	47	59	63	67	70
	8	334	93	---	---	65	69	71
160	1	69	19	45	49	53	54	57
	3	208	58	50	58	63	65	67
	5	345	95	51	59	64	67	69
	8	554	154	---	61	65	68	71
200	1	109	30	46	52	54	57	58
	3	328	91	49	59	63	66	68
	5	545	150	51	60	64	67	69
	8	874	243	---	60	67	69	72
250	1	172	48	49	54	56	59	61
	3	515	143	49	59	63	66	68
	5	860	240	52	60	64	67	69
	8	1374	382	---	62	67	69	71
315	1	274	76	50	55	58	60	62
	3	823	229	52	60	64	67	70
	5	1370	380	54	62	65	68	70
	8	2195	610	64	67	69	72	74

--- = value below the static minimum pressure difference

VLV65 - FLOW GENERATED NOISE - RELATIVE SOUND SPECTRUM

	NW100							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-7	-8	-5	-2	-3	-12	-18	-25

	NW125							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-9	-8	-5	-2	-3	-10	-17	-25

	NW160							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-7	-7	-3	-1	-4	-9	-17	-26

	NW200							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-5	-3	0	-1	-6	-11	-18	-27

	NW250							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-4	-2	1	-2	-6	-9	-16	-25

	NW315							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-1	0	1	-2	-5	-9	-16	-27

Differential pressure range: 0 - 300 Pa
Air velocity: 0,5 - 5,0 m/s
K_L= correction value; relative sound power level, relative to L_{WA}
$K_{LW} = L_{WA} + \{K_L\}$

CALCULATION EXAMPLE

VLV65 design data
NW 200 mm | V=545 m³/h |
Δp=100 Pa | L_{WA} = 60 dB(A)

Hz	63	125	250	500	1000	2000	4000	8000
K_L	-5	-3	0	-1	-6	-11	-18	-27

Sound values calculated according to formula
$K_{LW(relativ)} = L_{WA} + \{K_L\}$

gives

Hz	63	125	250	500	1000	2000	4000	8000
L_{WA}	60	60	60	60	60	60	60	60
K_L	-5	-3	0	-1	-6	-11	-18	-27
K_{LW}	55	57	60	59	54	49	42	33

VLV65 - RADIATED NOISE

VLV65 NW	V_K (m/s)	V (m^3/h)	V [l/s]	Δp_t = 50 Pa L_{WA} [dB(A)]	Δp_t = 100 Pa L_{WA} [dB(A)]	Δp_t = 150 Pa L_{WA} [dB(A)]	Δp_t = 200 Pa L_{WA} [dB(A)]	Δp_t = 250 Pa L_{WA} [dB(A)]
100	1	26	7	---	---	---	---	---
	3	79	22	---	---	26	28	30
	5	130	35	---	25	30	32	35
	8	210	58	---	---	35	39	40
125	1	42	12	---	---	---	---	---
	3	125	35	---	---	26	29	30
	5	210	60	---	30	33	34	36
	8	334	93	---	38	40	41	42
160	1	69	19	---	---	25	28	31
	3	208	58	---	33	36	38	40
	5	345	95	---	39	41	43	45
	8	554	154	---	44	46	47	48
200	1	109	30	---	25	29	32	34
	3	328	91	---	35	38	40	42
	5	545	150	---	38	42	44	46
	8	874	243	---	43	46	48	50
250	1	172	48	---	26	30	34	36
	3	515	143	---	37	40	42	44
	5	860	240	---	40	43	45	47
	8	1374	382	---	45	47	49	51
315	1	274	76	---	26	29	35	38
	3	823	229	---	38	42	42	44
	5	1370	380	---	40	44	44	47
	8	2195	610	---	47	50	50	51

--- = values below 25 dB(A)

VLV65 - RADIATED NOISE - RELATIVE SOUND SPECTRUM

	NW100							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	1	0	-8	-6	-5	-5	-10	-13

	NW125							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	2	1	-5	-2	-8	-7	-9	-12

	NW160							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	0	-1	-6	-4	-7	-7	-8	-10

	NW200							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	0	-2	-6	-4	-7	-7	-7	-11

	NW250							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	-1	-2	-5	-6	-9	-6	-7	-12

	NW315							
	Relative sound spectrum (dB)							
	Correction value K_L							
	Frequency (Hz)							
Hz	63	125	250	500	1000	2000	4000	8000
K_L	0	-2	-2	-6	-8	-6	-7	-19

Differential pressure range: 0-300 Pa
Air velocity: 0,5 – 5,0 m/s
K_L= correction value; relative sound power level, relative to L_{WA}
$K_{LW} = L_{WA} + \{K_L\}$

CALCULATION EXAMPLE

VLV65 design data
NW 200 mm | V=545 m³/h |
Δp=100 Pa | L_{WA} = 38 dB(A)

Hz	63	125	250	500	1000	2000	4000	8000
K_L	0	-2	-6	-4	-7	-7	-7	-11

Sound values calculated according to formula
$K_{LW(relativ)} = L_{WA} + \{K_L\}$

gives

Hz	63	125	250	500	1000	2000	4000	8000
L_{WA}	38	38	38	38	38	38	38	38
K_L	0	-2	-6	-4	-7	-7	-7	-11
K_{LW}	38	36	32	34	31	31	31	27

DUCT SILENCER (-RS) - INSERTION LOSS

L1=500

	D_e (dB/Okt)															
	P=50 - f_m (Hz)								P=100 - f_m (Hz)							
NW	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
100	3	6	10	16	22	30	14	13	5	13	15	19	33	31	25	15
125	3	5	9	14	20	24	12	11	4	10	13	18	29	25	18	12
160	2	4	7	12	18	19	10	9	3	9	11	16	26	19	14	10
200	1	3	6	10	16	15	7	6	3	7	9	15	25	17	11	9
250	1	2	4	9	15	11	4	3	2	6	8	14	23	15	9	7
315	1	1	3	8	12	8	3	2	2	4	7	13	20	12	7	5

L1=1450

	D_e (dB/Okt)															
	P=50 - f_m (Hz)								P=100 - f_m (Hz)							
NW	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
100	8	22	44	50	50	50	46	28	-	-	-	-	-	-	-	-
125	7	20	39	50	50	50	39	25	-	-	-	-	-	-	-	-
160	6	14	27	42	48	42	26	18	6	17	30	47	50	49	30	18
200	4	6	15	29	42	30	17	14	5	14	26	42	50	46	28	16
250	3	4	10	20	37	24	13	11	4	12	22	36	46	43	25	14
315	2	4	8	16	34	19	10	7	2	8	15	27	35	32	17	9

L1=950

	D_e (dB/Okt)															
	P=50 - f_m (Hz)								P=100 - f_m (Hz)							
NW	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
100	5	12	23	36	50	50	34	21	7	19	28	40	50	50	50	32
125	4	11	21	33	50	50	32	19	6	17	25	34	49	50	36	22
160	3	8	15	23	34	9	18	14	5	12	18	28	41	48	26	16
200	2	5	11	18	30	24	14	11	4	10	15	24	35	41	22	13
250	2	4	9	15	27	18	11	9	3	8	13	20	31	35	20	11
315	1	3	6	12	24	14	7	6	2	6	8	15	26	7	14	8

L1=1950

	D_e (dB/Okt)															
	P=50 - f_m (Hz)								P=100 - f_m (Hz)							
NW	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
100	9	30	50	50	50	50	50	38	-	-	-	-	-	-	-	-
125	8	26	50	50	50	50	50	33	-	-	-	-	-	-	-	-
160	-	-	-	-	-	-	-	-	8	23	39	50	50	50	41	25
200	-	-	-	-	-	-	-	-	7	19	34	50	50	50	37	21
250	-	-	-	-	-	-	-	-	6	16	29	48	50	49	33	18
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

P = packing thickness in mm

CONTROLLER SELECTION

Type	Size	Controller	Product
LMV-D3-MP	NW100 - 315	Compact	Belimo
LMV-D3-MF	NW100 - 315	Compact	Belimo
227VM-024-05	NW100 - 315	Compact	Gruner
Other controllers available on request. Make Belimo, Gruner, Sauter, Siemens and Delta Controls possible.			

TECHNICAL DATA OF CONTROL COMPONENTS

Measured value collection and control function
The volumetric flow controllers of the Belimo make, type LMV-D3-MP/-MF Compact and the Gruner make, type 227VM Compact are delivered by SCHAKO as standard with the operating mode (Y signal, U5 signal) 2-10 V DC. When activated by 2 V DC, the V_{min} volume is controlled, the smallest possible V_{min} volume that can be controlled can be seen from the "Volumetric Flow Range" tables.

NOTE: When the air volume drops below the V_{min} shown in the table, the correct functioning of the volumetric flow controller is no longer guaranteed!

Positive control damper "CLOSED"
Airtight sealing to DIN EN 1751 is achieved on site either via a positive control "CLOSED" by means of a switch or a relay, or via an actuator signal of 0 V DC applied to the input Y (all Compact controllers equipped with the operating mode 2-10 V DC). Accordingly, the drive will likewise close the flap in operating range 2 - 10 V DC (however, this does not apply to the operating range 0-10 V DC), and the VAV control will be inactive. To do so, it must be ensured that the actuator signal is < 0,1 V DC. This is why in rooms where defined pressures are active (e.g. laboratories), the damper should be closed via a digital on site switching contact.

If the Compact controllers of the Belimo make must be delivered with the operating mode 0-10 V DC on customer request, please note that a positive control "CLOSED" can only be effected via a switching contact with diode.

If the compact controllers of the Belimo make are used together with the type VRP-VFP-300 in the master/slave mode or in parallel mode, then only the 2-10 V DC operating mode is usually possible.

Positive control damper "OPEN"
Supports smoke extraction or is used as a safety position. The volumetric flow controller is in this case inactive, and the damper is driven to the mechanical open position.

V_{min} control to a minimum volumetric flow
Depending on requirement or by not assigning them, individual areas can be set to stand-by operation. In this way, minimum room flushing with greatly reduced energy expenditure is achieved.

V_{max} control to a maximum volumetric flow
Individual or several rooms are supplied for a short period with a maximum volumetric flow. This allows, for example, a room through-ventilation or efficient heating to be effected.

Continuous operation
As a function of the continuous driving signal and the programmed operating range (0-10 V DC or 2-10 V DC), the volumetric flow controller will regulate the volumetric flow linearly between the setpoint values V_{min} ...V_{max}.

Constant operation
If terminal 3 (Y driving signal) has not been assigned, the air volume set on the V_{min} potentiometer will be set to a constant volume.

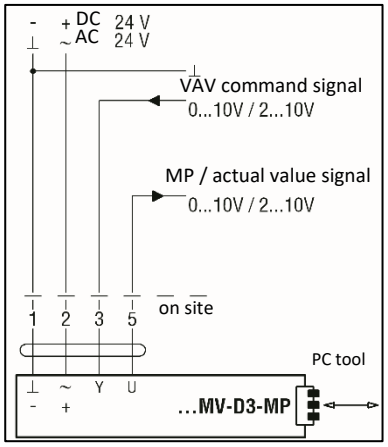
Two-stage volumetric flow rate control

Stage 1:	If terminal 3 (Y command signal) has not been assigned, the air volume set on the V_{min} potentiometer will be set to a constant volume.
Stage 2:	If AC 24 V is applied to terminal 3 (Compact controller) or terminal 7 (VRD3-SO, VRP-VFP-300), the VSR will keep the value set on the V_{max} potentiometer constant. With a switch or a contact in a connection line a "secondary volume flow control" is possible.

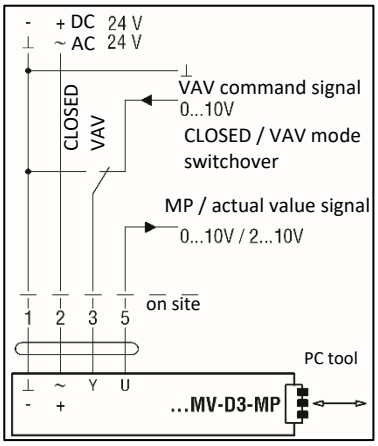
CIRCUIT DIAGRAMS - BELIMO

Circuit diagram - standard - controller
Compact controller - Belimo make - LMV-D3-MP / LMV-D3-MF

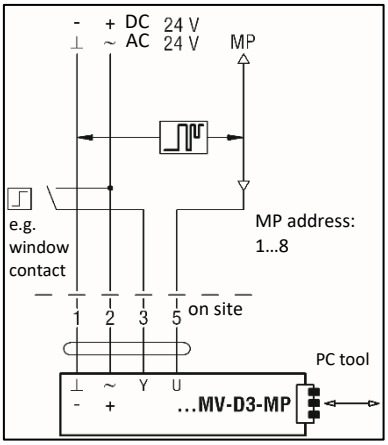
VAV with analogue command signal



VAV with lock (CLOSED) Model 2-10V DC



MP bus activation with integratedswitch- (LMV-D3-MP only)

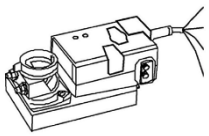


Lock mode (CLOSED): In the 2…10 V mode, the following function can be carried out with a 0 - 10 V signal.

Command signal Y	Volumetric flow	Function
< 0,1 V **	0	Damper CLOSED, VAV control inactive
0.2...2 V	V_{min}	Operating stage V_{min} active
2...10 V	V_{min} ... V_{max}	continuous operation v_{min} ... V_{max}

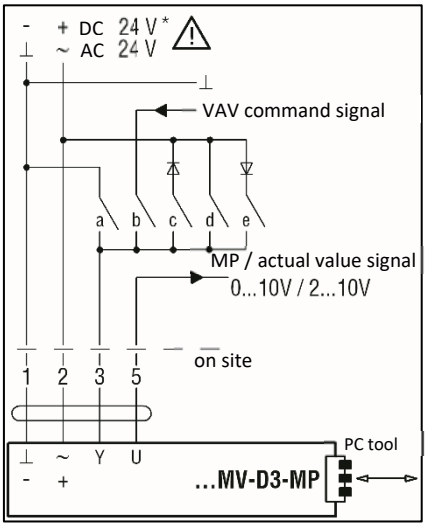
**Attention: Controller/DDC must be able to pull the command signal to 0 V.

Cable designations



No.	Designation	Wire colour	Function	
1	- ⊥	black	⊥ -	Feed
2	+ ~	red	~ +	AC/DC 24 V
3	Y	white	VAV / CAV command signal	
5	U	orange	- Actual value signal - MP bus connection	

CAV operation / positive contacts



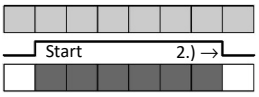
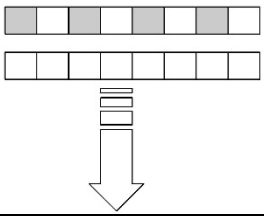
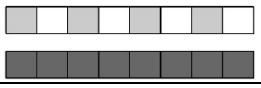
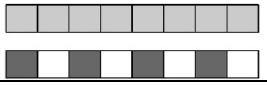
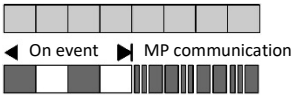
Note:
Please ensure mutual locking of the contacts!

CAV function for …-MV-D3-MP/-MF

Mode setting	---	0...10 V	0...10 V	0...10 V	0...10 V
	2...10 V	2...10 V	2...10 V	2...10 V	2...10 V
Signal	⊥ -	0...10 V 2...10 V	~	~ +	~
Function	3	3	3	3	3
Damper CLOSED	**a) CLOSED**		**c) CLOSED***		
$V_{min}...V_{max}$		**b) VAV**			
CAV - V_{min}	**everything open - V_{min} active**				
Damper OPEN					**e) OPEN***
CAV - V_{max}				**d) V_{max}**	

	Contact closed, function active
	Contact closed, function active, in mode 2...10 V only
	Contact open
*	not available for 24 V DC supply

LED table of functions for LMV-D3-MP / LMV-D3-MF

Application	Function	Description / action	LED pattern	Adaptation Address ⊕ ⊕ LED 1 power LED 2 status
N1 operation	Status display	- 24 V power supply o.k. - VAV-Compact ready for operation	LED 1 LED 2	
S1 service function	Synchronisation	Synchronisation started by: a) Operating / service unit b) Manual trigger device at the VAV-Compact c) Power ON behaviour	LED 1 LED 2	
S2 service function	Adaptation	Adaptation started by: a) Operating / service unit b) Key on the VAV-Compact	LED 1 LED 2	
V1 VAV service	VAV service active	a) Press both keys «Adaptation» & «Address» simultaneously b) VAV service will be activated: - until 24 V supply is switched off - until both keys are pressed again - after 2 hours have passed	LED 1 LED 2	
	Lack of air	Damper opens as actual volume is too low	LED 1 LED 2	
	Target volume reached	Control circuit balanced	LED 1 LED 2	
	Air excess	Damper closes as actual volume is too high	LED 1 LED 2	
B1 bus operation	Addressing via MP master (Acknowledge-ment at the VAV-Compact)	a) Addressing has been triggered at the MP master	LED 1 LED 2	
		b) Press addressing key LED will switch to the communication display as soon as the addressing process is complete.	LED 1 LED 2	
B2 bus operation	Addressing via MP master (with se-rial number)	Addressing at the MP master was triggered, LED will switch to the communication display as soon as the addressing process is complete.	LED 1 LED 2	
B3 bus operation communication	MP-PP display Communication	Communication display via MP master or oper-ating / service unit	LED 1 LED 2	

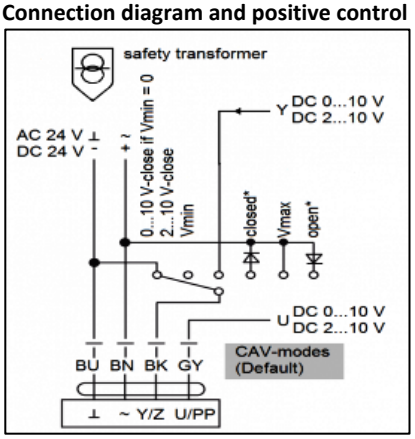
green LED (power) is lit
yellow LED (status) is lit
yellow LED (status) is flashing

1.) Synch time
2.) Adaptation time

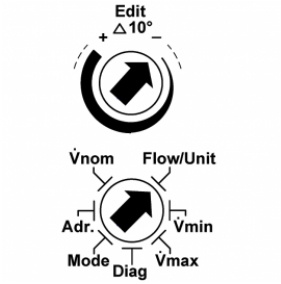
CIRCUIT DIAGRAMS - GRUNER

227VM-024-05 Compact

Connection diagram and positive control



Connection



Edit
The selector value allows values to be changed. The position of the arrow shows the set value. The changes are displayed as soon as the selector is moved ± 10 ° out of its position.

Flow / Unit
To set the required actual volumetric flow unit in m^3/h and l/s.

V_{min}
To set the required min. volumetric flow (setpoint value Y = 0V / 2V)

V_{max}
To set the required max. volumetric flow (setpoint value Y = 10V).

Mode (to set the direction of rotation)
0-n…0-10 V normal
2-n…2-10 V normal
0-i…0-10 V inverse
2-i…2-10 V inverse

Diag (diagnostics menu)
oP - opens the damper blade
cL - closes the damper blade
Hi - activates Vmax
Lo - activates Vmin
on - diagnostic mode is on, motor is off
oFF - diagnostic mode is off, display Y setpoint

V_{nom}
To set the volumetric flow according to VAV box

NOTE
Further information can be found in the GRUNER technical documentation:
Data sheet 227VM-024-05

SETTING THE OPERATING POTENTIOMETERS

with calculation formulas

Set value for V_{max}

$$EW_{V_{max}} = \frac{V_{max}}{V_{nenn}} \times 100\ \%$$

The required volumetric flow that is to flow at the 10 V DC command signal at terminal 3 (w/Y) or with positive control V_{max} is set in % at the V_{max} potentiometer of the controller, the ZTH EU device or PC-Tool. This value refers to the set **V_{nenn}** nominal volumetric flow.

Set value for V_{min}

$$EW_{V_{min}} = \frac{V_{min}}{V_{nenn}\ \textbf{oder}\ V_{max}} \times 100\%$$

The required volumetric flow that is to flow at the 0 V DC command signal (operating mode 0-10 V DC) or at the 2 V DC driving signal (operating mode 2 - 10 V DC) at terminal 3 (wY) or with positive control V_{min} is set in % at the V_{min} potentiometer of the controller, the ZTH EU device or PC-Tool. This value refers to the set V_{nenn} or V_{max} volumetric flow (depending on controller type).

Information regarding the set value V_{min}
in the following controllers, V_{min} refers to V_{nenn}:

Product	Type
Belimo	LMV-D3-MP/LMV-D3-MF
Gruner	227VM-024-05

Calculation of the U_5 voltage value

Operating mode: 2 - 10 V DC:

$$U_5 = \frac{V_{max}}{V_{nenn}} \times 8V+2V$$ V_{max} values

$$U_5 = \frac{V_{min}}{V_{nenn}} \times 8V+2V$$ V_{min} values

Operating mode: 0 - 10 V DC:

$$U_5 = \frac{V_{max}}{V_{nenn}} \times 10V$$ V_{max} values

$$U_5 = \frac{V_{min}}{V_{nenn}} \times 10V$$ V_{min} values

Calculation of the V_{nenn} volumetric flow

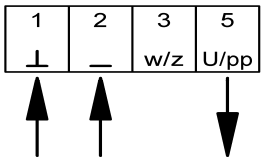
$$V_{nenn} = EK \times F \times 3600$$

Attention
The V_{nenn} value changes as a function of the set calibration curve.

EW	(%)	=	Set value
EK	(m/s)	=	Calibration curve
U_5	(V DC)	=	U_5 signal
F	(m^2)	=	Surface

Actual value measurement feedback signal U_5: voltmeter / PC-Tool

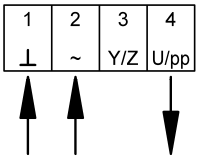
LMV-D3-MP / LMV-D3-MF



Supply voltage: 24 V AC/DC (terminals 1+2)
Measurement output 2 - 10 V DC (terminals 1+5)
Measurement output 0 - 10 V DC (terminals 1+5)

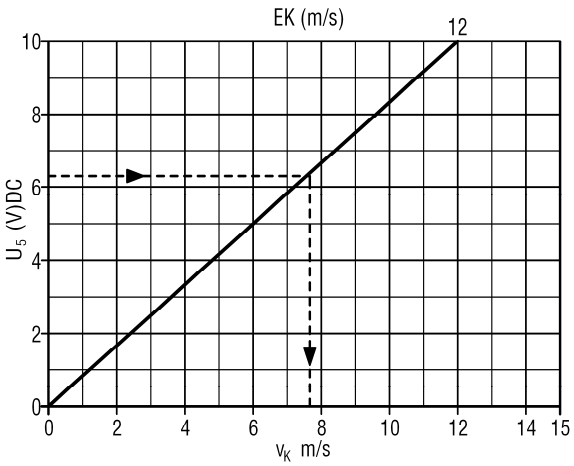
The actual value signal U5 is a real feedback of the volumetric flow actual value for monitoring and controlling the air throughput volume.

227VM-024-05



Supply voltage: 24 V AC/DC (terminals 1+2)
Measurement output 2 - 10 V DC (terminals 1+4)
Measurement output 0 - 10 V DC (terminals 1+4)

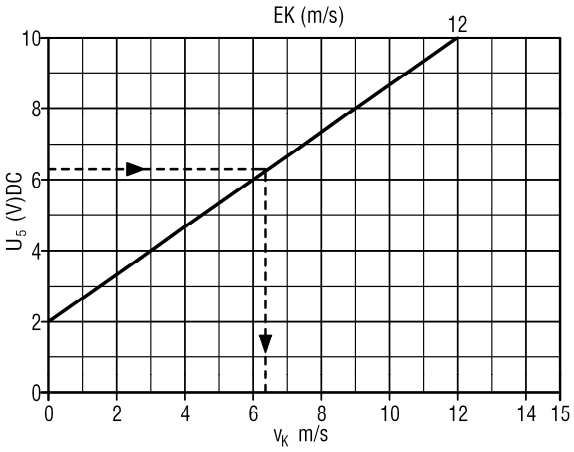
U_5 signal 0-10 V DC



Example

Assume:	Measurement output signal U_5 = 6,3 V DC see calibration value VRA-E = 12 m/sec
Measured value:	Duct velocity = 7,6 m/s
Air volume:	Duct velocity x area m² x 3600 = m³/h

U_5 signal 2-10 V DC



Example

Assume:	Measurement output signal U_5 = 6,3 V DC see calibration value VRA-E = 12 m/sec
Measured value:	Duct velocity = 3,6 m/s
Air volume:	Duct velocity x area m² x 3600 = m³/h

TECHNICAL DATA OF CONTROLLERS AND MOTORS

Controller standard

LMV-D3-MP (make BELIMO)
Dynamic pressure sensor, digital VAV controller and damper drive as communication-capable VAV-Compact solution.

Measuring principle:	Pressure reading with volumetric flow
Measuring range sensor:	2…~450 PA
Supply voltage:	AC 24 V 50/60 Hz; DC 24 V
Functional range:	AC 19,2…28,8 V; DC 21,6…28,8 V
Power consumption:	2 W
Dimensioning:	3.5 VA
Torque:	min. 5 Nm at the rated voltage
Control function:	VAV/CAV/Open-Loop; Supply/return air or stand-alone operation; master/slave parallel circuit; Mixing box control
Setting range V_{min}/V_{max}:	V_{min}=0…100 % of set V_{nenn} volumetric flow V_{max}=20…100 % of set V_{nenn} volumetric flow
Command variable w/Y: (input resistance min. 100 kΩ)	DC 2-10 V (4…20 mA with 500 Ω input resistance) DC 0-10 V (0…20 mA with 500 Ω input resistance) adjustable DC 0…10 V
Setting range Actual value signal U_5:	DC 2…10 V DC 0…10 V
MP bus function	
Address in bus mode:	1 … 8 (standard operation: PP)
LONWORKS®/EIB-Konnex/MODBUS RTU/BACnet:	with BELIMO interface UK24LON / UK24EIB, 1 …8 BELIMO MP devices (VAV / damper drive / valve)
DDC controller:	DDC controller / PLC from different manufacturers, with integrated MP interface
Fan Optimiser:	with BELIMO Optimiser COU24-A-MP
Sensor connection:	Passive (Pt1000, Ni1000, etc.) and active sensors (0…10 V), for example temperature, humidity, 2-point signal (switching power 16 mA @ 24 V), for example switch, presence detector
Protection class:	III (safety extra low voltage)
Degree of protection:	IP 54 (hose-connected)
EMC:	CE according to 39/336/EEC
Measuring air and ambient temperatures:	0° C…+50 °C, 5…95 % rH, non-condensing
Storage temperature:	-20 °C… + 80 °C
Sound power level:	max. 35 dB(A)
Operation and service:	plug-in via service socket / PC-Tool (from V3.1) / ZTH EU
Communication:	PP/MP bus, max. DC 15V, 1200 baud
Connection:	cable, 4x0,75 mm², terminals
Weight:	approx. 500 g

LMV-D3-MF (make BELIMO)
Dynamic pressure sensor, digital actuator as VAV-Compact solution

Measuring principle:	Pressure reading with volumetric flow
Measuring range sensor:	2…~450 PA
Supply voltage:	AC 24 V 50/60 Hz; DC 24 V
Functional range:	AC 19,2…28,8 V; DC 21,6…28,8 V
Power consumption:	2 W
Dimensioning:	3,5 VA
Torque:	min. 5 Nm at the rated voltage
Control function:	VAV/CAV/Open-Loop; Supply/return air or stand-alone operation; master/slave parallel circuit; Mixing box control
Setting range V_{min}/V_{max}:	V_{min}=0…100 % of set V_{nenn} volumetric flow V_{max}=20…100 % of set V_{nenn} volumetric flow
Command variable w/Y: (input resistance min. 100 kΩ)	DC 2-10 V (4…20 mA with 500 Ω input resistance) DC 0-10 V (0…20 mA with 500 Ω input resistance) adjustable DC 0…10 V
Setting range actual value signal U_5:	DC 2…10 V DC 0…10 V
Sensor connection:	Passive (Pt1000, Ni1000, etc.) and active sensors (0…10 V), for example temperature, humidity, 2-point signal (switching power 16 mA @ 24 V), for example switch, presence detector
Protection class:	III (safety extra low voltage)
Degree of protection:	IP 54 (hose-connected)
EMC:	CE according to 39/336/EEC
Measuring air and ambient temperatures:	0 °C…+50° C, 5…95 % rH, non-condensing
Storage temperature:	-20 °C…+80 °C
Sound power level:	max. 35dB(A)
Operation and service:	plug-in via service socket / PC-Tool (from V3.1) / ZTH EU
Communication:	PP, max. DC 15 V, 1200 baud
Connection:	cable, 4x0,75 mm², terminals
Weight:	approx. 500 g

227VM-024-05 (make GRUNER)
Dynamic pressure sensor, digital VAV controller and damper drive as communication-capable VAV-Compact solution.

Measuring principle:	Pressure reading with volumetric flow
Measuring range sensor:	0…~250 PA (bursting pressure 1 bar)
Supply voltage:	AC 24 V 50/60 Hz, DC 24 V
Functional range:	AC 19…29 V, DC 19…29 V
Power consumption:	2,5 W (5 Nm)
Dimensioning:	4,0 VA (5 Nm)
Torque:	min. 5 Nm at the rated voltage (10 Nm, 15 Nm, optional)
Control function:	VAV/CAV Supply/return air or stand-alone operation; master/slave parallel circuit
Setting range: V_{min} to V_{max}	V_{min}=0…100 % of V_{nom} V_{max}=0…100 % of V_{nom} $V_{konst.}$=0…100 % of V_{nom}
Command variable Y/Z (inherent resistance min. 100 kΩ)	DC 0-10 V (0-20 mA min. 500 Ω inherent resistance) DC 2-10 V (4-20 mA min. 500 Ω inherent resistance)
Setting range: (actual value signal U/PP)	DC 0-10 V DC 2-10 V
DCC controller:	DCC controller or PLC
Sensor integration:	passive or active sensor (0-10 V) for example, humidity, temperature 2-point signal (switching power 16 mA @ 24 V), for example switch, motion detector
Protection class:	III (Safety extra low voltage)
Degree of protection:	IP54 (measuring hoses connected)
Measuring air and Ambient temperature	0-70 °C (medium), 5-95 °C relative 0-50 °C (environment), humidity non-condensing
Storage temperature:	-20 °C to +80 °C
Sound power level:	<35 dB(A)
Operation and service:	using the display by means of a screwdriver directly at the device or via the feedback signal with PC software
Connection:	cable 1000 mm, 4 x 0,75 mm^2 (halogen-free), terminals
Dimensions:	115 x 65 x 61 mm
Weight:	approx. 435 g
Maintenance:	maintenance-free

STARTUP USING PC-TOOL

Direct connection to switch cabinet or socket (traditional application)

ZTH EU as MP level converter

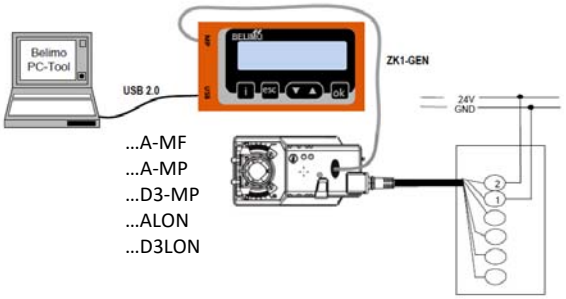
Description
The ZTH EU is also a potential-free interface between the USB port of a PC and the Belimo MP bus. It is used to connect the Belimo PC-Tool directly to the MP bus or directly to a programmable MFT drive.

Power supply
The ZTH EU is supplied with power by the USB port. The MP bus voltage is obtained internally by means of DC/DC converter. This is why no external power supply is necessary.

Driver
To be able to work with the ZTH EU, a suitable driver must be installed on the PC. The driver can be downloaded from the Belimo website (download section). After installation of the driver, the ZTH EU device will log in to the PC as a virtual COM interface.

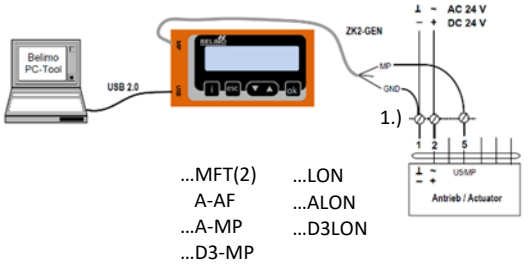
Note
For connection to USB ports of PCs and BELIMO-24 V drives only (to safety extra low voltage SELV or US class 2 feeds)

Connection diagram 1



Local connection via a service socket of the MF/MP or LON drive using a ZK1-GEN cable.

Connection diagram 2



Local connection via a connecting cable of the MF/MP or LON drive using a ZK2-GEn cable.

1.)	white	=	GND
	green	=	MP
	blue	=	not connected

STARTUP USING THE SETTING AND DIAGNOSTIC DEVICE ZTH EU (BELIMO)

Brief description
The VAV setting device ZTH EU allows efficient testing of VAV and CAV installations. Installations fitted with the Belimo VAV controller can be simply adapted to the room and user requirements. The VAV setting device ZTH EU replaces the previous setting device ZTH-GEN (2007-2014).

All standard Belimo VAV controllers with integrated PP communication (from 1992) that are sold in the EU can be set using the ZTH EU.

Specifications
- easy, quick setting of the VAV boxes parameters
- diagnostic function
- one tool for all VAV units
- voltage supplied by VAV controllers - no batteries required!
- service socket VAV / CR24 controller, PP connection
- includes connecting cable RJ12 6/4, 6-pin plug
- New generation, MP bus tester
- for functional test of MP bus
- backward compatible with all Belimo PP / MP units from 1992
- efficient handling, can be operated with one hand
- Selection of stages for test (OPEN/CLOSE/MIN/MAX/STOP)
- Damper position indicator for diagnostics
- Display of the setpoint / actual volume and $V_{min/max}$ setting in m^3/s (l/s).

Keys / Display

2 x 16-digit LCD with background lighting

▼▲	Forwards / Backwards Change value / status
OK	Confirm input
ESC	Cancel input / Leave submenu / Discard changes
i	shows additional information if available

Connection
Locally via service socket

Dimensions
85x65x23 (WxHxD)

Connection and supply

Stand-alone operation
Connection including supply takes place via the service socket at the VAV controller or via the terminals.

Bus operation
The ZTH EU can be used in the following units while the bus is running if it is connected via the local service socket: VAV-Compact L/N/SMV-D3-MP, NMVAX-D3-MP, L/NMV-D3LON.

With the VRP-M, L/NMV-D3-M and NMVAX-D3-MP, the MP-Bus must be disconnected when the service socket is used.

Restriction

Direct connection in an MP network or via an MP-Bus master is not possible.

The ZTH EU comes with a quick start guide in German and English to be affixed to the back of the unit.

STARTUP USING THE SETTING DEVICE GUIV-A

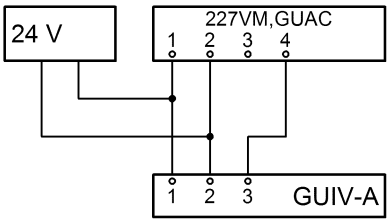
Application
The setting device GUIV-A is used by the startup or service personnel in order to carry out simple settings to the equipment or to check the actual values.
The controller type 227VM does not have any operating elements such as switches or setpoint potentiometers. To program the operating modes and the operating parameters V_{min} and V_{max}, the setting device GUIV-A is required, which can also be used to switch from 2 - 10 V DC to 0 - 10 V DC.

Connection
The GUIV-A can be connected electrically to 227 V via the U/PP connection by direct on-site or remote control, for example in a switch cabinet.

Structure and operation
The relevant parameters can be set and queried in the individual menu items, while the operating parameters programmed in-factory can be queried under menu item 10.

Note
As long as the U/PP connector is connected to the GUIV-A, the output signal U does not correspond to the actual value.

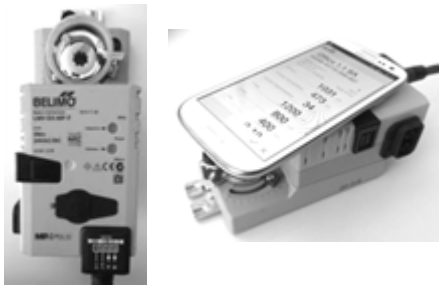
Connection diagram



1	Earth, neutral
2	Supply voltage 24 V AC
3	Setpoint value signal Y and positive control Z input 227VM, GUAC
4	Output communication signal PP and actual volumetric flow U

SMARTPHONE APP - BELIMO ASSISTANT

The NFC antenna area of the VAV Compact is located between the Belimo or OEM logo and the NFC label.
Align NFC-capable android smartphone with loaded Assistant app on the VAV-Compact such that the two antennae are above one another.



The Belimo Assistant app can be downloaded from the Google Play Store.

NFC-capable devices:	
-	LMV-D3-MP, NMV-D3-MP, SMV-D3-MP and LHV-D3-MP with printed NFC label.
Non-NFC-capable devices	
-	All devices without NFC label
-	LMV-D3-MF
-	LMV-D3-LON and NMV-D3-LON

PRIOR TO MOUNTING AND COMMISSIONING

An instruction leaflet containing information on safety, transport disposal, installation commissioning and maintenance is enclosed with each SCHAKO product . For safety reasons, this instruction leaflet must be read under all circumstances and completely adhered to.

These devices are NOT suitable for use in zones where there is a risk of explosion according to ATEX 94/9/EC. The operating safety of the devices is only guaranteed when used in accordance with their designated use.

Disposal

The devices have been prepared in accordance with the RoHS directive restricting the use of certain hazardous substances in electrical and electronic equipment (2002/95/EC). After its final decommissioning, the volumetric flow controller must be properly disposed of.

INSTALLATION INFORMATION

Installation and commissioning

- Installation with horizontal or vertical damper axle possible
- position-independent
- direct connection to moulded parts, such as bend or T-piece possible

MAINTENANCE AND SERVICE

Service and maintenance instructions

- Assemble in a way to allow inspection
- maintenance-free, as there is no wear
- not suitable for air containing sticky and oily particles
- For maintenance, service, retrofitting, etc., inspection openings in sufficient number and size must be provided on site.

LEGEND

D_e	[dB/Okt]	=	Insertion loss
EK	(m/s)	=	Calibration curve
f_m	(Hz)	=	Octave band centre frequency
V_{min}	(m³/h) [l/s]	=	Minimum volumetric flow
V_{max}	(m³/h) [l/s]	=	Maximum volumetric flow
Hz	(fm)	=	Hertz
K_L		=	correction value; relative sound power level, relative to L_{WA}
K_{Lw}	(-)	=	Relative sound spectrum
LOA	(-)	=	Number of holes in flat flange
P	(mm)	=	Packing thickness duct silencer
NW	(mm)	=	Nominal width
U_5	(V) DC	=	Measurement output (electric voltage)
V	(m³/h) [l/s]	=	Air volume
ΔV	[%]	=	Tolerance for the volumetric flow setpoint value
v_K	(m/s)	=	Duct velocity
øD	(-)	=	Hydraulic diameter
Δp	(Pa)	=	Pressure difference
$\Delta p_{t\,min}$	(Pa)	=	Minimum static pressure difference
Δp_t	(Pa)	=	Pressure loss

ORDER CODE

01	02	03	04	05	06	07	08
Type	Size	Material	Attachment assembly	Mode	Volumetric flow Vmin	Volumetric flow Vmax	Duct connection
Example							
VLV55	-100	-SV	-A001	-0	-0020	-0100	-GD1
VLV65	-200	-DD	-A061	-2	-0150	-0600	-MF1

SAMPLE – VLV55

VLV55-100-SV-A001-0020-0100-GD1
Volumetric flow controller type VLV55, size 100 mm, galvanised sheet steel, with compact controller Belimo LMV-D3-MP-SO, mode 0 - 10 V, setting values 20 - 100 m³/h, with rubber lip seal

SAMPLE – VLV65

VLV65-200-DD-A061-0150-0600-MF1
Volumetric flow controller type VLV65, size 200 mm, galvanised sheet steel, with DD coating, with compact controller GRUNER 227VM-024-05, setting values 150 - 600 m³/h, with METU flange

ORDER DETAILS

01 - Type
VLV55 = version with diameter ratio 55, 0.5 - 5 m/s
VLV65 = version with diameter ratio 65, 1 - 8 m/s (STANDARD)

02 - Size
100 = NW 100 mm
125 = NW 125 mm
160 = NW 160 mm
200 = NW 200 mm
250 = NW 250 mm
315 = NW 315 mm

03 - Material
SV = galvanised sheet steel (STANDARD)
DD = DD coating

04 - Attachment assembly
A001 = LMV-D3-MP-SO, 5 Nm - (STANDARD)
A006 = LMV-D3-MF-SO, 5 Nm
A061 = 227VM-024-05, 5 Nm
other controllers available on request

05 - Mode
0 = 0 - 10 V
2 = 2-10 V (STANDARD)

06 - Volumetric flow set value V_{min}/V_{konst}
0000 = ex works, see table p. 5
xxxx = 4-digit customer value in m³/h

07 - Volumetric flow set value V_{max}
0000 = ex works, see table p. 5
xxxx = 4-digit customer value in m³/h

08 - Duct connection: GD or flange
KA0 = without rubber lip seal/without flange
GD1 = with rubber lip seal (STANDARD)
FF1 = flat flange, galvanised sheet steel
MF1 = METU flange, galvanised sheet steel
Either with GD or flange. Combination is not possible!

SPECIFICATION TEXT

VLV55 | VLV65
Volumetric flow controller in round design, for round ductwork connection, for use in supply and return air systems for constant or variable volumetric flow regulation.

Measurement of the volumetric flows according to the Venturi principle. Standardised Venturi nozzle with measuring points for differential pressure measurement in front of the nozzle and in the nozzle neck. This ensures high control accuracy at low air velocities, duct pressures and any inflow conditions.

Nozzle and differential pressure sensor are resistant to pollution. Connecting pipe is suitable for air ducts to DIN EN 1506.
Position of the control damper is visible from outside.
Leakage at the damper blade to DIN EN 1751, class C.
Housing leakage to DIN EN 1751, class 4.

Special features
- designed for use at low air velocities and duct pressures
- position-independent installation possible
- high controlling precision with any inflow
- resistant to pollution

Materials of housing and internal parts
- Housing made of galvanised sheet steel (-SV)
- Damper blade seal made of EPDM, silicone- and halogen-free
- Ring chamber sealing made of EPDM, silicone- and halogen-free
- Venturi nozzle made of aluminium, with attached measuring points for determining average values to DIN EN ISO 5167.

Technical data
- Nominal sizes 100 - 315 mm
- Volumetric flow range 13 - 2195 m³/h (4 - 610 l/s) approx. 10 - 100 % of nominal volumetric flow
- Minimum pressure difference of 5 - 150 Pa
- Allowed static differential pressure range: 20 - 750 Pa
- Allowed ambient temperature 0 - 50 °C
- For use with duct velocities of 0,5 - 8 m/s (depending on the nozzle variant)

Add-on parts
Electronic compact controller suitable for individual control or connection to a building control system. If required, in BUS-capable design (LON, Modbus RTU, KNX, BACnet).
- Supply voltage 24 V AC/DC, 50/60 Hz
- wired and parameterised ex works
- controller with potentiometer and display for subsequent adjustment on request
- possible positive controls: CLOSED, V_{min}, V_{max}, OPEN
- It is possible to subsequently adjust the manufacturer set operation volumetric flow.

Product: SCHAKO **type VLV**

- Housing, damper blade and measuring sensor at an extra charge with DD coating (-DD)

Accessories (at an extra charge)

- METU flange (-MF1), on both sides, duct flange type AF.
- Flat flange (-FF1), on both sides, to DIN 24154/5.
- Rubber lip seal (-GD1), on both sides, made of special rubber.
- Duct silencer (-RS), rigid design, casing and perforated sheet made of galvanized sheet steel with mineral wool filling