

VHD

Active VAV Diffuser



- Active supply air unit for ceiling mounting
- Stable supply throw length with variable airflow rates
- Elimination of the risk of draughts
- Wide supply air temperature range
- Useful in systems with a constant static pressure ductwork system
- Designed for use with the VRI/V plenum
- Maximum flow rate adjustment and measurement section available for supply (MSM)
- Minimum airflow of the VHD: approximately 10...15 l/s for sizes 160...250

Accessories

- Balancing plenum VRI/V with connection cable for VHD

MATERIAL

PART	MATERIAL	FINISHING
Upper plate	Steel	Powder painted, white RAL 9010
Front panel	Perforated steel	Powder painted, white RAL 9010
Control cone	Steel	Powder painted, black
Gasket	Rubber	

QUICK SELECTION

qv	Pa	540	660	840	1080	1320	1560	1800	2040	2280
	l/s	45	55	70	90	110	130	150	170	190
	m ³ /h	162	198	252	324	396	468	540	612	684
VHD-160 + VRI/V-160-160(N)	LpA	20	25	32	40					
	ΔPst	12	17	28	46					
	ΔPtot	15	22	36	58					
	Ld	-	-	-	-					
	Lmin	-	-	1,0	1,6					
	L0.2	1,7	2,2	2,9	3,5					
VHD-200 + VRI/V-200-200(N)	LpA			21	28	34	39			
	ΔPst			16	26	38	54			
	ΔPtot			19	31	46	64			
	Ld			-	-	4,6	5,2			
	Lmin			1,2	1,8	2,2	3,0			
	L0.2			3,1	4,3	5,1	6,0			
VHD-250 + VRI/V-250-250(N)	LpA				22	28	33	37	41	45
	ΔPst				15	22	30	40	52	65
	ΔPtot				17	25	35	47	59	74
	Ld				-	4,0	4,6	4,8	5,1	5,4
	Lmin				1,6	2,0	2,6	3,0	3,4	4,0
	L0.2				3,9	4,5	5,0	5,2	5,5	6,0

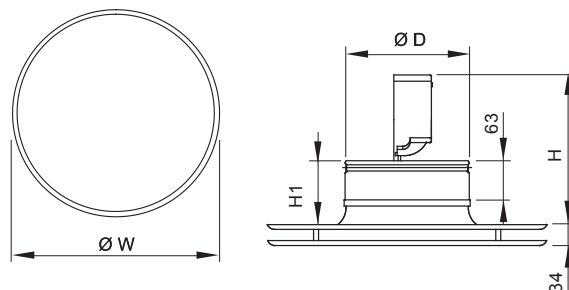
LpA values presented with room attenuation 4 dB (red 10m² - sab). When using room attenuation 8 dB (red 25m² - sab): LpA - 4dB.

Pa Supply air cooling capacity, W
 LpA A-weighted sound pressure level, reduced by total equivalent absorption surface of 10m², dB(A) red 10m² - sab
 ΔPst Static pressure drop, Pa

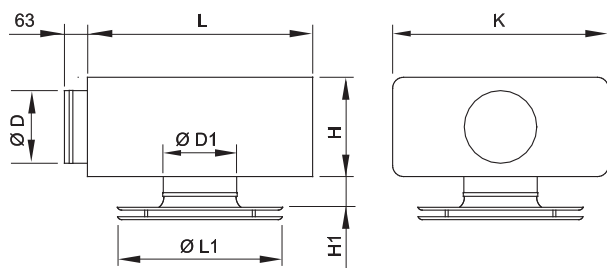
ΔPtot Total pressure drop, Pa
 Ld Distance from the supply unit, at which air jet detaches from ceiling, m
 Lmin Minimum distance between central lines of two supply units, m (V3 = 0,25m/s at 1.8m height)
 L0.2 Isothermal throw length, m when residual velocity of supply air jet 0,2 m/s
 Room temperature (Tr) = 24 °C
 Supply air temperature (Ta) = 14 °C
 Room height = 2,8 m

DIMENSIONS

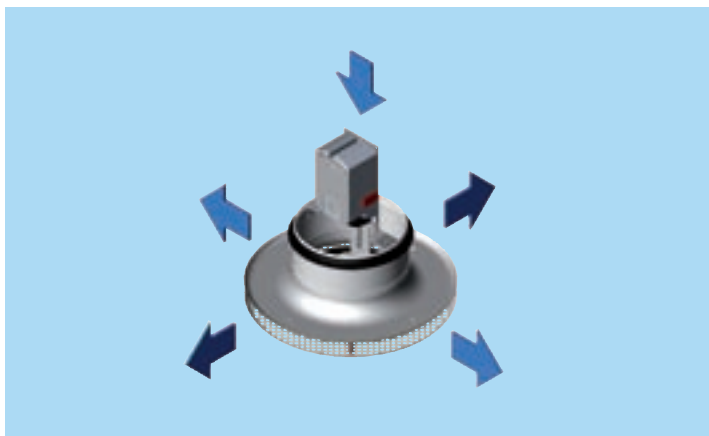
NS	ØW	H	H1	ØD
160	299	262	98	159
200	449	267	104	199
250	449	275	109	249



Dimensions with VRI/V plenum



NS	VRI/V	L	L1	H	H1	K	ØD	ØD1
160	125...160	458	299	182	96...126	432	124	162
160	160...160	458	299	222	96...126	432	159	162
200	200...200	618	449	272	100...130	592	199	202
250	250...250	618	449	336	111...141	592	249	252



Function

The VHD is an active ceiling diffuser for supply air. Air is supplied to the room space mainly through the side slots of the diffuser. The air jet supplied horizontally through the side slots induces room air. The unit maintains a high outlet air velocity between the minimum and maximum airflow rates, creating comfortable conditions and low residual air velocities in the occupied zone.

In the demand-based ventilation (DBV) and variable air volume (VAV) systems, room conditions can be guaranteed to be without a risk of draughts, at both the maximum and minimum airflow rate.

The pressure dependent function of the VHD operates in combination with a constant pressure duct zone. An external room controller varies the room airflow rate by running the VHD diffuser actuator with a standard 0...10 VDC control signal.

Accessories

Actuator

In the standard delivery the VHD is always equipped with a Siemens GDB161.2E/HA damper actuator.

VRI/V plenum for supply air

Use of the VHD is most beneficial with a VRI/V plenum. The VRI/V plenum includes:

A measurement and adjustment module MSM

An electric junction box for power and control signal supply as well as a cable for easy connection of the variable air diffuser VHD

Installation safety and hanging wire for air diffuser

Servicing

Open the diffuser part and detach the perforated plate of the coupling sleeve. Remove the control cone part completely.

Loosen two screws which are holding the motor assembly on VHD body and let it hang on the wire.

The MSM is removed through VRI/V outlet by pulling from its body - not the measurement tubes or control spindle.

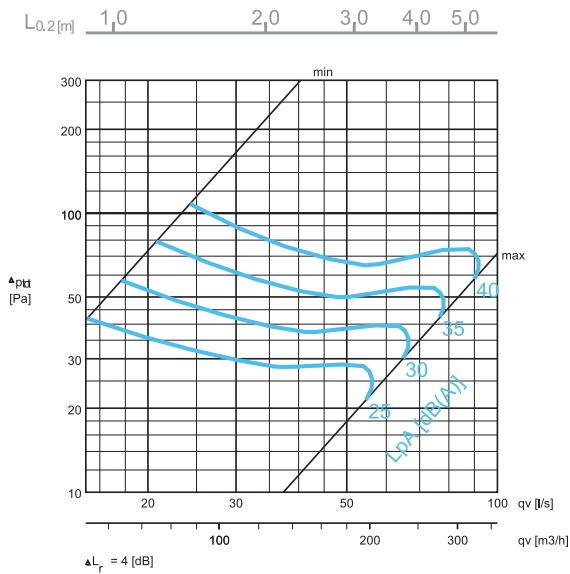
Clean the parts with a damp cloth, instead of immersing in water.

Replace all parts in opposite order.

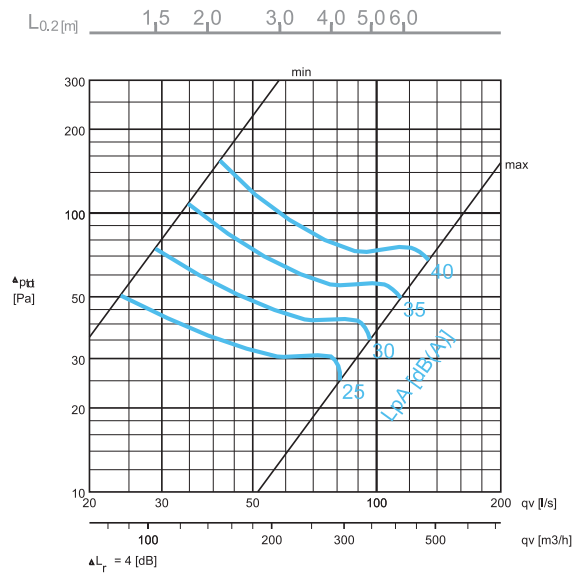
ACTUATOR	TORQUE	CONTROL ARRANGEMENT	OPERATING VOLTAGE	POWER CONSUMPTION
LM 24-SR + ZH-LM	110 N	Control signal input 0...10 VDC Operating range 2...10 VDC (0...100%) Manual override operation	24 VAC	3VA

Pressure drop, throw pattern and sound data

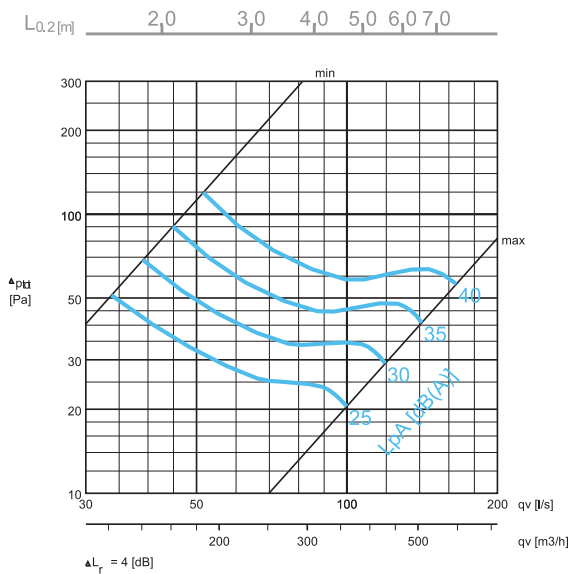
VHD-160 + VRI/V 160-160



VHD-200+ VRI/V 200-200



VHD-250+ VRI/V 250-250



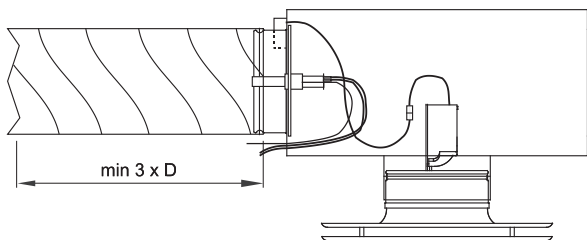
Selection example:

Requirements:	qv = 100 l/s	Selection:	VHD-200+VRI/V
	Lp(A) < 35 dB(A)		Lp(A) = 31 dB(A)
	L0.2 < 6.0 m		L0.2 = 5.2 m
			$\Delta P_{tot} = 38$ Pa

SOUND LEVEL DATA

		qv	ΔP_{st}	ΔP_{tot}	F (Hz)								LpA [dB(A)]	NR	NC	
		(l/s)			(m ³ /h)	(Pa)	(Pa)	63	125	250	500	1000				2000
VHD-160 + VRI/V-160- 160(N)	Min	15	54	42	42	41	31	28	28	25	5	3	3	25	21	19
		18	65	57	57	42	34	33	33	30	13	7	4	30	26	25
		21	76	79	79	42	37	37	38	36	20	14	6	35	32	30
		24	86	107	108	43	40	41	43	41	28	20	9	40	37	36
	Max	55	198	17	21	40	31	30	29	24	10	3	3	25	20	19
		65	234	24	30	42	36	34	33	30	18	4	3	30	26	24
		77	277	34	42	44	40	38	37	36	26	13	3	35	32	30
		90	324	46	58	47	45	42	41	41	33	23	4	40	37	36
VHD-200 + VRI/V-200- 200(N)	Min	24	86	50	51	40	34	28	29	24	6	5	3	25	21	19
		29	104	74	75	42	38	33	34	29	15	11	3	30	26	24
		35	126	107	108	44	42	37	38	35	24	18	3	35	31	29
		42	151	153	154	46	46	42	43	40	33	24	3	40	36	35
	Max	81	292	21	25	38	35	29	29	24	10	3	3	25	21	19
		96	346	30	35	42	39	33	33	29	18	4	3	30	25	24
		114	410	42	50	45	44	36	38	35	26	13	3	35	31	30
		134	482	57	68	48	48	40	42	40	33	22	3	40	36	35
VHD-250 + VRI/V-250- 250(N)	Min	34	122	51	51	40	36	31	29	21	14	4	3	25	20	19
		39	140	68	69	41	39	36	34	26	19	9	3	30	26	25
		45	162	90	91	43	43	40	39	31	24	15	3	35	31	30
		52	187	119	120	45	46	45	45	37	29	21	3	40	37	36
	Max	100	360	18	20	36	33	29	30	21	8	3	3	25	22	20
		119	428	26	29	40	38	33	35	28	17	4	3	30	27	25
		141	508	36	41	43	43	37	39	34	25	13	3	35	31	30
		166	598	49	56	46	47	40	44	40	33	21	3	40	36	35

LpA values presented with room attenuation 4 dB (red 10m² - sab). When using room attenuation 8 dB (red 25m² - sab): LpA - 4dB.
NR/NC noise criteria



Installation

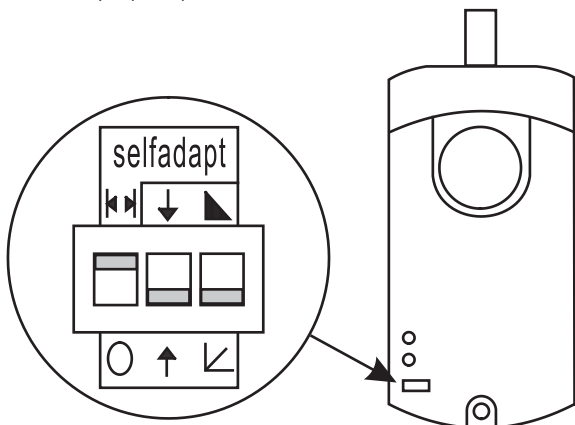
The active diffuser shall be installed in conjunction with the VRI/V plenum box. The VRI/V plenum shall have a safety distance of 3D minimum upstream, to ensure reliable measurement and accurate control of the airflow rate.

A hanging and safety wire for VHD diffuser is delivered with the VRI/V plenum. Hang the VHD diffuser to the wire by means of a key ring.

VHD is connected electrically to VRI/V with ready assembled cable plug.

Control that the actuator settings are in line with the factory pre-set DIL switches.

Release the actuator clutch and pull the control cone to the fully open position.

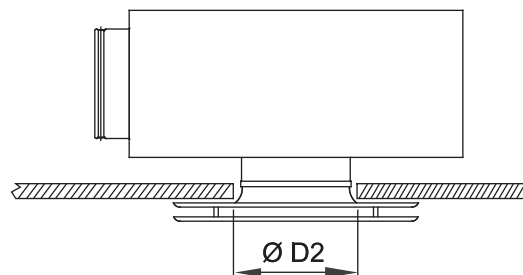


Mount the VHD diffuser assembly to the VRI/V plenum box.

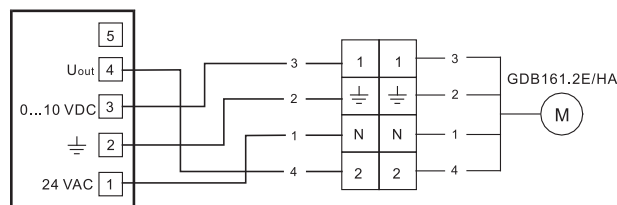
Note: The technical performance for the combination of supply air diffuser and plenum is presented separately for the two different installations.

Dimensions of installation hole in suspended ceiling

NS	Ø
160	211
200	265
250	333



Wiring diagram



Junction box

Cable connection plug

Control signals in junction box

Terminal 3

0 VDC = minimum position / airflow
10 VDC = maximum position / airflow

Terminal 4

(feedback from actuator)
Not connected

Commissioning

Make sure that the control cone of each active VHD (and VHB) damper is fully open (at the lowest position). This can be done either mechanically or electrically:

If the power is not connected to active diffuser, release the actuator clutch and pull the control cone to the fully open position.

If a 24 VAC power supply is connected to diffusers, please make sure that the control signal is constantly at 10 VDC.

Check that the duct zone constant pressure is at the intended level (for example, between 30 and 50 Pa).

If the duct zone pressure is too low and the zone pressure control damper is fully open, you should either adjust the supply fan pressure setpoint to be higher or adjust the MSM adjustment unit in the VRI/V plenum.

The zone pressure control damper shall have a sufficient operative differential pressure over the damper (for example, 30 Pa or more).

Suggested Specifications

The active diffuser shall be made of painted steel with a white (RAL 9010) standard colour.

Air shall be introduced into the space through the side slots and perforated front panel, ensuring a high mixing rate. The diffuser shall maintain appropriate discharge velocity throughout the total airflow range.

The diffuser shall be connected to a balancing plenum designed for the active diffuser installation and equipped with a measurement and adjustment module.

The diffuser shall have a rubber gasket to ensure tight connection to the plenum.

Adjustment

The airflow rate of the active diffuser is measured and adjusted using the MSM module inside VRI/V plenum.

Attach the measurement instrument to the measuring tubes on VRI/V plenum and the airflow rate is calculated using the pressure difference reading and the k factor.

$$q_v = k * \sqrt{\Delta p_m}$$

q_v calculated airflow rate (l/s)

k k factor from the table

ΔP_m measured pressure (Pa)

NS	k
160	15,9
200	26,2
250	44,5

If the airflow rate of the active diffuser is too high, adjust the position of the MSM adjustment unit in the VRI/V plenum to closer position. If maximum airflow can't be reached, open MSM module first full open and if this is not enough, increase the duct zone pressure

The minimum airflow is factory pre-adjusted. It can be increased by turning the screw in the middle of the control cone.

Product code

VHD-D

D = Diameter of duct connection
160, 200, 250

Specifics and accessories

CO = Colour

W W=White

X X=Special colour

Code example

VHD-160, CO=W

Sub products

VRI Plenum (Diffusers)