

TECHNICAL INFORMATION

APPLICATION	Functionality	Diffuser with VAV functionality Stand-alone or BMS integration
	Airflow direction	Radial
	Airflow type	Supply or exhaust
CONSTRUCTION	Shape	Square
	Panel size	495x495 mm, 594x594 mm, 619x619 mm, other ceiling types available on request
	Available diameters	125, 160, 200, 250 mm
	Height	218 mm
MATERIAL	Standard material	Powder-coated galvanised steel Glass-fibre reinforced polycarbonate
	Seal diffuser neck	Double lip EPDM
	Other seals	Polyolefin closed-cell structured and cross-linked foam
	Flow sensor	Aluminum with polyamide coupling; PVC end caps and tubing
MOUNTING	Mounting options	T profile system ceiling
CONTROLLER	Functionality	VAV / CAV Master-slave architecture
	Actuator	Integrated stepper motor
	Operating voltage	220 VAC \pm 10% @ 50-60 Hz (power supply unit PSU)
	Control signal	DC 0/2 .. 10 V Signal origin: analog input : remote master controller (supply or exhaust) Setpoint (total zone flow) with flow offset (supply vs exhaust)
	Override functions	Open / closed - fixed control disc position

VCD

INTELLIGENT VAV DIFFUSER

Variations **VCD**



The VCD is an intelligent ceiling air diffuser with integrated flow rate controller for both supply and exhaust purposes. This enables autonomous flow rate modification depending on the prevailing environmental conditions, e.g. occupation degree, indoor air pollution and thermal loads. Thermal comfort in the occupied zone is optimized during operation as the diffuser exit air velocity is better preserved at changing flow rates than with traditional diffusers. Although primarily aimed for constant-pressure duct system designs, it can be applied to other situations too.

[All-in-one air diffuser with VAV functionalities](#)

[Plug-and-play remote commissioning](#)

[Optimal throw length](#)

[Applicable to any ceiling system](#)



ACCESSORIES

PSU

Power supply unit



FLEXBEND

Flexible duct support



MCU

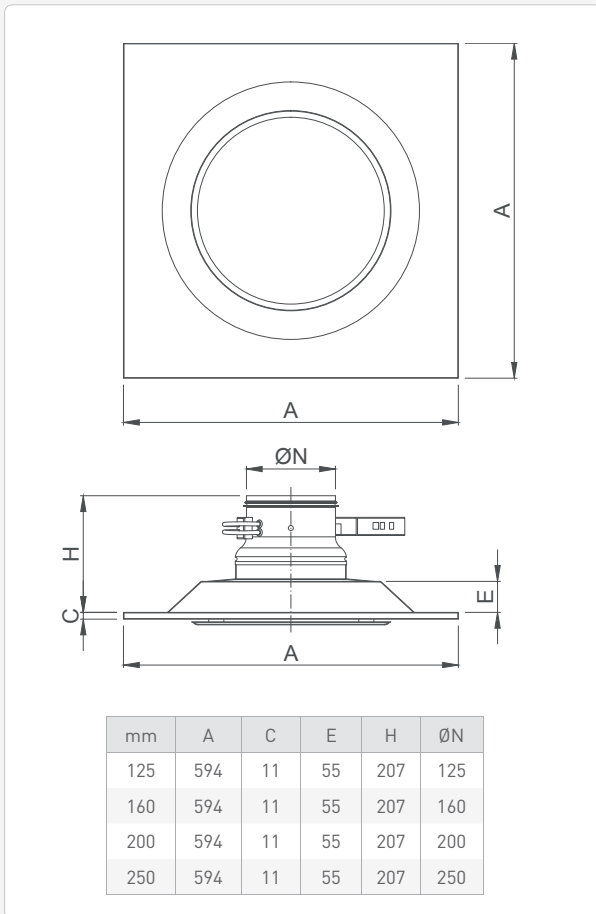
Master communication unit



INTELLIGENT VAV DIFFUSER

VCD

DRAWING



ACCURACY FLOW MEASUREMENT

- Duct velocities larger than 1 m/s are recommended, and should never go below 0.3 m/s (i.e. below pressure detection limit).

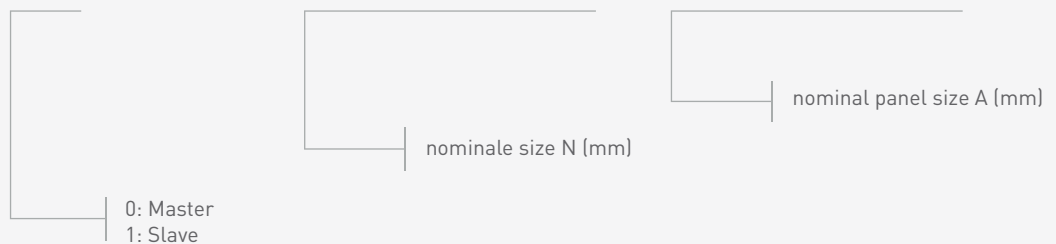
VELOCITY [m/s]	MEASUREMENT ERROR [%]
≥ 0.75	< 15
≥ 1.0	< 10
≥ 1.3	< 5

- The above volume flow rate accuracy applies to situations with a straight upstream section of the duct according to ISO 5219 / EN 1751, and measured according ISO 3966. Direct upstream mounting of a 90° flexible duct by means of the FlexBend results in a supplementary error of ±6%.

HOW TO ORDER

DIFFUSER

V C D 1 0 0 - 0 1 6 0 0 5 9 4



POWER SUPPLY (PSU)

P S U -

Note: up to 15 diffusers per PSU

MASTER CONTROL UNIT

M C U -

Note: if more than 15 diffusers, or more than 1 PSU, is being used : BACnet TCP/IP

SELECTION DATA

MAXIMUM FLOW SECTION

100% open control disc

Please also consult the VCD selection tool for more thorough selections

Note: a minimal static pressure loss dP_s of 20 Pa is recommended for cooling applications

SIZE	Q_v	(m ³ /h)	75	100	125	150	200
		(L/s)	21	28	35	42	56
125	V_{duct}	[m/s]	1.7	2.3	2.8	3.4	4.5
	dP_s	[Pa]	1	2	3	5	8
	dP_{tot}	[Pa]	3	5	8	11	20
	Throw @ 0.2 m/s	[m]	1.0	1.3	1.7	2.0	2.7
	sound power L_w	[dB(A)]	<20	<20	<20	23	32
	sound pressure L_p	[dB(A)]	<20	<20	<20	<20	24
	160	Q_v	(m ³ /h)	125	175	200	250
		(L/s)	35	49	56	69	83
V_{duct}		[m/s]	1.7	2.4	2.8	3.5	4.1
dP_s		[Pa]	<1	1	2	3	4
dP_{tot}		[Pa]	3	5	7	10	15
Throw @ 0.2 m/s		[m]	1.6	2.2	2.5	3.1	3.7
sound power L_w		[dB(A)]	<20	<20	22,9	30	35
sound pressure L_p		[dB(A)]	<20	<20	<20	22	27
200	Q_v	(m ³ /h)	200	250	300	400	500
		(L/s)	56	69	83	111	139
	V_{duct}	[m/s]	1.8	2.2	2.7	3.5	4.4
	dP_s	[Pa]	3	5	7	12	19
	dP_{tot}	[Pa]	5	8	11	20	31
	Throw @ 0.2 m/s	[m]	2,2	2,7	3,3	4,3	5,4
	sound power L_w	[dB(A)]	20,8	26,7	31,4	39	45
	sound pressure L_p	[dB(A)]	<20	<20	23,4	31	37

L_p : sound pressure room attenuation of 8 dB(A)

VAVi SYSTEM ARCHITECTURE

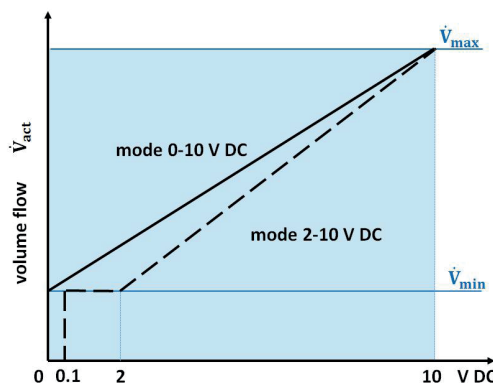
The VAVi diffuser network can consist of up to 60 diffusers such as VCD. They can be arranged into control areas, with each such area being populated with the number of diffusers required to satisfy the comfort control in that area. Areas of control are designated 'zones' and comprise a demarked space such as a room, hallway or office area. Each such 'zone' will contain a single or multiple diffusers. One diffuser in such a zone will be designated as 'master' diffuser and will dictate the volume flows of the other diffusers in the same control zone, being designated as 'slave' diffusers and will follow the 'master' control outputs.

The VAVi system diffusers are diffusers with integrated VAV functionalities. Hence, input control signals (0/2 .. 10 V) result in a flow rate between a (pre-set) minimal and maximal flow, denoted as V_{min} and V_{max} respectively. The master diffuser obtains its setpoint from an external controller analog input or from another, remote, master diffuser. In the latter situation, supply can be coupled to exhaust and vice versa. If both flow rates are not equal, e.g. a part of the airflow is directed to or from another zone, an offset can be defined (positive or negative). The total zone flow rate is specified at the master's level. It subsequently is scaled to the individual diffuser setpoint and transferred to the slave diffusers. Each diffuser will calculate its own setpoint (including offset) according to its pre-set V_{min} and V_{max} values.

VAVi system diffusers are modular and are easy to change from masters to slaves on-site. For a diffuser to be a master, an on-board controller should be fitted. The Grada VAVi software tool is subsequently used to designate a zone number, link slave diffusers to that zone, read diffuser status, and read and write diffuser settings. A power supply unit (PSU) supplies power to up to 15 diffusers (see fig. 1). Any combination of master or slave diffusers can make up the 15 diffusers powered by a single PSU. A single inter-diffuser cable that carries both power and communication links diffusers in a daisy chain manner. A maximum length of 150 m of inter-diffuser cables and up to 20 cables (Grada inter-diffuser and extension cables only) can be used per PSU. A USB module and laptop with Grada VAVi software loaded makes it possible to connect to all of the diffusers connected to a power supply.

Diffuser settings, status and inter-diffuser relationships can be read and edited using the software. The software uses a simple and intuitive interface that allows the user to position and locate diffusers on a floor plan that represent an actual installation. Diffuser icons represent the diffusers on the floor plan and maximising a diffuser icon gives access to its settings and status. To manage a building's energy and comfort from a central point, PSU's can be connected together using a master communications unit (MCU). A MCU can connect to 4 PSU's and therefore a total of 4 x 15 diffusers, i.e. 60 diffusers, at a time (fig. 3). Multiple MCU's can be connected together to manage the entire building. MCU's are the access point through which a building management system (BMS) connects to the VAVi system. At the moment, bacnet TCP/IP is available. Since only one MCU access point is required for every 60 diffusers, the cost of connecting to a BMS is drastically reduced. Every MCU variant gives access to 60 diffusers at a time by using the VAVi software.

Important: joining cables by cutting and joining voids the Grada warranty. Cables that have been cut and joined negatively affect the reliability and quality of the communication signal on a channel and can potentially damage components. Every PSU comes with 2 termination resistors. It is important to fit them to the first & last diffuser. Termination ensures a reliable communications signal across the diffuser network.



VAVI SYSTEM ARCHITECTURE

FIG. 1

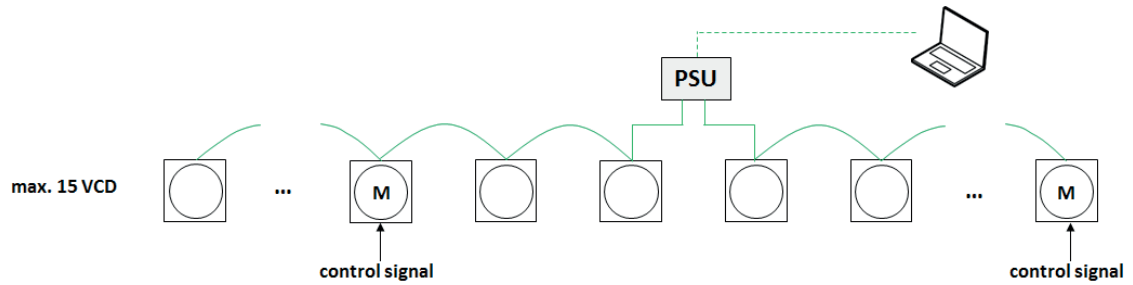


FIG. 2

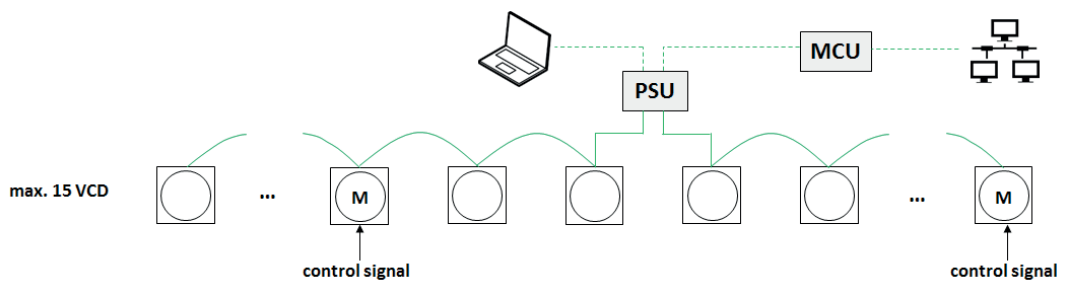
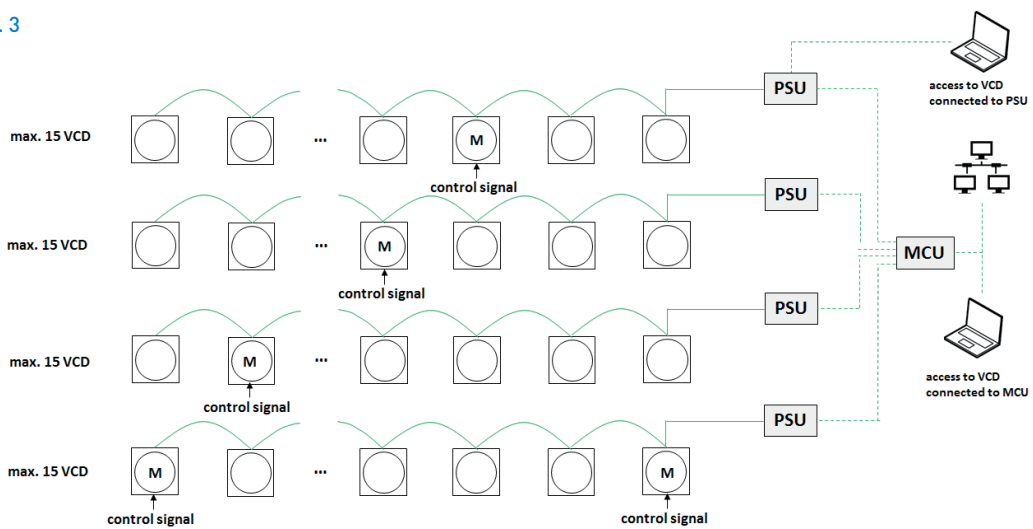


FIG. 3



VAVI COMMISSIONING

The Grada VAVi software is used to commission VAVi diffusers and manage an entire buildings individual comfort levels. Diffuser settings, status and inter-diffuser relationships can be read and edited using the software. The VAVi software is free of charge and can be downloaded from Grada's website (www.grada.com).

The software uses a simple and intuitive interface that allows the user to position and locate diffusers on a floor plan that represents an actual installation. Diffuser icons represent the diffusers on the floor plan and maximising a diffuser icon gives access to its settings and status. Since every diffuser has a unique address (serial number), it is possible to link the address with its position. Every diffuser comes with 2 labels, one to identify the diffuser and the other to mark its position on a floor layout plan. Should a diffuser be lost, a ping button allows the user to identify the diffuser on the software and position it correctly. The software incorporates a Project Selector for easy navigation between floors and sections. Once a project has been commissioned it can be saved. It is not necessary to run the software for the VAVi system to operate.

- Remote commissioning
- Access and edit diffuser settings, status and inter-diffuser relationships (master-slave)
- Adjust minimal and maximal flow rate settings
- Fault monitoring
- Monitoring of flow rate and supply temperature
- Simple and intuitive interface
- Position and locate diffusers on floor plan representing the actual situation
- Comprehensive help file built into the software

