## Constant & Variable air volume controllers Air volume the smart way





# Disclose the secret of fresh air!



Systemair has been taking care of Indoor Air Quality (IAQ) as an essential resource since 1974. Today Systemair is one of the leading ventilation companies worldwide. A success story, which started in Skinnskatteberg, Sweden with the invention of the inline duct fan. This invention revolutionised the ventilation world. Since then the company has continuously advanced and now offers a comprehensive range of products for all ventilation requirements. The expert at Systemair have the required knowledge and understanding in finding solutions when considering the ventilation of shopping

centres, domestic ventilation of a family home to the complex ventilation of tunnels and metro stations. More than 3000 employees and in excess of 60 subsidiaries in 44 countries globally we are available to our customers.

With this catalogue which features air distribution products and accessories we give you as our customer a general overview of what Systemair can offer within this range.

#### Quality

Systemair has been certified according to ISO 9001, ISO 14001 and ATEX. Our R&D centre remains one of the most modern facilities in Europe. We test in compliance with the international standards EN, ISO and AMCA.

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## CONTENTS

Systemair	4-5
A good indoor climate is vital	6-7
Optima-R	8-10
Optima-RI	11-13
Optima-RS	14-16
Accessories	17-20
Room controllers	
Presence detectors	32-35
Optima controller solutions	
Cooling and Heating batteries	45-59
Group product range	60-61



# Systemair worldwide



#### Skinnskatteberg, Sweden:

Systemair AB, the Systemair group head office in Skinnskatteberg, Sweden. The production is virtually fully automated with modern machinery featuring advanced computer support. Also located here is the company's most advanced test installation for measuring technical data.

#### Windischbuch, Germany:

Production facility for fans and modular air handling units, specialized on engineered products (e.g. tunnel and jet fans). Distribution center.

#### Hässleholm, Sweden:

VEAB is the leading European manufacturer of electric duct heaters. Production of heating and cooling coils, electric and water based.

#### Ukmerge, Lithuania:

Production of smaller air handling units with energy recovery systems.

#### Maribor, Slovenia:

Specialized in centrifugal smoke extract fans, EN certified.





Quality: Systemair is certified in accordance with ISO 9001; ISO 14001 and ATEX. Our research and development laboratories are one of the most modern in Europe; measurements are made in accordance with international standards like AMCA and ISO.



Save energy, lower running cost! Our label "Green Ventilation" features products with a high energy saving potential. All products labelled with "Green Ventilation" combine energy economy with energy efficiency.



Hasselager, Denmark: Production of air handling units.

#### Bratislava, Slovakia:

The factory in Bratislava manufactures air distribution products and EN certified fire and smoke dampers.

#### Delhi / Hyderabad, India

The factories in India manufactures air handling units, air distribution products & fans.

#### Kuala Lumpur, Malaysia : Manufacturing of products for the Asian market.

Madrid, Spain: Production of air handling units.

Kansas City, USA: Production of fans for the US market.

#### Bouctouche, Canada:

Manufacturing of duct fans and heat exchangers used in residential ventilation for the North American market.

#### Dal, Eidsvoll, Norway:

Production of air handling units for the Norwegian market.

![](_page_4_Picture_18.jpeg)

![](_page_5_Picture_1.jpeg)

#### Offices

Office buildings generally require good ventilation during the day as well as heat and cooling recovery and reconditioning of supply air depending on external conditions. Ventilation systems with demand control should be considered for offices where staffing levels vary. As a rule, offices develop an excess of heat produced by people, lighting, solar radiation, computer equipment, etc. In many cases there is a need to cool the air and prevent uncomfortable high temperatures. In larger buildings that accumulate heat energy easily, you should consider employing night cooling. If the office is in a city environment, a higher filtration class should be used. In an office environment, there is also considerable need to reduce the noise generated by the ventilation system.

#### Schools and nurseries

A school environment means a lot of people present at certain times of the day, i.e. generally there are relatively large variations. This means that it should be possible to use demand control for the ventilation system. Normally, with heat and/or cool recovery is warranted. There will be short periods during the year when heating may be required. However if there is effective sunscreening, then air reconditioning is rarely required. High demand for low noise levels. At day nurseries, activities such as cooking that create odours are common, so there is often a need for supply air and extract air to be kept separate. There must be heat recovery in the form of a plate heat exchanger, for example.

![](_page_5_Picture_6.jpeg)

![](_page_5_Picture_7.jpeg)

#### Shops

As a rule, the number of people in a shop changes constantly throughout the day, making a control-on-demand ventilation system the sensible option. Recirculating air in combination with carbon dioxide control  $(CO_2)$  and heat recovery can be one optimised solution for these types of premises. When there are few people present,  $CO_2$ levels will be low and an increased amount of return air can be mixed into the system. As the number of people present increases, the amount of return air is reduced and replaced with fresh outdoor air. If heating is required at night-time, the premises are warmed up using 100% recirculating air.

![](_page_5_Picture_10.jpeg)

#### Industry

Industrial premises will often have high airflows if the work carried out there generates high levels of air pollution. If the pollutants are also aggressive, there may be requirements that affect the choice of material used. Systemair offers products for different environmental classes that can cope with tough environments. Filtration of processed air can be adapted to suit specific demands.

![](_page_6_Picture_3.jpeg)

#### Hotels

The requirements for conditioning in hotels are characterised by demands relating to fire protection, demand control and low noise levels. The choice of air handling unit will probably be affected by these demands. What is important here is good functions for speed control and quiet operation. In addition to quiet air handling units with demand control, Systemair can also supply fans and dampers for fire protection.

![](_page_6_Picture_6.jpeg)

#### Healthcare premises

Healthcare premises can encompass numerous activities, everything from operating theatres to wards. The activity determines the requirements. Operating theatres will have stringent demands for cleanliness and ventilation. Wards require low noise levels. If several areas are served by the same system, the unit must have demand control and possibly even subsystems. Systemair's range of air handling units can satisfy all requirements relating to healthcare premises, whether these have to do with air cleanliness, noise levels or demand control.

![](_page_6_Picture_9.jpeg)

![](_page_6_Picture_10.jpeg)

![](_page_7_Picture_1.jpeg)

#### **General Description**

In Variable Air Volume (VAV) systems, supply of cool air increases as the cooling load increases, and the air supply decreases as the load decreases.

VAV systems are the most modern, energy efficient all air systems available for comfort air conditioning. VAV systems require less fan capacity than a comparable constant volume system because with VAV only the required air is used. Typically a VAV system fan volume is 60% of a CAV system.

Control of air flow in a VAV system is accomplished through an electronic device, which regulate the amount of supply air to the space in response to a proportional room/space temperature controller.

#### Pressure Independent

Systemair VAV units are pressure independent The accurate volume control achieved by pressure independent VAV units results in substantial energy savings as well as increased comfort to the occupant. Conditioned air volume is precisely regulated according to demand. A maximum air volume setting avoids drafty air distribution; a minimum air volume setting avoids cold air dumping and stuffiness.

Minimum and Maximum air flow requirements are set to suit the space application. "Pressure independent units have controls consisting of an inlet duct sensor, damper, controller/actuator and room temperature controller". The VAV device controls the air supply volume through the inlet duct velocity pressure sensor to maintain air flow, as the air-conditioning load in the space changes the thermostat signal will reset the VAV controller to change the supply air volume to suit the space requirements. At any given setting, the controller will maintain the required air volume regardless of inlet static pressure changing. This mode of operation is called "Pressure Independent".

Variable Air Volume units allow the design to take full advantage of shifting loads from lights, occupancy, solar and equipment diversity, which typically leads up to a 40% saving in the total air volume required. Consequently, the central plant and ducting would cost less, thus compensating for the additional cost of VAV terminal units and fan speed controls.

Systemair offers complete range of VAV's factory tested and calibrated. The VAV range offered are as following:

- 1. Round single skin VAV units (Optima-R), used in installations for return or supply air in low pressure systems as single-zone control
- 2. Round double skin VAV units (Optima-R-I), used in installations for return or supply air in medium to high pressure systems as single-zone control
- 3. Round to rectangular single skin insulated VAV units (Optima-R-S), used in installations for return or supply air in medium to high pressure systems as multi-zone control

#### **Benefits**

The VAV system offers some advantage and benefits over conventional systems as given below

- Fan energy savings from longhour usage at reduced volumes, also installed fan horsepower reductions.
- Greater flexibility in respect to varying loads, which are easier zoned, resulting in occupancy controlled comfort and energy saving.
- Reduced installation and set-up cost.
- Reduced system energy consumption cost.
- Single unit for easy mounting.
- Integrated high efficiency sound attenuator.
- Suited for mounting of all controls according to customer specification.
- Accurate air volume control with centre averaging multi-point airflow differential cross velocity pressure sensor.

![](_page_7_Picture_25.jpeg)

# **RDA** Self regulating constant air volume

![](_page_8_Picture_2.jpeg)

#### Function

The air flow regulator RDA is an element placed inside the duct in order to obtain a constant flow within a pressure range from 50 to 200 Pascal. It is used in ventilation or air conditioning systems for supply or return air. The air is forced to pass through predetermined space in which a flap can change the position according to the specified air flow. The flap is attached on to a calibrated spring and therefore no auxiliary power is needed.

#### Design

RDA is made from plastic material (polystyrene) classified M1 in grey colour. Maximum temperature is 60°C.

#### Mounting

RDA is inserted directly into a horizontal or vertical circular duct. It is fixed and kept airtight by a lip seal. Arrow indicates the airflow. If the unit is placed in supply duct, the space between the diffuser and the unit must be at least 3x diameter of the duct. If used for return air the space must be 1x diameter of the duct.

#### Ordering Code

RDA-80/15 80 - size 15 - air volume

Flow regulators are characterized by their noise level in dB(A).

Airflow	Lw dB(A)			
(m³/h)	50 Pa	100 Pa	150 Pa	200 Pa
15	25	29	32	35
30	26	31	35	38
45	27	33	36	39
60	32	37	39	42
75	32	37	40	42
90	32	38	41	44
120	30	34	39	42
150	33	37	41	45
180	34	40	44	47
210	34	40	42	44
240	35	41	44	47
270	37	43	45	49
300	33	37	42	45

Tests reports : CETIAT 2315002 for air flow RD  $\emptyset$ 80 to RD  $\emptyset$ 125 mm

#### Dimensions

![](_page_8_Figure_15.jpeg)

Size	L (mm)	D1 (mm)	D2 (mm)
80	55	76	73
100	60	96	93
125	90	120	117
160	89	456	147

\*spacer = special body without spacers

 $1^*$  air flow = special shims with air flow ref.

#### Diagram

![](_page_8_Figure_20.jpeg)

![](_page_8_Picture_21.jpeg)

A flow regulator can provide several flow rates by simply changing the number of calibrated Shims positioned within the casing. The tables below show the relationship between the number of Shims, Spacers required to achieve the flow rates.

![](_page_9_Picture_2.jpeg)

Spacer

	15 m³/h	2 Shims
RD Ø80	30 m³/h	1 Shim
	45 m³/h	Without any Shim

	15 m³/h	2 Shims
RD Ø100 (1 Spacer)	30 m³/h	1 Shim
(T Spacer)	45 m³/h	Without any Shim

	60 m³/h	2 Shims
RD Ø100	75 m³/h	1 Shim
	90 m³/h	Without any Shim

![](_page_9_Picture_7.jpeg)

22 6125	15 m³/h	2 Shims
RD Ø 125	30 m³/h	1 Shim
(z spacers)	45 m³/h	Without any Shim

00 6125	60 m³/h	2 Shims
RD Ø125 (1 Spacer)	75 m³/h	1 Shim
(T Spacer)	90 m³/h	Without any Shim

	120 m³/h	2 Shims
RD Ø125	150 m³/h	1 Shim
	180 m³/h	Without any Shim

![](_page_9_Picture_11.jpeg)

	60 m³/h	2 Shims
RD Ø150/160	75 m³/h	1 Shim
(_ )pecces,	90 m³/h	Without any Shim

	120 m³/h	2 Shims
RD Ø150/160 (1 Spacer)	150 m³/h	1 Shim
	180 m³/h	Without any Shim

	210 m³/h	3 Shims
DD Ø150/160	240 m³/h	2 Shims
KU Ø 1507 160	270 m³/h	1 Shim
	300 m³/h	Without any Shim

![](_page_9_Picture_15.jpeg)

![](_page_10_Picture_1.jpeg)

	120 m³/h	2 Shims
RD Ø200	150 m³/h	1 Shim
	180 m³/h	Without any Shim

	210 m³/h	3 Shims
RD Ø200	240 m³/h	2 Shims
(1 Spacer)	270 m³/h	1 Shim
	300 m³/h	Without any Shim

	350 m³/h	1 Air Flow Dependant Shim
RD Ø200	400 m³/h	1 Air Flow Dependant Shim
	450 m³/h	1 Air Flow Dependant Shim
	500 m³/h	Without any Shim

![](_page_10_Picture_5.jpeg)

	120 m³/h	2 Shims	
KD Ø250 (3 Spacers)	150 m³/h	1 Shim	
(3 Spacers)	180 m³/h	Without any Shim	

RD Ø250 (2 Spacers)	210 m³/h	3 Shims	
	240 m³/h	2 Shims	
	270 m³/h	1 Shim	
	300 m³/h	Without any Shim	

RD Ø250 (1 Spacer)	350 m³/h	1 Air Flow Dependant Shim
	400 m³/h	1 Air Flow Dependant Shim
	450 m³/h	1 Air Flow Dependant Shim
	500 m³/h	Without any Shim

RD Ø250	550 m³/h	3 Shims	
	600 m³/h	2 Shims	
	650 m³/h	1 Shim	
	700 m³/h	Without any Shim	

![](_page_10_Picture_10.jpeg)

![](_page_11_Picture_1.jpeg)

# **RPK-R & RPK-R-I** Constant air flow regulator

#### Description

RPK-R is a round constant air flow regulator which is used for exact mechanical setting of required air volume in ventilation systems without need of any other energy. RPK-R is available in two versions:

RPK-R without outside insulation.

RPK-R-I with outside 50 mm thick heat and sound insulation.

#### RPK-R is characterized by:

- regulation accuracy
- easy mounting
- maintenance-free
- tight connection with the duct

#### Design

The RPK-R is manufactured from galvanized sheet metal only the blade is from aluminium. All steel parts are zinc plated, spring is made from high quality steel. Sliding bearing is suitable for high temperatures and doesn't require any lubrication. The cover of adjusting mechanism is made from ABS plastic and the plastic functional parts are from PA plastic. The outside insulation is made from 50 mm thick glass fiber material with outside steel casing.

#### Function

The RPK-R enables regulation of individually required amounts of air in separate ventilation system zones. RPK-R works in temperature from -20 to 80°C and relative humidity up to 80%. Recommended air flow velocity is from 3 to 8 meters per second at pressure difference to  $\Delta p$  500 Pa. Accuracy is ±5 %(±10% for outer settings).

#### Mounting

Regulator can be mounted to horizontal, diagonal or vertical duct. The blade must be always horizontal. It is necessary to pay attention to correct direction of mounting, so that the air is entering the regulator according to the arrow direction, which is located on regulator casing. Connecting the duct and the regulator is done according to its size with grub screws Ø3,2x13 to Ø3,9x16, or with rivets of the same diameters and the connection is sealed with sealing tape. After mounting, set the required air volume by turning the working screw on the controller box.

![](_page_11_Picture_18.jpeg)

![](_page_11_Figure_19.jpeg)

RPK-R main dimensions

![](_page_11_Figure_21.jpeg)

![](_page_11_Figure_22.jpeg)

![](_page_11_Figure_23.jpeg)

Size	v (m.s⁻¹)	q (m³.h <sup>-1</sup> )	øD (mm)	øD2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	m (kg)	m(i) (kg)
80	4,3-8,4	75-140	78	170	350	260	76	123	0,8	1,7
100	3,7-7,5	100-200	97	190	350	260	86	136	1	2,1
125	3,2-7,1	125-300	122	215	360	270	100	148	1,2	2,4
140	3,6-6,4	190-340	137	230	370	280	107	156	1,4	2,8
160	4,3-8,9	300-620	157	250	380	290	117	166	1,6	3,2
180	2,8-8,1	250-720	177	270	390	300	128	176	1,9	3,6
200	3,2-7,3	350-800	197	290	400	310	138	186	2,1	4
250	3,8-7,5	650-1300	247	340	425	335	164	208	3,3	5,8
315	3,1-6,0	850-1650	312	405	500	410	196	243	5	8,3

#### Technical part

Size	q (m³.h⁻¹)	q (I.s <sup>-1</sup> )	Accuracy (%)	Pmin (Pa)
	75	20,8	15	100
00	100	27,8	15	100
00	120	33,3	10	100
	140	38,9	10	100
	100	27,8	15	65
100	150	41,7	10	65
100	175	48,6	10	80
	200	55,6	10	100
	125	34,7	15	65
175	200	55,6	10	65
125	250	69,4	10	80
	300	83,3	10	100
	190	52,8	15	65
140	250	69,4	10	65
140	300	83,3	10	80
	340	94,4	10	100
	300	83,3	15	65
160	400	111,1	10	65
100	500	138,9	10	80
	620	172,2	10	100
	250	69,4	15	65
190	400	111,1	10	65
100	600	166,7	10	80
	720	200,0	10	100
	350	97,2	15	65
200	500	138,9	10	65
200	700	194,4	10	80
	800	222,2	10	90
	650	180,6	15	65
250	900	250,0	10	65
250	1100	305,6	10	80
	1300	361,1	10	90
	850	236,1	15	65
315	1200	333,3	10	65
	1500	416,7	10	80
	1650	458,3	10	90

![](_page_12_Figure_4.jpeg)

![](_page_12_Figure_5.jpeg)

Way of mounting RPK-R and RPK-R-I

![](_page_12_Picture_7.jpeg)

![](_page_13_Picture_1.jpeg)

# RPK-S and RPK-S-I

Constant air flow regulator

#### Description

RPK-S is a square constant air flow regulator which is used for exact mechanical setting of required air volume in ventilation systems without need of any other energy. RPK-S is available in two versions:

RPK-S without outside insulation.

RPK-S-I with outside 50 mm thick heat and sound insulation.

#### RPK-S is characterized by:

- regulation accuracy
- easy mounting
- maintenance-free

#### Design

The RPK-S is manufactured from galvanized sheet metal only the blade is from aluminium. All steel parts are zinc plated, spring is made from high quality steel. Sliding bearing is suitable for high temperatures and doesn't require any lubrication. The cover of adjusting mechanism is made from ABS plastic and the plastic functional parts are from PA plastic. The outside insulation is made from 50 mm thick glass fiber material with outside steel casing.

#### Function

The RPK-S enables regulation of individually required amounts of air in separate ventilation system zones. RPK-S works in temperature from -20 to 80°C and relative humidity up to 80%. Recommended air flow velocity is from 3 to 8 meters per second at pressure difference to  $\Delta p$  500 Pa. Accuracy is ±5 %(±10% for outer settings).

#### Mounting

Regulator can be mounted to horizontal, diagonal or vertical duct. The blade must be always horizontal. It is necessary to pay attention to correct direction of mounting, so that the air is entering the regulator according to the arrow direction, which is located on regulator casing. Connecting the duct and the regulator is with flanges. After mounting, set the required air volume by turning the working screw on the controller box.

![](_page_13_Figure_18.jpeg)

Nominal dimension a x b [mm]

Size	q (m³.h⁻¹)	a (mm)	b (mm)	m (kg)	m(i) (kg)
200x100	330-580	200	100	2,9	5,3
200x200	510-1200	200	200	3,7	6,6
300x100	470-850		100	3,7	6,6
300x150	600-1350	300	150	4,1	7,2
300x200	800-1670		200	4,6	8,0
400x200	1100-2400		200	5,4	9,3
400x250	1750-3400		250	6,1	10,1
400x300	1700-3600	400	300	6,5	10,8
400x400	2000-5400		400	9,0	13,7
500x200	1500-3200		200	6,2	10,5
500x250	2300-4500		250	6,7	11,0
500x300	2400-4300	500	300	7,0	11,7
500x400	2400-5500		400	10,1	15,1
500x500	3800-6500		500	13,0	18,6
600x200	1500-3500		200	7,0	12,3
600x250	2550-5100		250	7,4	12,8
600x300	2700-5000	(00	300	10,2	15,3
600x400	2900-5500	600	400	11,4	17,0
600x500	3000-9000		500	14,6	20,7
600x600	4250-8600		600	15,8	22,6

![](_page_13_Picture_21.jpeg)

![](_page_14_Figure_1.jpeg)

Way of mounting RPK-S

![](_page_14_Figure_3.jpeg)

Main dimension of RPK-S

![](_page_14_Figure_5.jpeg)

Main dimension of RPK-S-I

![](_page_14_Picture_7.jpeg)

![](_page_15_Picture_1.jpeg)

# Optima R

Single skin circular variable air volume unit

#### Highlights:

- Blade tightness class 4 according to EN 1751
- Casing tightness class C according to EN 1751
- ILH Hygienic certification VDI 6022 & VDI 3803
- Measuring accuracy of 5 %
- Air volume range of 36 to 13500 m3/h
- Operating pressure of up to 1000 Pa

#### Function

Systemair circular VAV terminal units are available in two versions:

Single skin Optima R. Single skin circular VAV terminal units are commonly used for return air applications or for supply applications at low system pressures.Terminal units are ideal for single zone control with supply and return in Master and Slave setup such as offices, hotel rooms or meeting rooms where the required cooling and heating load will vary on demand.

#### Design

VAV unit housing constructed of galvanized steel sheet, large surface pleated for extra stiffness. In Optima R-I the external acoustic insulation of fiber glass material is designed to absorb the radiated sound power level generated by the damper assembly. The insulation is once again is covered by a secondary galvanized sheet steel to protect the insulation and to add to the low frequency sound radiated in high pressure systems.

Special design of centre averaging multipoint airflow differential cross velocity pressure sensor assures an accurate air flow readings even in difficult installations. Button punch snap lock seams, lock form with airtight nylon bearings to assure low casing leakage.

#### **Available Sizes**

Inlet/outlet : from Ø100 to Ø630 mm

#### Controls

The VAV terminal units are as standard equipped with Belimo compact controller without any MP or other communication capability to be used as stand alone or in Master and Slave setting. The compact controllers which are supplied with MP-Bus communication capability,

![](_page_15_Figure_21.jpeg)

Size	ØD (mm)	L (mm)
100	97	400
125	122	
140	137	(00
160	157	600
180	177	
200	197	
225	222	
250	247	800
280	277	
315	312	
355	352	
400	397	1000
500	497	1000
630	627	

 $^{\ast}$  All dimensions given in mm in accordance to EN 1506 ØD are the Inlet-Outlet dimensions

can be connected later in time to building managment systems to create a zone controle by creating bus-rings solutions.

The compact controllers are equally available with MP-Bus, LON and ModBus communication capability on demand.

The compact controllers which are supplied only with MP-Bus communication can be connected later in time with other Bus- Interfaces. Compact controllers are factory calibrated prior to dispatch.

![](_page_15_Picture_27.jpeg)

## Optima-R-Single skin terminal units Discharge sound levels

				_	Lw	(dB) at	ΔP <sub>t</sub> =200	Pa	-	_	L <sub>p</sub> A			Ľ	(dB) at a	ΔP <sub>t</sub> =400	Pa			L <sub>p</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	40	45	45	45	43	41	37	31	38	45	49	49	49	47	45	41	35	42
125	72	26	48	52	52	52	50	48	44	38	45	52	57	56	56	55	52	49	43	49
12.5	109	58	52	57	56	56	55	52	49	43	49	56	61	61	60	59	57	53	47	54
	144	103	55	60	59	59	58	55	52	46	52	59	64	64	63	62	60	56	50	57
	60	6	42	47	47	46	45	42	39	33	40	47	51	51	51	49	47	43	37	44
160	119	22	49	54	52	53	52	49	46	40	47	54	58	58	58	56	54	50	44	51
100	179	50	53	58	57	57	56	53	50	44	51	58	62	62	62	60	58	54	48	55
	239	89	56	61	60	60	59	56	53	47	53	60	65	65	65	63	61	57	51	58
	94	5	43	48	48	47	46	44	40	34	41	48	53	53	52	51	48	45	39	46
200	189	19	50	55	54	54	52	50	47	41	47	55	59	59	59	57	55	51	45	52
200	283	43	54	58	58	58	56	54	50	44	51	58	63	63	63	61	59	55	49	56
	378	77	56	61	61	61	59	57	53	47	54	61	66	66	65	64	62	58	52	59
	146	4	44	48	48	48	46	44	40	34	41	49	54	53	53	52	49	46	40	46
250	292	15	50	55	54	54	53	50	47	41	48	55	60	60	59	58	56	52	46	53
250	437	34	54	58	58	58	56	54	50	44	51	59	64	63	63	61	59	56	50	56
	583	61	56	61	61	60	59	57	53	47	54	61	66	66	66	64	62	58	52	59
	233	3	44	49	48	48	47	44	41	35	42	49	54	54	54	52	50	46	40	47
215	467	12	50	55	54	54	53	50	47	41	48	55	60	60	60	58	56	52	46	53
515	700	27	53	58	58	58	56	54	50	44	51	59	64	63	63	62	59	56	50	57
	933	47	56	61	60	60	59	56	53	47	53	61	66	66	66	64	62	58	52	59

					Lw	(dB) at a	∆P <sub>t</sub> =600	Pa			L <sub>P</sub> A			L	(dB) at A	P <sub>t</sub> =800	Ра			L <sub>p</sub> A
ØD (mm)	l/s	∆P <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	47	52	52	51	50	48	44	38	45	49	54	53	53	52	49	46	40	47
125	72	26	54	59	59	59	57	55	51	45	52	56	61	61	60	59	57	53	47	54
125	109	58	59	63	63	63	61	59	55	49	56	60	65	65	65	63	61	57	51	58
	144	103	62	66	66	66	64	62	58	52	59	63	68	68	68	66	64	60	54	61
	60	6	49	54	54	54	52	50	46	40	47	51	56	56	55	54	52	48	42	49
160	119	22	56	61	61	60	59	57	53	47	54	58	63	63	62	61	59	55	49	56
100	179	50	60	65	65	64	63	61	57	51	58	62	67	67	66	65	63	59	53	60
	239	89	63	68	68	67	66	63	60	54	61	65	70	69	69	68	65	62	56	63
	94	5	51	56	55	55	54	51	48	42	48	53	58	57	57	56	53	50	44	51
200	189	19	57	62	62	62	60	58	54	48	55	60	64	64	64	62	60	56	50	57
200	283	43	61	66	66	66	64	62	58	52	59	63	68	68	68	66	64	60	54	61
	378	77	64	69	69	68	67	64	61	55	62	66	71	71	70	69	67	63	57	64
	146	4	52	57	56	56	55	52	49	43	49	54	59	58	58	57	54	51	45	52
250	292	15	58	63	63	62	61	59	55	49	56	60	65	65	64	63	61	57	51	58
250	437	34	62	67	66	66	65	62	59	53	59	64	69	68	68	67	64	61	55	62
	583	61	64	69	69	69	67	65	61	55	62	67	71	71	71	69	67	63	57	64
	233	3	53	57	57	57	55	53	49	43	50	55	60	59	59	58	55	52	46	53
215	467	12	59	63	63	63	61	59	55	49	56	61	66	65	65	64	61	58	52	59
515	700	27	62	67	67	67	65	63	59	53	60	64	69	69	69	67	65	61	55	62
	933	47	65	69	69	69	67	65	61	55	62	67	72	71	71	70	67	64	58	65

All above acoustic data's are without silencer and any room absorption Acoustic data presented in accordance to EN ISO 5135 and EN ISO 3741  $\,$ 

![](_page_16_Picture_5.jpeg)

## Optima-R-Single skin terminal units Radiated sound levels

					Ľ	(dB) at a	ΔP <sub>t</sub> =200	Ра			L <sub>P</sub> A			Ľ	(dB) at	ΔP <sub>t</sub> =400	Pa		-	L <sub>P</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	28	32	31	29	28	25	24	<15	23	35	38	37	35	34	32	30	23	29
125	72	26	32	36	35	33	32	29	28	21	27	38	42	41	39	38	35	34	27	33
125	109	58	35	38	37	35	34	32	30	23	29	41	44	43	41	41	38	36	29	36
	144	103	36	40	39	37	36	33	32	25	31	42	46	45	43	42	39	38	31	37
	60	6	27	31	30	28	27	24	23	<15	22	34	37	36	34	34	31	29	22	28
160	119	22	32	35	34	32	32	29	27	20	27	38	42	40	39	38	35	33	26	33
100	179	50	35	38	37	35	34	32	30	23	29	41	44	43	41	41	38	36	29	35
	239	89	36	40	39	37	36	33	32	25	31	43	46	45	43	43	40	38	31	37
	94	5	27	31	30	28	27	24	23	<15	22	34	37	36	34	33	31	29	22	28
200	189	19	32	36	35	33	32	29	28	21	27	38	42	41	39	38	35	34	27	33
200	283	43	35	39	37	36	35	32	30	23	30	41	45	44	42	41	38	37	30	36
	378	77	37	41	39	38	37	34	32	25	32	43	47	46	44	43	40	39	32	38
	146	4	28	31	30	28	27	25	23	<15	22	34	37	36	34	34	31	29	22	29
250	292	15	33	37	35	33	33	30	28	21	28	39	43	41	40	39	36	34	27	34
250	437	34	36	40	38	37	36	33	31	24	31	42	46	45	43	42	39	38	31	37
	583	61	38	42	41	39	38	35	34	27	33	45	48	47	45	44	42	40	33	39
	233	3	29	32	31	29	28	26	24	<15	23	35	38	37	35	35	32	30	23	30
315	467	12	34	38	37	35	34	31	30	23	29	41	44	43	41	41	38	36	29	35
515	700	27	38	41	40	38	38	35	33	26	32	44	48	46	45	44	41	39	32	39
	933	47	40	44	42	41	40	37	35	28	35	46	50	49	47	46	43	42	35	41

					Lw	(dB) at a	∆P <sub>t</sub> =600	Ра			L <sub>P</sub> A			Lw	(dB) at A	∆P <sub>t</sub> =800	Pa			L <sub>P</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	38	42	40	39	38	35	33	26	33	41	44	43	41	41	38	36	29	35
125	72	26	42	46	44	43	42	39	37	30	37	45	48	47	45	45	42	40	33	39
125	109	58	44	48	47	45	44	41	40	33	39	47	51	49	48	47	44	42	35	42
	144	103	46	50	48	47	46	43	41	34	41	49	52	51	49	49	46	44	37	43
	60	6	37	41	40	38	37	34	33	26	32	40	44	42	40	40	37	35	28	35
160	119	22	42	45	44	42	42	39	37	30	37	44	48	47	45	44	41	40	33	39
160	179	50	44	48	47	45	44	41	40	33	39	47	51	49	48	47	44	42	35	42
	239	89	46	50	49	47	46	43	42	35	41	49	52	51	49	49	46	44	37	44
	94	5	37	41	40	38	37	34	33	26	32	40	43	42	40	40	37	35	28	35
200	189	19	42	46	44	43	42	39	37	30	37	45	48	47	45	45	42	40	33	39
200	283	43	45	49	47	45	45	42	40	33	40	48	51	50	48	47	45	43	36	42
	378	77	47	51	49	48	47	44	42	35	42	50	53	52	50	50	47	45	38	44
	146	4	37	41	40	38	37	34	33	26	32	40	44	42	41	40	37	35	28	35
250	292	15	43	46	45	43	43	40	38	31	38	45	49	48	46	45	42	41	34	40
250	437	34	46	50	48	46	46	43	41	34	41	49	52	51	49	48	46	44	37	43
	583	61	48	52	50	49	48	45	43	36	43	51	54	53	51	51	48	46	39	45
	233	3	39	42	41	39	38	36	34	27	33	41	45	43	42	41	38	36	29	36
215	467	12	44	48	47	45	44	41	40	33	39	47	51	49	47	47	44	42	35	42
515	700	27	48	51	50	48	48	45	43	36	42	50	54	53	51	50	47	46	39	45
	933	47	50	54	52	51	50	47	45	38	45	53	56	55	53	53	50	48	41	47

All above acoustic data's are without silencer and any room absorption Acoustic data presented in accordance to EN ISO 5135 and EN ISO 3741

![](_page_17_Picture_5.jpeg)

# **Optima-RI** Double skin circular variable air volume unit

![](_page_18_Picture_2.jpeg)

#### Highlights:

- Blade tightness class 4 according to EN 1751
- Casing tightness class C according to EN 1751
- ILH Hygienic certification VDI 6022 & VDI 3803
- Measuring accuracy of 5 %
- Air volume range of 36 to 13500 m3/h
- Operating pressure of up to 1000 Pa

#### Function

Systemair circular VAV terminal units are available in two versions:

Double skin Optima R-I Double skin circular VAV terminal units are commonly used for supply or for return air applications at medium to high system pressures. Terminal units are ideal for single zone control with supply and return in Master and Slave setup such as offices, hotel rooms or meeting rooms where the required cooling and heating load will vary on demand.

#### Design

VAV unit housing constructed of galvanized steel sheet, large surface pleated for extra stiffness. In Optima R-I the external acoustic insulation of fiber glass material is designed to absorb the radiated sound power level generated by the damper assembly. The insulation is once again is covered by a secondary galvanized sheet steel to protect the insulation and to add to the low frequency sound radiated in high pressure systems.

Special design of centre averaging multipoint airflow differential cross velocity pressure sensor assures an accurate air flow readings even in difficult installations. Button punch snap lock seams, lock form with airtight nylon bearings to assure low casing leakage.

#### **Available Sizes**

Inlet/outlet : from Ø100 to Ø630 mm

#### Controls

The VAV terminal units are as standard equipped with Belimo compact controller without any MP or other communication capability to be used as stand alone or in Master and Slave setting. The compact controllers which are supplied with MP-Bus communication capability, can be connected later in time to building managment systems to create a zone controle by creating bus-rings solutions.

The compact controllers are equally available with MP-Bus, LON and ModBus communication capability on demand.

The compact controllers which are supplied only with MP-Bus communication can be connected later in time with other Bus- Interfaces. Compact controllers are factory calibrated prior to dispatch.

![](_page_18_Figure_23.jpeg)

Size	ØD (mm)	L (mm)
100	97	400
125	122	
140	137	(00
160	157	600
180	177	
200	197	
225	222	
250	247	800
280	277	
315	312	
355	352	
400	397	1000
500	497	1000
630	627	

\* All dimensions given in mm in accordance to EN 1506 ØD are the Inlet-Outlet dimensions

![](_page_18_Picture_26.jpeg)

## Optima-RI-Double skin terminal units Discharge sound levels

					Lw	(dB) at	ΔP <sub>t</sub> =200	Ра			L <sub>P</sub> A			Ľ	(dB) at a	ΔΡ <sub>t</sub> =400	Ра			L <sub>P</sub> A
ØD (mm)	l/s	∆P,min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	37	42	42	40	36	34	34	28	33	44	49	49	47	42	41	40	34	39
125	72	26	43	48	48	46	42	40	40	34	39	50	55	55	53	48	47	46	40	45
125	109	58	47	52	52	50	45	44	43	37	42	53	59	58	56	52	51	50	44	49
	144	103	49	54	54	52	48	46	46	40	45	56	61	61	59	54	53	52	46	51
	60	6	40	46	45	43	39	38	37	31	36	47	52	52	50	45	44	43	37	42
160	119	22	46	51	51	49	45	43	43	36	42	53	58	58	56	51	50	49	43	48
100	179	50	49	55	54	53	48	47	46	40	45	56	61	61	59	55	53	53	46	52
	239	89	52	57	57	55	50	49	48	42	47	58	64	63	62	57	56	55	49	54
	94	5	43	48	48	46	41	40	39	33	38	49	55	54	53	48	47	46	40	45
200	189	19	48	53	53	51	47	45	45	39	44	55	60	60	58	53	52	51	45	50
200	283	43	51	57	56	55	50	49	48	42	47	58	63	63	61	57	55	55	48	54
	378	77	54	59	59	57	52	51	50	44	49	60	66	65	63	59	58	57	51	56
	146	4	45	50	50	48	43	42	41	35	40	51	57	56	54	50	49	48	42	47
250	292	15	50	55	55	53	48	47	46	40	45	56	62	61	60	55	54	53	47	52
250	437	34	53	58	58	56	51	50	49	43	48	59	65	64	63	58	57	56	50	55
	583	61	55	60	60	58	53	52	51	45	50	62	67	67	65	60	59	58	52	57
	233	3	46	52	51	50	45	44	43	37	42	53	58	58	56	52	50	50	44	49
315	467	12	51	56	56	54	50	48	48	42	47	58	63	63	61	56	55	54	48	53
610	700	27	54	59	59	57	53	51	51	44	50	61	66	66	64	59	58	57	51	56
	933	47	56	61	61	59	55	53	53	56	52	63	68	68	66	61	60	59	53	58

					Lw	(dB) at a	ΔP <sub>t</sub> =600	Ра			L <sub>P</sub> A			Ľ	(dB) at a	∆P <sub>t</sub> =800	Ра			L <sub>p</sub> A
ØD (mm)	l/s	∆P,min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	48	53	53	51	46	45	44	38	43	50	55	55	53	49	47	47	41	46
125	72	26	54	59	59	57	52	51	50	34	49	56	62	61	59	55	54	53	47	52
125	109	58	57	62	62	60	56	54	54	48	53	60	65	65	63	58	57	56	50	55
	144	103	60	65	65	63	58	57	56	50	55	62	68	67	66	61	60	59	53	58
	60	6	51	56	56	54	49	48	47	41	48	54	59	59	57	52	51	50	44	49
160	119	22	57	62	62	60	55	54	53	47	52	59	64	64	62	58	56	56	50	55
100	179	50	60	65	65	63	58	57	56	50	55	63	68	68	66	61	60	59	53	58
	239	89	62	67	67	65	61	59	59	53	58	65	70	70	68	64	62	62	55	61
	94	5	53	59	58	56	52	51	50	44	49	56	61	61	59	55	53	53	46	52
200	189	19	59	64	64	62	57	56	55	49	54	61	67	66	65	60	59	58	52	57
200	283	43	62	67	67	65	60	59	58	52	57	65	70	70	68	63	62	61	55	60
	378	77	64	69	69	67	63	61	61	55	60	67	72	72	70	65	64	63	57	62
	146	4	55	60	60	58	54	52	52	46	51	58	63	63	61	57	55	55	48	54
250	292	15	60	66	65	63	59	58	57	51	56	63	68	68	66	62	60	60	54	59
250	437	34	63	69	68	66	62	61	60	54	59	66	71	71	69	65	63	63	57	62
	583	61	65	71	70	69	64	63	52	56	61	68	73	73	71	67	65	65	59	64
	233	3	57	62	62	60	56	54	54	47	53	60	65	65	63	58	57	56	50	55
215	467	12	62	67	67	65	60	59	58	52	57	65	70	70	68	63	62	61	55	60
515	700	27	65	70	70	68	63	62	61	55	60	67	73	72	70	66	65	64	58	63
	933	47	67	72	72	70	65	64	63	57	62	69	75	74	72	68	67	66	60	65

All above acoustic data's are without silencer and any room absorption Acoustic data presented in accordance to EN ISO 5135 and EN ISO 3741  $\,$ 

![](_page_19_Picture_5.jpeg)

### Optima-RI-Double skin terminal units Radiated sound levels

				-	L,	(dB) at a	ΔP <sub>t</sub> =200	Pa	_	-	L <sub>P</sub> A		_	L	(dB) at	ΔP <sub>t</sub> =400	Pa			L <sub>P</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	23	26	27	26	20	<15	<15	<15	<15	30	33	34	32	26	23	21	<15	23
125	72	26	27	30	31	29	24	21	<15	<15	21	34	37	38	36	30	27	25	<15	27
125	109	58	30	33	34	32	26	23	21	<15	23	36	39	40	38	33	30	28	<15	29
	144	103	31	34	35	33	28	25	23	<15	25	38	41	42	40	34	31	29	<15	31
	60	6	24	27	28	26	21	<15	<15	<15	<15	30	33	34	33	27	24	22	<15	24
160	119	22	29	32	33	31	25	22	20	<15	22	35	38	39	37	31	28	26	<15	28
100	179	50	31	34	35	33	28	25	23	<15	25	37	41	42	40	34	31	29	<15	31
	239	89	33	36	37	35	30	27	25	<15	26	39	42	43	41	36	33	31	20	33
	94	5	25	28	29	28	22	<15	<15	<15	<15	32	35	36	34	28	25	23	<15	25
200	189	19	30	33	34	32	27	24	22	<15	24	37	40	41	39	33	30	28	<15	30
200	283	43	33	36	37	35	30	27	25	<15	27	39	43	44	42	36	33	31	20	33
	378	77	35	38	39	37	32	29	27	<15	29	41	45	46	44	38	35	33	22	35
	146	4	27	30	31	29	24	21	<15	<15	20	33	36	37	36	30	27	25	<15	27
250	292	15	32	36	37	35	29	26	24	<15	26	39	42	43	41	35	32	30	20	32
250	437	34	36	39	40	38	32	29	27	<15	29	42	45	46	44	39	36	34	23	35
	583	61	38	41	42	40	34	31	29	<15	31	44	47	48	46	41	38	36	25	37
	233	3	30	33	34	32	26	23	21	<15	23	36	39	40	38	33	30	28	<15	29
215	467	12	35	38	39	38	32	29	27	<15	29	42	45	46	44	38	35	33	23	35
313	700	27	39	42	43	41	35	32	30	20	32	45	48	49	47	42	39	37	26	38
	933	47	41	44	45	43	38	35	33	22	35	47	51	52	50	44	41	39	28	41

					Lw	(dB) at a	∆P <sub>t</sub> =600	Ра			L <sub>p</sub> A			Ľ	(dB) at a	∆P <sub>t</sub> =800	Pa			L <sub>P</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	36	6	33	36	37	35	30	27	25	<15	27	36	39	40	38	33	30	28	<15	29
125	72	26	37	40	41	39	34	31	29	<15	31	40	43	44	42	37	34	32	21	33
125	109	58	40	43	44	42	36	33	31	21	33	42	45	46	44	39	36	34	23	36
	144	103	41	44	45	43	38	35	33	22	35	44	47	48	46	40	37	35	25	37
	60	6	34	37	38	36	31	28	26	<15	27	37	40	41	39	33	30	28	<15	30
160	119	22	38	42	43	41	35	32	30	<15	32	41	44	45	43	38	35	33	22	34
100	179	50	41	44	45	43	38	35	33	22	34	44	47	48	46	40	37	35	25	37
	239	89	43	48	47	45	40	37	35	24	36	46	49	50	48	42	39	37	27	39
	94	5	35	38	39	37	32	29	27	<15	29	38	41	42	40	35	32	30	<15	31
200	189	19	40	43	44	42	37	34	32	21	34	43	46	47	45	40	37	35	24	36
200	283	43	43	46	47	45	40	37	35	24	36	46	49	50	48	42	39	37	27	39
	378	77	45	48	49	47	42	39	37	26	39	48	51	52	50	44	41	39	29	41
	146	4	37	40	41	39	34	31	29	<15	30	40	43	44	42	36	33	31	21	33
250	292	15	42	45	46	45	39	36	34	23	36	45	48	49	47	42	39	37	26	38
250	437	34	45	49	50	48	42	39	37	26	39	48	51	52	50	45	42	40	29	41
	583	61	48	51	52	50	44	41	39	29	41	50	53	54	52	47	44	42	31	44
	233	3	40	43	44	42	36	33	31	21	33	42	45	46	44	39	36	34	23	36
215	467	12	45	48	49	48	42	39	37	26	39	48	51	52	50	45	42	40	29	41
315	700	27	49	52	53	51	45	42	40	30	42	51	54	55	53	48	45	43	32	45
	933	47	51	54	55	53	48	45	43	32	44	54	57	58	56	50	47	45	35	47

All above acoustic data's are without silencer and any room absorption Acoustic data presented in accordance to EN ISO 5135 and EN ISO 3741  $\,$ 

![](_page_20_Picture_5.jpeg)

![](_page_21_Picture_1.jpeg)

## **Optima RS** Single skin variable air volume unit Round inlet and rectanglar oulet

#### Highlights:

- Blade tightness class 4 according to EN 1751
- Casing tightness class C according to EN 1751
- Measuring accuracy of 5 %
- Air volume range of 54 to 5400 m3/h
- Operating pressure of up to 1000 Pa
- 30 mm high density insulation with cleanable protection tissue cover

#### Function

Single skin round to square VAV terminal units is commonly used for supply air applications or for return air applications at low to medium system pressures. Optima-RS VAV terminal units are ideal for multizone control with supply and return in master and slave setup such as offices, hotel rooms or meeting rooms where the required cooling and heating load will vary on demand.

#### Design

VAV unit housing constructed of galvanized steel sheet, large surface pleated for extra stiffness. Internal thermal acoustic insulation of fibre glass material, dual density insulation cover tissue is used to protect the fiberglass insulation to protect the deterioration of the insulation for air speeds of 20-25m/s.

Acoustic insulation in the housing has aerodynamic flow for extra low sound level. Double skin low leakage elliptical damper with airtight neoprene gasket seal. Special design of centre averaging multi-point airflow differential cross velocity pressure sensor assures an accurate air flow readings even in difficult installations. Button punch snap lock seams, lock form with airtight nylon bearings to assure low casing leakage. Rectangular outlet with M8 riveted nuts, suited for connecting to duct flange. 12 mm aluminium shaft with nylon bearings

#### **Available Sizes**

Inlet/outlet : from Ø125 to Ø400 mm

#### Controls:

The VAV terminal units are as standard equipped with Belimo compact controller without any MP or other communication capability to be used as stand alone or in Master

![](_page_21_Picture_19.jpeg)

The compact controllers are equally available with MP-Bus, LON and ModBus communication capability on demand. The compact controllers which are supplied only with MP-Bus communication can be connected later in time with or per-zones with other Bus-Interfaces. Compact controllers are factory calibrated prior to dispatch.

![](_page_21_Figure_21.jpeg)

#### **Dimensions and Airflow**

Size	ØD (mm)	L (mm)	L0 (mm)	L1 (mm)	W (mm)	H (mm)	W1 (mm)	H1 (mm)
125	122	450	150	300	200	200	260	260
140	137	450	150	300	200	200	260	260
160	157	600	200	400	250	200	310	260
180	177	600	200	400	250	200	310	260
200	197	700	200	500	400	200	460	260
250	247	750	250	500	500	250	560	310
315	312	950	250	700	600	350	660	410
400	397	950	250	700	700	400	760	460

 $^{\star}$  All dimensions given in mm in accordance to EN 1505 ØD are the Inlet dimensions

![](_page_21_Picture_25.jpeg)

## Optima-RS Discharge sound levels

					Lw	(dB) at a	ΔP <sub>t</sub> =200	Ра			L <sub>p</sub> A			Lw	(dB) at A	∆P <sub>t</sub> =400	Ра			L <sub>P</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	35	0	29	31	32	29	29	27	21	<15	23	35	36	37	35	34	32	26	<15	29
175	69	1	37	38	39	37	36	34	28	21	31	42	43	45	42	42	39	33	27	36
125	104	2	41	42	43	41	40	38	32	25	35	46	48	49	46	46	44	37	31	40
	139	4	44	45	46	44	43	41	35	28	38	49	51	52	49	49	47	40	34	43
	56	1	34	35	36	34	33	31	25	<15	28	40	41	42	40	39	37	31	24	34
160	111	2	41	42	43	41	40	38	32	25	35	47	48	49	47	46	44	38	31	41
100	167	5	45	46	47	45	44	42	36	29	39	51	52	53	51	50	48	42	35	45
	222	9	48	49	50	48	47	45	39	32	42	53	55	56	53	53	51	45	38	47
	90	1	38	40	41	38	38	36	29	23	32	44	46	47	44	44	42	35	29	38
200	181	3	45	46	47	45	44	42	36	29	39	51	52	53	51	50	48	42	35	45
200	271	8	48	50	51	48	48	46	40	33	42	54	56	57	54	54	52	46	39	48
	361	13	51	52	54	51	51	48	42	36	45	57	58	60	57	57	54	48	42	51
	139	1	42	43	44	42	41	39	33	26	36	48	49	50	48	47	45	39	32	42
250	278	4	48	49	50	48	47	45	39	32	42	54	55	56	54	53	51	45	38	48
230	417	10	51	52	54	51	51	48	42	36	45	57	59	60	57	57	55	48	42	51
	555	17	54	55	56	54	53	51	45	38	48	60	61	62	60	59	57	51	44	54
	222	1	45	46	47	45	44	42	36	29	39	51	52	53	51	50	48	42	35	45
315	445	5	50	52	53	50	50	48	41	35	44	57	58	59	57	56	54	48	41	51
CI C	667	12	54	55	56	54	53	51	45	38	48	60	61	62	60	59	57	51	44	54
	889	22	56	57	58	56	55	53	47	40	50	62	64	65	62	62	60	53	47	56
	347	2	47	48	49	47	46	44	38	31	41	54	55	56	54	53	51	45	38	48
400	694	6	52	53	55	52	52	49	43	37	46	59	60	61	59	58	56	50	43	53
400	1042	14	55	57	58	55	55	53	46	40	49	62	63	64	62	61	59	53	46	56
	1389	25	57	59	60	57	57	55	49	42	51	64	65	66	64	63	61	55	48	58

					L <sub>w</sub>	(dB) at <i>L</i>	P <sub>t</sub> =600	Ра			L <sub>p</sub> A			Lw	(dB) at <i>L</i>	∆P <sub>t</sub> =800	Ра			L <sub>p</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	35	0	38	40	41	38	38	36	29	23	32	41	42	43	41	40	38	32	25	35
125	69	1	45	47	48	45	45	43	37	30	39	48	49	50	48	47	45	39	32	42
125	104	2	50	51	52	50	49	47	41	34	44	52	53	54	52	51	49	43	36	46
	139	4	53	54	55	53	52	50	44	37	47	55	56	57	55	54	52	46	39	49
	56	1	43	45	46	43	43	41	34	28	37	46	47	48	46	45	43	37	30	40
160	111	2	50	51	52	50	49	47	41	34	44	52	54	55	52	52	50	43	37	46
100	167	5	54	55	56	54	53	51	45	38	48	56	58	59	56	56	54	47	41	50
	222	9	57	58	59	57	56	54	48	41	51	59	60	62	59	59	56	50	44	53
	90	1	48	49	50	48	47	45	39	32	42	50	52	53	50	50	48	41	35	44
200	181	3	54	56	57	54	54	52	45	39	48	57	58	59	57	56	54	48	41	51
200	271	8	58	59	60	58	57	55	49	42	52	60	62	63	60	60	58	52	45	54
	361	13	61	62	63	61	60	58	52	45	55	63	64	65	63	62	60	54	47	57
	139	1	61	53	54	51	51	49	42	36	45	54	55	56	54	53	51	45	38	48
250	278	4	57	59	60	57	57	55	49	42	51	60	61	62	60	59	57	51	44	54
250	417	10	61	62	63	61	60	58	52	45	55	64	65	66	64	63	61	55	48	58
	555	17	63	65	66	63	63	61	55	48	57	66	67	68	66	65	63	57	50	60
	222	1	55	56	57	55	54	52	46	39	49	57	59	60	57	57	55	49	42	51
315	445	5	60	62	63	60	60	58	52	45	54	63	64	666	63	63	60	54	48	57
515	667	12	64	65	66	64	63	61	55	48	58	66	68	69	66	66	64	58	51	60
	889	22	66	67	68	66	65	63	57	50	60	69	70	71	69	68	66	60	53	63
	347	2	957	59	60	57	57	55	49	42	51	60	62	63	60	60	58	51	45	54
400	694	6	63	64	65	63	62	60	54	47	57	65	67	68	65	65	63	57	50	59
-00	1042	14	66	67	68	66	65	63	57	50	60	69	70	71	69	68	66	60	53	63
	1389	25	68	69	70	68	67	65	59	52	62	71	72	73	71	70	68	62	55	65

All above acoustic data's are without silencer and any room absorption Acoustic data presented in accordance to EN ISO 5135 and EN ISO 3741  $\,$ 

![](_page_22_Picture_5.jpeg)

## Optima-RS Radiated sound levels

				_	Lw	(dB) at <i>L</i>	∆P <sub>t</sub> =200	Ра			L <sub>p</sub> A			Lw	(dB) at <i>L</i>	∆P <sub>t</sub> =400	Ра			L <sub>p</sub> A
ØD (mm)	l/s	ΔP <sub>t</sub> min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	35	0	36	37	33	24	<15	<15	<15	<15	<15	39	40	36	27	<15	<15	<15	<15	21
105	69	1	43	45	40	32	24	<15	<15	<15	25	47	48	44	35	28	22	<15	<15	29
125	104	2	48	49	45	36	29	23	<15	<15	30	51	51	48	40	32	26	20	<15	33
	139	4	51	52	48	39	32	26	20	<15	33	55	56	52	43	35	29	23	<15	36
	56	1	37	38	34	25	<15	<15	<15	<15	36	40	41	37	28	21	<15	<15	<15	22
140	111	2	45	46	42	33	25	<15	<15	<15	26	48	49	45	36	29	23	<15	<15	30
160	167	5	49	50	46	37	30	24	<15	<15	31	53	54	50	41	33	27	21	<15	34
	222	9	52	54	49	41	33	27	21	<15	34	56	57	53	44	37	31	25	<15	38
	90	1	38	40	35	27	<15	<15	<15	<15	20	42	43	39	30	23	<15	<15	<15	24
200	181	3	46	48	43	35	27	21	<15	<15	28	50	51	47	38	31	25	<15	<15	32
200	271	8	51	52	48	39	32	26	<15	<15	33	54	56	51	43	35	29	23	<15	36
	361	13	54	56	51	42	35	29	23	<15	36	58	59	55	46	39	33	27	<15	40
	139	1	40	41	37	28	20	<15	<15	<15	21	43	44	40	31	24	<15	<15	<15	25
250	278	4	48	49	45	36	28	22	<15	<15	29	51	52	48	39	32	26	20	<15	33
200	417	10	52	54	49	40	33	27	21	<15	34	56	57	53	44	37	31	25	<15	38
	555	17	56	57	53	44	36	30	24	<15	37	59	60	56	47	40	34	28	20	41
	222	1	41	43	38	29	22	<15	<15	<15	23	45	46	42	33	26	<15	<15	<15	27
315	445	5	49	51	46	37	30	24	<15	<15	31	53	54	50	41	34	28	22	<15	35
515	667	12	54	55	51	42	35	29	23	<15	36	58	59	55	46	39	33	27	<15	40
	889	22	57	59	54	46	38	32	26	<15	39	61	62	58	49	42	36	30	22	43
	347	2	43	44	40	31	23	<15	<15	<15	24	46	48	43	34	27	21	<15	<15	28
400	694	6	51	52	48	39	32	26	<15	<15	33	54	56	51	43	35	29	23	<15	36
400	1042	14	56	57	53	44	36	30	24	<15	37	59	61	56	47	40	34	28	21	41
	1389	25	59	60	56	47	40	34	28	20	41	63	64	60	51	44	38	32	24	45

					Lw	(dB) at <i>L</i>	P <sub>t</sub> =600	Pa		_	L <sub>p</sub> A			L,	(dB) at <i>L</i>	P <sub>t</sub> =800	Pa			L <sub>p</sub> A
ØD (mm)	l/s	∆P,min (Pa)	63	125	250	500	1000	2000	4000	8000	dB(A)	63	125	250	500	1000	2000	4000	8000	dB(A)
	35	0	41	42	38	29	22	<15	<15	<15	23	42	44	39	31	23	<15	<15	<15	24
175	69	1	49	50	46	37	30	24	<15	<15	31	50	51	47	38	31	25	<15	<15	32
120	104	2	53	55	50	41	34	28	22	<15	35	55	56	52	43	36	30	24	<15	37
	139	4	56	58	53	45	37	31	25	<15	38	58	59	55	46	39	33	27	<15	40
160	56	1	42	43	39	30	23	<15	<15	<15	24	44	45	41	32	24	<15	<15	<15	25
	111	2	50	51	47	38	31	25	<15	<15	32	51	53	48	40	32	26	20	<15	33
100	167	5	55	56	52	43	35	29	23	<15	36	56	57	53	44	37	31	25	<15	38
	222	9	58	59	55	46	39	33	27	<15	40	59	60	56	47	40	34	28	20	41
	90	1	44	45	41	32	25	<15	<15	<15	26	45	47	42	34	26	20	<15	<15	27
200	181	3	52	53	49	40	33	27	21	<15	34	53	55	50	41	34	28	22	<15	35
	271	8	56	58	53	45	37	31	25	<15	38	58	59	55	46	39	33	27	<15	40
	361	13	60	61	57	48	41	35	29	21	42	61	63	58	49	42	36	30	23	43
	139	1	45	47	42	33	26	20	<15	<15	27	47	48	44	35	28	22	<15	<15	29
250	278	4	53	55	50	41	34	28	22	<15	35	55	56	52	43	36	30	24	<15	37
250	417	10	58	59	55	46	39	33	27	<15	40	59	61	56	48	40	34	28	21	41
	555	17	61	63	58	49	42	36	30	23	43	63	64	60	51	44	38	32	24	45
	222	1	47	48	44	35	28	22	<15	<15	29	48	50	45	37	29	23	<15	<15	30
215	445	5	55	56	52	43	36	30	24	<15	37	57	58	54	45	37	31	25	<15	38
212	667	12	60	61	57	48	41	35	29	21	42	61	63	58	50	42	36	30	23	43
	889	22	63	64	60	51	44	38	32	24	45	65	66	62	53	46	40	34	26	47
	347	2	48	50	45	37	29	23	<15	<15	30	50	51	47	38	31	25	<15	<15	32
400	694	6	57	58	54	45	38	32	26	<15	39	58	59	55	46	39	33	27	<15	40
400	1042	14	61	63	58	50	42	36	30	23	43	63	64	60	51	44	38	32	24	45
	1389	25	65	66	62	53	46	40	34	26	47	66	68	63	55	47	41	35	28	48

All above acoustic data's are without silencer and any room absorption Acoustic data presented in accordance to EN ISO 5135 and EN ISO 3741  $\,$ 

![](_page_23_Picture_5.jpeg)

# Accessories

# **LDC** Circular Attenuator

![](_page_24_Picture_3.jpeg)

Circular silencer LDC designed to fit directly to Optima-R and Optima-RI VAV terminal units. The inlet and outlet connection complies with the spiral duct standard. The LDC effectively reduces noise levels on the discharge of the VAV unit or in the duct work. Two silencers can be used in series together in installations where noise reduction is a particularly strong requirement, this can be very effective. For the most effective noise reduction, the silencer should be fitted immediately downstream of the VAV terminal unit and before the accessories such as Optima-R-MO (Round Multi-outlet units) or after the Accessories such as VBC (Water Batteries). The silencer is delivered in various fixed lengths and is insulation thickness 100 mm. All LDC silencers are fitted with tightness rubber gasket to assure leak less connection. MK can be used to facilitate the connection and mounting of the system.

![](_page_24_Figure_5.jpeg)

Size	Ø D (mm)	L <sub>nom</sub> (mm)	Ø D <sub>1</sub> (mm)	L (mm)	m (kg)
100-300	97	300	200	360	2,28
100-600	97	600	200	660	4,09
100-900	97	900	200	960	5,18
100-1200	97	1200	200	1260	6,46
125-600	122	600	224	665	4,39
125-900	122	900	224	965	6,2
125-1200	122	1200	224	1265	7,47
150-600	147	600	250	600	5,37
160-600	157	600	260	670	5,37
160-900	157	900	260	970	7,48
200-600	197	600	300	685	6,9
200-900	197	900	300	985	9,74
250-600	247	600	355	600	8,55
250-900	247	900	355	900	11,7
315-600	312	600	415	600	11,8
315-900	312	900	415	900	16,3
355-900	352	900	560	900	25,2
400-900	397	900	600	900	24,3

![](_page_24_Picture_7.jpeg)

![](_page_25_Picture_1.jpeg)

**Optima-SA** Rectangular Sound Attenuator

Rectangular silencer Optima-SA designed to fit directly to Optima-RS VAV terminal units. The inlet and outlet connection is designed to effectively and easily be mounted to the Optima-RS units.

The Optima-SA effectively reduces noise levels on the discharge of the VAV unit. Two silencers can be used in series together in installations where noise reduction is a particularly strong requirement, this can be very effective. For the most effective noise reduction, the silencer should be fitted immediately downstream of the VAV terminal unit and before the accessories such as Optima-RS-MO (Rectangular to round Multi-outlet units) or after the Accessories such as VBR (Water Batteries). The silencer is delivered in fixed length of 1000mm and is insulated with thicknesses which vary to assure highest attenuation possible without compromising an increase in the pressure loss.

![](_page_25_Figure_5.jpeg)

Size	W (mm)	H (mm)	L (mm)	m (kg)
200x200-1000	200	200	1000	9,1
250x200-1000	250	200	1000	10,2
400x200-1000	400	200	1000	13,4
500x250-1000	500	250	1000	19,1
600x350-1000	600	350	1000	22,7
700x400-1000	700	400	1000	26,4

![](_page_25_Picture_7.jpeg)

# Optima-R-MO & RI-MO Multioutlet box

![](_page_26_Picture_2.jpeg)

Optima-R-MO are Multi-Outlet plenum boxes which are designed to be used with Round VAV units. Multi-Outlet plenum boxes are as standard without any insulation internally or externally. On request following boxes can be insulated as required on site.

Multi outlet plenum boxes are designed to facilitate installation of VAV units to multiple diffusers for supply or return air application.

![](_page_26_Figure_5.jpeg)

Optima-RS-MO are Multi-Outlet plenum boxes which are designed to be used with Round to rectangular outlet VAV units. Multi-Outlet plenum boxes are as standard without any insulation internally or externally. On request following boxes can be insulated as required on site. Multi outlet plenum boxes are designed to facilitate installation of VAV units to multiple diffusers for supply or return air application.

![](_page_26_Figure_7.jpeg)

Size	ØD <sub>in</sub> (mm)	ØD <sub>out</sub> (mm)	B (mm)	H (mm)	L (mm)
100-80	97	78	250	190	150
100-100	97	97	300	190	170
125-100	122	97	300	210	170
125-125	122	122	350	210	190
140-100	137	97	300	230	170
140-140	137	137	380	230	210
160-125	157	122	350	250	190
160-160	157	157	420	250	230
180-140	177	137	380	270	210
180-180	177	177	460	270	250
200-160	197	157	420	290	230
200-200	197	197	500	290	270
225-180	222	177	460	320	250
225-225	222	222	560	320	300
250-200	247	197	500	340	270
250-250	247	247	610	340	330
280-225	277	222	560	370	300
280-280	277	277	670	370	370
315-250	312	247	610	410	330
315-315	312	312	740	410	390
355-280	352	277	670	450	370
355-355	352	352	820	450	430
400-315	397	312	740	480	390
400-400	397	397	910	480	470

# Optima-RS-MO

Multioutlet box
-----------------

Size	W (mm)	H (mm)	ØD <sub>out</sub> (mm)	L (mm)
200x200-80	200	200	78	190
200 x 200 - 100	200	200	98	190
250 x 200 - 100	250	200	98	190
250 x 200 - 125	250	200	122	190
400 x 200 - 125	400	200	122	190
400 x 200 - 140	400	200	137	210
400 x 200 - 160	400	200	157	210
400 x 200 - 180	400	200	177	250
500 x 250 -160	500	250	157	250
500 x 250 -180	500	250	177	330
500 x 250 -200	500	250	197	330
600 x 350 - 200	600	350	197	330
600 x 350 - 250	600	350	247	370
700 x 400 - 250	700	400	247	370
700 x 400 - 315	700	400	312	390

![](_page_26_Picture_12.jpeg)

![](_page_27_Picture_1.jpeg)

The stand-alone version, Argus-RC, is designed for control of heating and cooling in a single zone or a room. A system consists of different control units and a relay box. The control units are pre-programmed, but can be configured for a specific application by using the display and switches. (However, the default setting is in most cases applicable.)

The control units have built-in temperature sensors. An external temperature sensor can also be connected.

#### Controllers Heating and Cooling

![](_page_27_Picture_5.jpeg)

![](_page_27_Picture_6.jpeg)

Argus-RC Room Unit

Argus-RC-O Room Unit Occupancy H

![](_page_27_Picture_9.jpeg)

![](_page_27_Picture_10.jpeg)

![](_page_27_Picture_11.jpeg)

# **RC** Room controller

![](_page_28_Picture_2.jpeg)

RC is a room controller from the Argus series intended to control heating and cooling in a zone control system.

- Awarded design
- Simple installation
- On/Off or 0...10 V control
- Input for occupancy detector, window contact, condensation detector and change-over function

RC is a room controller from the Argus series. It does not have a communication connection.

#### Argus

Argus is a wide series of controllers which handle heating and cooling. The controllers are divided into two different series, With and Without communication capability. The controller group with no communication capability, to which RC belongs, are pre-programmed, stand-alone controllers. The controllers with communication are preprogrammed and are ready to be installed into a controller network to suit the communication type

#### Applications

The Argus controllers are suitable in buildings where you want optimal comfort and low energy consumption, for example offices, schools, shopping centres, airports, hotels and hospitals etc. See application examples on page 7.

#### Design

The controllers have a modern design. The design has been awarded the 2007 "iF product design award". The standard colour is white, but the frame and centre can be received in a number of different colours on inquiry. The units can be combined, offering many different effects.

#### Sensor

The controller has a built-in sensor. An external Pt1000sensor can also be used.

#### Actuators

RC can control 0...10 V DC valve actuators and/or 24 V AC thermal actuators.

#### Easy to install

The modular design with a separate bottom plate for wiring makes the whole Argus series easy to install and commission. The bottom plate can be put into place before the electronics are installed. Mounting is directly on the wall or on an electrical connection box.

![](_page_28_Picture_21.jpeg)

![](_page_28_Picture_22.jpeg)

#### **Control states**

RC has control state:Heating and cooling in sequenceThe change-over function can be activated, see below.

#### **Operating modes**

There are three different operating modes: Stand-by, Occupied and Bypass. Occupied is the preset operating mode. It can be changed to Stand-by with a dipswitch. The operating modes can be activated via an occupancy detector.

**Stand-by :** The room is in an energy save mode and is not used at the moment. This can for example be during nights, weekends, evenings etc. The controller is prepared to change operating mode to Occupied if someone enters the room. Both heating and cooling are disconnected within a temperature interval around the applicable setpoint (heating setpoint value=-3°C, cooling setpoint=+3°C).

**Occupied :** The room is in use and is therefore in a comfort mode. The controller regulates the temperature around a heating setpoint (22°C) and a cooling setpoint (24°C).

**Bypass:** The temperature in the room is controlled in the same way as in operating mode Occupied. The output for forced ventilation is also active. Bypass is useful for example in conference rooms, where many people are present at the same time for a certain period of time.

After 10 minutes absence, the controller will automatically return to the preset operating mode (Occupied or Stand-by).

#### **Occupancy detector**

By connecting an occupancy detector, RC can switch between Bypass and the preset operating mode (Occupied or Stand-by). The temperature is then controlled according to requirement, which saves energy and keeps the temperature at a comfortable level.

#### Change-over function

RC has an input for change-over that automatically resets output UO1 to operate with heating or cooling function. The input can be connected to sensors of type PT1000 and have the sensor mounted so that it senses the temperature on the supply pipe to the coil.

When the temperature exceeds 22°C, the output function is set to heating and when the temperature drops below 18°C, the output is set to cooling.

As an alternative, a potential-free contact can be used. When the contact is open the controller works with the heating function and when it is closed, with the cooling function. To ensure satisfactory functioning using sensor, the system must have continuous primary circuit circulation. When the change-over function is not used, the input must be left disconnected.

#### Setpoint

In Occupied mode, the controller operates from a heating setpoint (22°C) or a cooling setpoint (24°C) that can be changed locally using dipswitches.

The setpoint can be adjusted up and down (±3°C) with the knob on the front of the controller. Switching between heating and cooling setpoints is done automatically in the controller depending on the heating and cooling requirement.

#### **Built-in safety functions**

RC has an input for a condensation detector which prevents condensation. The controller also has frost protection. It prevents frost damages by by ensuring that the room temperature does not drop below 8°C when the controller is in Off-mode (caused by open window).

#### Indications

The controller has an LED shaped like a thermometer on the front. A red indication is shown when heating control is functional and a blue indication when cooling control is active. No LED indication shows that neither heating nor cooling control is active.

![](_page_29_Picture_23.jpeg)

#### Actuator exercise

All actuators are exercised. The exercise takes place at a 23 hours interval. An opening signal is sent to the actuator for as long time as the run time has been configured. Then a closing signal is sent for as long time and the exercise is finished.

#### Application example

![](_page_29_Picture_27.jpeg)

![](_page_29_Picture_28.jpeg)

Technical data	
Supply voltage	1830 V AC, 5060 Hz
Internal consumption	2.5 VA
Ambient temperature	050°C
Storage temperature	-20+70°C
Ambient humidity	Max 90% RH
Protection class	IP20
Built-in temperature sensor	NTC type, measuring range 050°C, accuracy ±0.5°C at 1530°C
Material, casing	Polycarbonate, PC
Weight	110 g
Colour	Cover: Polar white RAL9010
	Bottom plate: Light gray
	Is also available in other colours on inquiry, contact systemair for more
	Information.
CE	This product conforms with the requirements of European EMC standards
	CENELEC EN 61000-6-1 and EN 61000-6-3, and the requirements of
	European LVD standard IEC 60 730-1. It carries the CE mark.
Inputs	
External room sensor	PT1000-sensor, 050°C. Suitable sensors are Argus's
	TG-R5/PT1000,TG-UH/PT1000 and TG-A1/PT1000.
Change-over alt. potential-free contact	PT1000-sensor, 0100°C. Suitable sensor is Argus's TG-A1/PT1000.
Occupancy detector	Closing potential-free contact. Suitable occupancy detector is Argus's
	IR24-P.
Condensation detector alt. window contact	Argus's condensation detector KG-A/1 resp. potential-free contact
Outputs	
Forced ventilation	24 V AC actuator, max 0.5 A
Valve actuator alt, thermal actuator	2 outputs

Valve actuator alt. thermal actuator	2 outputs
Valve actuator	010 V DC, max 5 mA
Thermal actuator	24 V AC, max 2.0 A
Control	Heating or cooling
Actuator exercise	23 hours interval Terminal blocks Lift type for cable cross-section 2.1 $mm^2$

#### Basic setpoint heating, setting with dipswitches

The ON-position is marked on the dipswitch. The cooling setpoint is 2°C higher.

Basic setpoint, heating (°C)	SW1	SW2
20	OFF	OFF
22 (FS)	OFF	ON
24	ON	OFF
26	ON	ON

#### Other dipswitches

	ON	OFF	Comment
SW3	Stand-by	Occupied (FS)	Preset operating mode
SW4	DI, window contact. Closed contact indi- cates closed window.	CI, Argus's condensation detector, KG-A/1 (FS).	Function terminal 33, DI2/CI.
SW5	Digital output for 24 V AC thermal actua- tor.	Analogue output for 010 V DC valve actuator (FS).	Function terminal 23, UO1.
SW6	Digital output for 24 V AC thermal actua- tor.	Analogue output for 010 V DC valve actuator (FS).	Function terminal 24, UO2.
SW7	External, PT1000-sensor	Internal NTC-sensor (FS)	Temperature sensor

![](_page_30_Picture_8.jpeg)

#### Wiring

Terminal	Designation	Operation
10	G	Supply voltage 24 V AC
11	GO	Supply voltage 0 V
12	D01	Output for forced ventilation
13-14		No function
20	GDO	24 V AC out common for DO
21	GO	0 V common for UO (when 010 V actuator is used)
22		No function
23	U01	Output for 010 V valve actuator alt. thermal actuator. Heating or cooling.
24	U02	Output for 010 V valve actuator alt. thermal actuator. Heating or cooling.
30	AI1	Input for external sensor
31	UI1	Input for change-over sensor alt. potential-free contact
32	DI1	Input for occupancy detector
33	DI2/CI	Input for Argus's condensation detector KG-A/1 alt. window contact
40	+C	24 V DC out common for UI and DI
41	AGnd	Analogue ground
42-43		No function

#### Dimensions

![](_page_31_Picture_4.jpeg)

мм

#### Product documentation

Document	Туре
Instruction Argus RC	Instruction for RC
Product sheet TG-R4/PT1000, TG-R5/PT	Information about room sensors, outdoor sensors and
Product sheet TG-UH/PT	strap-on sensors suitable for RC
Product sheet TG-A1/PT	
Product sheet IR24-P	Information about occupancy detector suitable for RC
Instruction IR24-P	Instruction for IR24-P
Product sheet CS-1	Information about condensation detector for the Argus controllers

![](_page_31_Picture_8.jpeg)

# Argus Midi Pre-programmed room controllers with communication

![](_page_32_Picture_2.jpeg)

Argus Midi has basically the same set-up as the standalone version. However, every individual zone system in every room can be connected to a bus line enabling communication with a central SCADA system via RS485 using EXOline or Modbus.

The room controllers are pre-programmed

# Relay Box

ROOM I

#### Controllers Heating and Cooling

![](_page_32_Figure_8.jpeg)

![](_page_32_Picture_9.jpeg)

![](_page_32_Picture_10.jpeg)

![](_page_32_Figure_11.jpeg)

Argus- RC-CH Room Unit Hidden Set-point

![](_page_32_Picture_13.jpeg)

Argus- RC-C Room Unit

![](_page_32_Picture_15.jpeg)

![](_page_33_Picture_1.jpeg)

RC-CDO is a complete pre-programmed room controller from the Argus Midi series intended to control heating and cooling in a zone control system.

- Awarded design
- Communication via RS485 (Modbus or EXOline)
- Fast and safe configuration via Argus tool®
- Simple installation
- On/Off or 0...10 V control
- Backlit display
- Input for occupancy detector, window contact, condensation detector and change-over function

RC-CDO is a room controller from the Argus series. It has a display and communication via RS485 (Modbus or EXOline) for integration into systems.

#### Argus

Argus is a wide series of controllers which handle heating and cooling.

The controllers are divided into three different series, Mini, Midi and Maxi. Mini are pre-programmed,

stand-alone controllers. Maxi consists of freely programmable controllers with communication. The Midi group, to which RC-CDO belongs, are pre-programmed controllers with communication.

#### Applications

The Argus controllers are suitable in buildings where you want optimal comfort and low energy consumption, for example offices, schools, shopping centres, airports, hotels and hospitals etc.

#### Design

The controllers have a modern design. The design has been awarded the 2007 "iF product design award".

#### Sensor

The controller has a built-in sensor. An external Pt1000sensor can also be used.

#### Actuators

RC-CDO can control 0...10 V DC valve actuators and/or 24 V AC thermal actuators.

#### Easy to install

The modular design with a separate bottom plate for wiring makes the whole Argus series easy to install and commission. The bottom plate can be put into place before the electronics are installed. Mounting is directly on the wall or on an electrical connection box.

![](_page_33_Picture_25.jpeg)

#### Flexibility with communication

RC-CDO can be connected to a central SCADA-system via RS485 (EXOline or Modbus) and configured for a particular application using the cost-free configuration tool Argus tool<sup>®</sup>.

![](_page_33_Picture_28.jpeg)

#### **Display handling**

The display has the following indications: It is possible to set different parameter values in a FORCED VENTILATION CHANGEABLE VALUE

![](_page_34_Picture_3.jpeg)

parameter menu in the display, using the buttons on the controller. You change parameter values with the INCREASE and DECREASE buttons and confirm changes with the Occupancy button.

#### **Control states**

![](_page_34_Figure_6.jpeg)

RC-CDO can be configured for different control states/ control sequences:

- Heating
- Heating or cooling via the change-over function
- Heating/Heating
- Heating/Cooling
- Heating/Cooling with VAV-control and forced supply air function
- Heating/Cooling with VAV-control
- Cooling
- Cooling/Cooling

#### Operating modes

There are five different operating modes: Off, Unoccupied, Stand-by, Occupied and Bypass. Occupied is the preset operating mode. It can be changed to Stand-by in the parameter menu in the display. The operating modes can be activated via a central command, an occupancy detector or the Occupancy button.

**Off:** Heating and cooling are disconnected. However, the temperature must not drop below the set minimum tem-

perature (Factory setting (FS)=8°C). Operating mode Off is activated on open window.

**Unoccupied:** The room where the controller is placed is not used for an extended period, for example during holidays or long weekends. Both heating and cooling are disconnected within a temperature interval with configurable min/max temperatures (FS min=15°C, max=30°C).

**Stand-by:** The room is in an energy save mode and is not used at the moment. This can for example be during nights, weekends, evenings etc. The controller is prepared to change operating mode to Occupied if someone enters the room. Both heating and cooling are disconnected within a temperature interval around the applicable setpoint (FS heating setpoint value=-3°C, cooling setpoint=+3°C).

**Occupied:** The room is in use and is therefore in a comfort mode. The controller regulates the temperature around a heating setpoint (FS=22°C) and a cooling setpoint (FS=24°C).

**Bypass:** The temperature in the room is controlled in the same way as in operating mode Occupied. The output for forced ventilation is also active. Bypass is useful for example in conference rooms, where many people are present at the same time for a certain period of time. When Bypass has been activated by a press on the Occupancy button, the controller will automatically return to the preset operating mode (Occupied or Stand-by) after a configurable time (FS=2 hours). If an occupancy detector is used, the controller will automatically return to the preset operating mode after 10 minutes absence.

#### **Occupancy detector**

By connecting an occupancy detector, RC-CDO can switch between Bypass and the preset operating mode (Occupied or Stand-by). The temperature is then controlled according to requirement, which saves energy and keeps the temperature at a comfortable level.

#### The Occupancy button

If you press the Occupancy button for less than 5 seconds when the controller is in the preset operating mode, the controller changes to operating mode Bypass. If you press the button for less than 5 seconds when the controller is in Bypass, it changes operating mode to the preset operating mode.

When the Occupancy button is held depressed for more than 5 seconds, the controller changes operating mode to "Shutdown" (Off/Unoccupied), regardless of the current operating mode. Via the display or Argus tool<sup>®</sup>, you can configure which operating mode, Off or Unoccupied, should be activated on "Shutdown" (FS=Unoccupied). If you press the Occupancy button for less than 5 seconds in

![](_page_34_Picture_29.jpeg)

Shutdown, the controller returns to Bypass.

#### Forced ventilation

Argus has a built-in function for forced ventilation. A short press on the Occupancy button activates output DO1 for example for a damper.

#### Change-over function

RC-CDO has an input for change-over that automatically resets output UO1 to operate with heating or cooling function. The input can be connected to sensors of type PT1000 and have the sensor mounted so that it senses the temperature on the supply pipe to the coil.

When the temperature exceeds 22°C, the output function is set to heating and when the temperature drops below 18°C, the output is set to cooling. As an alternative, a potential-free contact can be used. When the contact is open the controller works with the heating function and when it is closed, with the cooling function. To ensure satisfactory functioning using sensor, the system must have continuous primary circuit circulation. When the change-over function is not used, the input must be left disconnected.

#### Setpoint

In Occupied mode, the controller operates from a heating setpoint (FS = 22°C), or a cooling setpoint (FS = 24°C) that can be changed using the INCREASE and DECREASE buttons. Pressing on INCREASE increases the current setpoint by 0.5°C with each press up to the max. limit (FS = +3°C). Pressing on DECREASE decreases the current setpoint by 0.5°C with each press down to the min. limit

#### $(FS = -3^{\circ}C).$

Switching between heating and cooling setpoints is done automatically in the controller depending on the heating and cooling requirement.

#### Built-in safety functions

RC-CDO has an input for a condensation detector which prevents condensation. The controller also has frost protection. It prevents frost damages by ensuring that the room temperature does not drop below 8°C when the controller is in Off-mode.

#### Actuator exercise

All actuators are exercised. The exercise takes place at set intervals in hours (FS=23 hours interval). An opening signal is sent to the actuator for as long time as the run time has been configured. Then a closing signal is sent for as long time and the exercise is finished.

#### Configuration and supervision with Argus tool®

RC-CDO is pre-programmed on delivery, but can be configured using Argus tool<sup>®</sup>.

Argus tool<sup>©</sup> is a PC-based program that makes it possible to configure and supervise an installation, and change settings, via a clear and easy user interface.

#### Application examples

![](_page_35_Figure_19.jpeg)

ROOM I

![](_page_35_Picture_21.jpeg)

![](_page_35_Figure_22.jpeg)
## Technical data

Supply voltage Internal consumption Ambient temperature Storage temperature Ambient humidity Protection class Communication Modbus Communication speed Display Built-in temperature sensor Material, casing Weight Colour

## CE

standards

## Inputs

External room sensor

Change-over alt. potential-free contact Occupancy detector IR24-P. Condensation detector alt. window contact

## Outputs

Forced ventilation Valve actuator alt. thermal actuator Valve actuator Thermal actuator Control

Actuator exercise Terminal blocks 18...30 V AC, 50...60 Hz
2.5 VA
0...50°C
-20...+70°C
Max 90% RH
IP20
RS485 (EXOline or Modbus) with automatic detection/change-over
8 bits, 1 or 2 stop bits. Odd, even (FS) or no parity.
9600 bps (not changeable)
LCD with background illumination
NTC type, measuring range 0...50°C, accuracy ±0.5°C at 15...30°C
Polycarbonate, PC
110 g
Cover: Polar white RAL9010
Bottom plate: Light gray

This product conforms with the requirements of European EMC CENELEC EN 61000-6-1 and EN 61000-6-3, and the requirements of European LVD standard IEC 60 730-1. It carries the CE mark.

PT1000-sensor, 0...50°C. Suitable sensors are Argus's TG-R5/PT1000,TG-UH/PT1000 and TG-A1/PT1000. PT1000-sensor, 0...100°C. Suitable sensor is Argus's TG-A1/PT1000. Closing potential-free contact. Suitable occupancy detector is Argus's

Argus's condensation detector KG-A/1 resp. potential-free contact

24 V AC actuator, max 0.5 A 2 outputs 0...10 V DC, max 5 mA 24 V AC, max 2.0 A Heating or cooling

FS = 23 hours interval Lift type for cable cross-section 2.1 mm<sup>2</sup>

## Setpoint settings via Argus tool<sup>®</sup> or in the display

Basic heating setpoint	540°C
Basic cooling setpoint	550°C
Setpoint displacement	±010°C (FS = ±3°C)



## Wiring

Terminal	Designation	Operation
10	G	Supply voltage 24 V AC
11	GO	Supply voltage 0 V
12	D01	Output for forced ventilation
13-14		No function
20	GDO	24 V AC out common for DO
21	G0	0 V common for UO (when 010 V actuator is used)
22		No function
23	U01	Output for 010 V valve actuator alt. thermal actuator. Heating or cooling.
24	U02	Output for 010 V valve actuator alt. thermal actuator. Heating or cooling.
30	Al1	Input for external sensor
31	UI1	Input for change-over sensor alt. potential-free contact
32	DI1	Input for occupancy detector
33	DI2/CI	Input for Argus's condensation detector KG-A/1 alt. window contact
40	+C	24 V DC out common for UI and DI
41	AGnd	Analogue ground
42	А	RU-Bus A
43	В	RU-Bus B

Dimensions



mm

## Product documentation

Document	Туре	
Argus Midi Manual	Manual for the controllers from the Argus Midi series	
Installation instruction Argus RC-CDO	Installation instruction for RC-CDO	
Product sheet TG-R4/PT1000, TG-R5/PT	nformation about room sensors, outdoor sensors and	
Product sheet TG-UH/PT	strap-on sensors suitable for RL-LDU	
Product sheet TG-A1/PT		
Product sheet IR24-P	Information about occupancy detector suitable for RC-CDO	
Instruction IR24-P	Instruction for IR24-P	
Product sheet KG-A/1	Information about condensation detector for the Argus controllers	



# Argus-IR24-P Presence detector



IR24-P is a presence detector designed for automatic ventilation control of HVAC systems.

- Power supply 24 V AC or DC
- Intended for wall or ceiling mounting
- Unobtrusive design
- Potentialfree, changeover relay
- Both relay on-delay and/or relay off-delay, can
- be individually set

#### Function

The IR24-P is a presence detector designed for automatic ventilation control of HVAC systems. It saves money and gives higher comfort in premises which require forced ventilation for shorter periods of time, such as conference rooms, assembly-halls etc. The unit provides a changeover relay signal output for start/stop of fan or similar equipment. It can be wall or corner mounted with 110°, 15m detection range.

#### Range adjustments

In order to suit different rooms or areas, the detection range of IR24-P can be adjusted by changing the direction of the sensor. To change the sensor direction, release the screw on the mounting bracket and then carefully move the sensor to the direction desired.

#### On / Off Delay

The ON and OFF delays are designed to provide smarter energy management of HVAC systems. ON delay is the time given to the sensor to certify the occupancy, before it activates the output relay. OFF delay is the time that the relay is activated after the last detection. Both ON and OFF delays can be easily set by placing the jumper head on the corresponding pins as following.

	А	В	С	E	E	F
ON	0 sec.	10 sec.	30 sec.	1 min.	5 min	10 min.
OFF	10 sec.	1 min.	5 min.	10 min.	20 min.	30 min.





#### Technical data

- Infrared sensor Dual element
- Power supply 24 ± 2 V AC/DC
- Detection range 15 x 15 m at 25°C
- Output relay 24 V DC, 0.2 A max.
- Consumption 5 mA @24 V AC
- Mounting height 1.8...3.6 m
- Mounting bracket MB-99
- Detectable speed 0.1...3.0 m/sec.
- RFI immunity Av. 20 V/m (10...1,000 MHz)
- Ambient temperature -20°C...50°C
- Ambient humidity 95% RH max.
- Dimension 112 x 66 x 45 mm



## Operation

## A. Standby

After the warm up time expires, the sensor enters into standby mode. The detector will check whether both delays are properly set. If not, the green LED will blink to indicate.

## B. Relay ON Delay

Relay ON delay is the time given to sensor to verify true occupancy before activating the relay output. Any further detection during ON delay will NOT reset the timer.

## C. 1-minute Waiting

When Relay ON delay expires, the sensor enters into a 1-minute waiting time. If no detection occurs within 1 minute, the sensor will return to standby mode. If any detection occurs, then relay output will be activated and Relay OFF delay will be started.

#### D. Relay OFF Delay

Relay OFF delay is the time of relay activating. Every detection during this period will reset the timer



#### Installation and Wiring

N.B. Do not install where the detector is exposed to direct sunlight or directly above strong sources of heat. Make sure the detection area does not have any obstruction (plants, large pieces of furniture, curtains etc.) which may block the detection.

Installation (see also picture beside)

- Mount the base of mounting bracket on the selected position. Lead the cable through the access tunnel of mounting bracket or through the knockout openings
- 2. Open the front cover by loosening the locking screw at the bottom. Lead the cable into the unit and assemble the mounting bracket with the unit.

Connect the cable to the corresponding terminals according to the instructions below.



24 V AC/DC (non-polarity)

(NC-COM-NO: Outputs for On-Off control of fan coil operation.)

4. Replace the front cover and then proceed with the walk test.

## Walk Test

Apply power supply and allows 25 seconds for sensor to warm up. The green LED will blink during warm up period. Walk across the detection zones (invisible) at normal speed. The red LED will blink whenever the sensor detects the motion.





# Argus-IR24-PC Presence detector



IR24-P is a presence detector designed for automatic ventilation control of HVAC systems.

- Power supply 24 V AC/DC
- Intended for ceiling mounting
- 360° detection
- · Individually settable On and Off delays
- Change-over output
- Unobtrusive design

IR24-PC is a 360° presence detector for automatic ventilation control of HVAC systems. It uses infrared light. The detector has a change-over output for activation/deactivation of a fan coil controller.

#### **Detection pattern**



#### On/Off delays

IR24-PC has individually settable On and Off delays. The delays are designed to provide better energy management of HVAC systems. The On delay is the time given to the sensor to certify the occupancy before it activates the fan coil controller. The Off delay is the operating time for the fan coil after the last detection. The On and Off delays are set by placing the jumper head on the corresponding pins according to the table and figure below.

	А	В	С	E	E	F
ON	0	10	30	60	300	600
OFF	10	60	300	600	1200	1800

(Values in seconds)

	ON		OF	F
А		A		
В		B		
Ċ		Ċ		
D		D	•	
Е		E		
F		F		

#### Installation

Loosen the screw and remove the cover. Carefully lift out the electronics cassette by bending the plastic clips outwards. Lead the cable into the bottom part. Mount the bottom part on the ceiling. Replace the electronics

cassette and connect the cable to the corresponding terminals (see the section Wiring on the next page). Finally, replace the front cover.

Note: Do not touch the infrared sensor in the middle of the electronics cassette.

#### Testing the function

To test the function of the detector, apply power supply and wait for the detector to warm up (~25 sec.). The LED will blink (long and short) during the warm-up period. Ensure that the jumper head connectors of the

On and Off delays are placed in the "A" position (the shortest time). Walk across the detection zones at normal speed. The LED will be lit when the sensor detects the motion.

Note: The LED will blink if a jumper head connector is not properly placed.



## Technical data

Power supply	24 +/- 2 V AC/DC
Power consumption	15 mA
Output	200 mA, 24 V DC, change-over relay
Ambient humidity	Max. 95% RH
Temperature range	-20°C+50°C
Protection class	IP20
Mounting	Ceiling mounting
Mounting height	2.44.2 m
Infrared sensor	Dual element
Detection range	Height x 2.5 at 25°C
On delay	0, 10, 30, 60, 300 or 600 seconds
	(selectable)
Off delay	10, 60, 300, 600, 1200 or 1800
	seconds (selectable)

## Wiring



## NC-COM-NO: Output for On-Off control.

### Dimensions



## Product documentation

Document	Туре
Instruction IR24-PC	Instruction for IR24-PC





## Compact or universal air volume control with Belimo.

## The cost-efficient way to controlled room climate.

## Human health

well-being and work performance are crucially influenced by room climate. Belimo room and system solutions – a complete range of products for cost-efficient motorisation and control of zones and single rooms in the comfort zone, industry, trade and sensitive working areas – are proven in countless installations all over the world.

# VAV-Compact – efficient room control with a single unit

Actuator, controller and sensor in one unit - VAV-Compact provides an economical solution for variable and constant air volume control systems in office buildings, hotels, hospitals, etc. Special rotary actuators with a torque of 5, 10 or 20 Nm and linear actuators with 150 Nm can be supplied for a wide range of VAV/CAV unit sizes and types. VAV-Compact controllers can be controlled conventionally or via the Belimo MP-Bus®. The MP types can be integrated in a higher-level system – together with one sensor per device - either via a DDC controller with an MP interface or by means of a gateway. The fans are incorporated in an MP-Bus® based Fan Optimiser to facilitate cost-optimised control according to demand.

## VAV-Universal – flexibility in problematic environments

The ready-to-connect VAV-Universal range encompasses rotary and safety actuators as well as controllers with dynamic and static pressure sensors. These devices can be finely tuned to exacting requirements in industry, trade and public buildings. Digital, self-adaptive VRP-M controllers interact with fast-running actuators in laboratories or production areas with a severely polluted room atmosphere to assure an instant supply of fresh air. Depending on what is chosen, the control systems can be integrated in a higher-level fieldbus and equipped - directly or over the MP-Bus® – with the Belimo Fan Optimiser to cut fan energy consumption by up to 50%.



## Increased convenience a better working atmosphere, optimum energy efficiency.

## VAV-Compact for convenient solutions

- Individual room comfort
- Wide range of potential applications
- Adjustable to each application
- Demand-based single-room application
- Operation with Fan Optimiser



VAV

VAV

## VAV-Universal with VRP-M controller and fast-runing actuators for sensitive working areas Instant pure air

- Extraction of polluted air
- Ready-to-connect control system for maximum safety
- Integration in MP-Bus® network
- Volumetric flow or pressure control

## VAV-Compact with bus connection

Intelligent simplicity

- System connection to DDC controller with MP interface via MP-Bus<sup>®</sup>
- Integration in higher-level systems such as LonWorks<sup>®</sup>, Konnex, Ethernet TCP/IP, Profibus DP, etc. via MP gateway
- Convenient, cost-efficient wiring
- Maximum flexibility in new, retrofitted, converted or renovated buildings

# VAV-Compact with Belimo Fan Optimiser for reduced energy consumption

Up to 50% fan energy saving

- Optimised consumption and operating costs
- Reduced flow noise thanks to lower supply pressure in the air duct system
- Reduced wiring expenses thanks to MP-Bus<sup>®</sup> network







Function	VAV-Compact			VAV-Universal	
	MODBUS types	LON types	MP types	VRP-M system solutions	Universal program
Sensors Controller	Modbus	LONMARK*	MP2-BUS LMV-D3-MP NMV-D3-MP	VFP VFD3 MP2-BUS' VRP-M	VRD3 VRP VRP.
Actuators	LMV-D3 MOD NMV-D3 MOD	LMV-D3LON NMV-D3LON	LHV-D3-MP	LMQ24A-SRV-ST NMQ24A-SRV-ST NM24A-V-ST SF24A-V-ST with emergency control function	LM24A-V NM24A-V SM24A-V LF24-V with emergency control function SF24A-V with emergency control function
Bus integration			Into Gate LonV Konr Mod UK24 BACr UK24	PORBUS field bus systems via MP- way Vorks <sup>®</sup> : Gateway UK24LON ex: Gateway UK24EIB bus RTU: Gateway 4MOD het MS/TP: Gateway 4BAC	
Ventilator optimisa- tion via MP bus				<b>MP2</b> *BUS* Fan Optimiser COU24-A-MP	
Service tool		and the second	ZTH-GEN	-1	
Parameterisation and Service software				PC-Tool MFT-P	
Room controller				CR2 CRA	4 24
Positioner			Ø	CRP24	5G

Information: Documents to VAV-Compact LON version, VRP-M system solution, VAV-Universal, single room controllers CR24, CRA24, CRP24, Fan Opti-miser COU24-A-MP and Tools and Interfaces are available as separate documents.



## VAV-Compact Functions

## Master / slave connection



Principle:

- 1. A reference signal, e.g. from a room temperature controller, is connected to the master input.  $\dot{V}_{min}$  and  $\dot{V}_{max}$  are set on the master controller.
- 2. The volumetric flow actual value signal from the master acts as a reference signal for the slave controller. The master is installed on the supply or exhaust air side, depending on the application. See "Determination of the master controller".

For connection diagram, see page 39-42



Determination of the master controller If both units have:

- Non-identical  $\dot{V}_{\text{nom}}$  settings, the controller with the lower  $_{\text{nom}}.$
- Identical  $\dot{V}_{nom}$  settings, the controller with the higher air olume setting acts as master

## • Positive pressure in the room

Master: Supply air unit Slave: Exhaust air unit

#### • Negative pressure in the room

Master: Exhaust air unit Slave: Supply air unit

## Room pressure ratio

In a master / slave connection, any changes in the air system of the master (supply pressure too low, e.g. due to a pressure control fault) are detected and reported to the slave. This guarantees an equal percentage ratio of supply air to exhaust air.

In a master / slave configuration, only one controller can act as master. However, one master controller can control several parallel slave controllers.

When are master / slave connections used?

- In systems with air volume controllers in the supply and exhaust air that are required to work sequentially
- When an equal percentage ratio of supply air to exhaust air is specified.

## Operating volumetric flow settings

The  $\dot{V}_{max}$ - and  $\dot{V}_{min}$  values used for the required volumetric flow are set on the master and transferred to the slave by means of a reference signal.

## CAV application

In constant air volume applications, operating mode control (CLOSED /  $\!\!\!$ 

 $\dot{V}_{min}$  etc.) is only set on the master controller. Slave setting if the room pressure ratio is balanced The  $\dot{V}_{min}$  setting on the slave is always 0%. If the room pressure ratio is 1:1 and all controllers are the same size, the slave controller is set to  $\dot{V}_{max}$  100% /  $\dot{V}_{min}$  0%. Slave setting if the room pressure ratio is unbalanced The  $\dot{V}_{min}$  setting on the slave is always 0%. Setting with % scale on the ZTH-GEN hand-operated

device The ratio of slave volume to master volume is set as fol-

IOWS WITH	U	ie vmax value on the slave controller:
Nu cou		Ý <sub>max</sub> s · Ý
	=	100
V max 3%		Ý <sub>max</sub> M·Ý
		nom S
₩max S%	=	$\dot{V}_{\text{max}}$ value that must be set on the controller in %
₩ <sub>nom</sub> M	=	Nominal volume of the master unit in $m^3/h$
V <sub>max</sub> м	=	Maximum volume of the master unit in $m^3/h$
<b>V</b> nom S	=	Nominal volume of the slave unit in $m^3/h$
Vmax S	=	Maximum volume of the slave unit in m <sup>3</sup> /h

#### Setting with PC-Tool / ZTH-GEN

These two setting tools can be used to enter the volumetric flow ratio directly in  $m^3/$  h, II/s or cfm, i.e. there is no need to calculate the setting ratio.

#### Example

- Required: Positive pressure in the room with 20% excess air
- Supply air unit:  $\dot{V}_{nom}$  1600 m<sup>3</sup>/h /  $\dot{V}_{max}$  1500 m<sup>3</sup>/h
- Exhaust air unit:  $\dot{V}_{nom}$  2400 m<sup>3</sup>/h /  $\dot{V}_{max}$  1200 m<sup>3</sup>/h

### Find: $\dot{V}_{max}$ setting of the slave controller

53% = <u>1200 · 1600</u>

$$3\% = \frac{1500 \cdot 2400}{1500 \cdot 2400} \cdot 100$$



## VAV-Compact Functions

#### Parallel connection



#### Principle:

The reference signal of the temperature controller is connected in a parallel circuit with the reference value inputs of the supply and exhaust air controllers. The operating volumetric flows  $\dot{v}_{max}$  and  $\dot{v}_{min}$  are set on both controllers.

For connection diagram, see page 39-42



#### Room pressure ratio

In a parallel connection, the two VAV units are operated independently of one another with a common reference signal. The operating volumetric flows of the supply and exhaust air units must be set according to the required room pressure ratio.

The supply and exhaust air controllers work independently of one another, i.e. if a fault occurs in the supply or exhaust air system, the room pressure ratio is impaired for technical reasons. In the worst case, the unit tolerances may be accumulated. This circumstance must be taken into account by the project planning engineer.

#### When are parallel connections used?

- If air volume controllers operate with parallel supply and exhaust air (controlled by a common reference variable)
- If the supply and exhaust air devices have different sizes and different minimum and maximum volumetric flow settings
- If constant differential control is active between the supply and exhaust air
- In systems with several supply and exhaust air devices
- In circulating air systems for airtight rooms.

#### Operating volumetric flow settings

The  $\dot{v}_{max}$  and  $\dot{v}_{min}$  values used for the required volumetric flow must be set on each VAV controller.

#### **CAV** application

In constant air volume applications, operating mode control (CLOSED /  $\dot{v}_{min}$  etc.) is set on both controllers.

#### Setting if the room pressure ratio is balanced

Owing to the proportional assignment of the reference signal to the value ranges for  $\dot{V}_{max}$  and  $\dot{V}_{min}$ , it is possible to operate VAV units with different nominal widths and differentiated ranges parallel to one another.

#### Setting if the room pressure ratio is unbalanced

The operating volumetric flows of the supply and exhaust air units must be set according to the difference:

- Positive pressure ratio in the room Supply air volume > exhaust air volume
- Negative pressure ratio in the room Exhaust air volume > supply air volume



## Single-duct systems

Function diagram



## **Brief Description**

Control solution for CAV single-room application CAV single-duct system, occupancy-controlled Standalone operation or integrated in a building automation system (I/O integration)

#### Functions

The CAV controller is controlled by means of the motion detector in two modes on the basis of room occupancy  $\dot{V}$  min ...  $\dot{V}$ max:

- Room unoccupied: constant air volume  $\dot{v}_{\text{min}}$
- Room occupied: constant air volume  $\dot{V}_{\text{max}}$

#### Motion detector

With switching output for low switching capacity (load 0.24 mA)

#### VAV-Compact control device

#### ..MV-D3-MP

VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.

• Damper position feedback controlled via the MP-Bus for demand based fan optimisation.

#### IRC-VAV CAV room solution with motion detector



CAV single-duct system, occupancy-controlled

#### Wiring diagram



#### Notes

- Connection and terminal designations of the motion detector in accordance with the manufacturer's specification
- Mode setting on the CAV controller: 0 ... 10 V oder 2 ... 10 V



Single-duct systems



## **Brief Description**

Control solution for VAV single-room application Stand-alone operation or integrated in a building automation system (I/O integration)

#### Functions

The 0 ... 10 V V single-room or DDC controller controls the VAV controller with vaiable air volume in the range from  $\dot{V}_{min}$  ...  $\dot{V}_{max}$ , depending on the room cooling needs.

## Single-room or DDC controller

With The 0 ... 10 V output single (cooling sequence). Controller functions in accordance with the manufacturer's specification.

## VAV-Compact control device

#### ..MV-D3-MP

VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.

• Damper position controlled via the MP-Bus for demand based fan optimisation.

## IRC-VAV CAV room solution with 0....10V control



## Anschlussschema



#### Notes

- Connection and terminal designations in accordance with the controller manufacturer's specification
- Mode setting on the VAV controller: 0 ... 10 V



#### Single-duct systems



IRC-VAV VAV room solution with CR 24 room controller



#### VAV singleduct system, room tempreture-controlled

Note

For technical data and a detailed description of functions, see CR24 product information.

## Wiring diagram



#### Notes

- Further VAV applications such as boost (fast heat up), night cool down (air heated with water or electrically), night cooling, combination available with chilled ceiling.
- Mode setting for VAV controller for this application: 2 ... 10 V

## **Brief description**

Control solution for VAV single-room application, VAV single-duct system, room temperature-controlled, Stand-alone operation or integrated in a building automation system (I/O integration)

## **Functions**

The CR24-B1 single-room controller controls the connected VAV controllers with a variable air volume in the range from  $\dot{v}_{min} \dots \dot{v}_{max}$ , depending on the room cooling needs. Other functions can be optionally connected (e.g. with a motion detector): energy hold off, standby, etc.

## Room temperature controller

CR24-B1 (automatic) CR24-A1 Room temperature controller (15 ... 36°C) with an integrated or external temperature sensor

- Mode selection with a pushbutton and three LEDs: AUTO, ECO (reduced room temperature for standby or night operation) and MAX (flushing operation with 15' timer)
- Room protection function (frost / excess temperature)
- Inputs for energy hold off, standby operation, external temperature sensor, summer / winter compensation
- VAV system output
- Self-resetting start-up and service function
- Tool connection for diagnostics, settings and trend recordings

VAV-Compact control device ..MV-D3-MP, VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.

• Damper position controlled via the MP-Bus for demand based fan optimisation.

#### Input and output assignment

Functions	Description	Assignment
VAV	VAV system output (0) 2 10 V	Output ao1
Optional functions	Description	Assignment
EHO	Energy hold off (window)	Input di1
Sensor	External temperature sensor NTC 5K	Input ai1
Shift	External shift 0 10 V (Summer / Winter compensation)	Input ai2

#### Note

Terminal designations in accordance with the Belimo final controlling element.

#### Configuration, settings

DIP switches



Setpoint WH range: 15 ... 36 °C



#### **Dual-duct systems**



#### IRC-VAV VAV dual-duct solution with CR 24 room controller



#### Note

For technical data and a detailed description of functions, see CR24 product information.

#### Wiring diagram



#### Note

- Terminal descriptions correspond to the Belimo actuator
- connection.Mode setting for VAV controller for this application: 2 ... 10 V

#### Control solution for VAV single-room application

VAV dual-duct system, room temperature-controlled Stand-alone operation or integrated in a building automation system (I/O integration)

#### Functions

The two air volume controllers mix the hot and cold air supplied by the dual-duct air conditioning system to obtain the condition requested by the CR24-B1 room temperature controller. The constant air volume (CAV) controller for the hot air adjusts to the set Vmax volume for heating. The variable air volume (VAV) controller for the cold air adds the variable amount of cold air requested by the room temperature controller. If cooling needs exceed the hot air volume, the hot-air part is shut off and only cold air is supplied.

**Optional:** The cold-air part can be shut off by means of a switching contact at input d1.

#### Room temperature controller

CR24-B1(automatic) CR24-A1

Room temperature controller (15 ... 36°C) with an integrated or external temperature sensor

- Mode selection with a pushbutton and three LEDs: AUTO, ECO (reduced room temperature for standby or night operation) and MAX (flushing operation with 15' timer)
- Room protection function (frost / excess temperature)
- Inputs for cold air shut-off, external temperature sensor, summer / winter compensation
- VAV system output
- Self-resetting start-up and service function
- Tool connection for diagnostics, settings and trend recordings

#### VAV-Compact control device .. MV-D3-MP

VAV-Compact control device for supply air, exhaust air or mixing units, comprising a sensor, VAV controller and actuator for pressure-independent air volume controls.

#### Input and output assignment

Functions	Description	Assignment
VAV	VAV system output (0) 2 10 V	Output ao1
Optional functions	Description	Assignment
Shut-off CA	Cold air shit-off	Input di1
Sensor	External temperature sensor NTC 5K	Input ai1
Shift	External shift 0 10 V (Summer / Winter compensation)	Input ai2

#### Configuration, settings

DIP switches

1 2	1	P-Band	normal	wide
	2	di2	Stand by	Change over

Setpoint WH range: 15 ... 36 °C





Brief	desi	crint	tion

riet description	
Application	The digital VAV-Compact has PI control characteristics and is used for pressure-independent control of VAV units in the comfort zone.
Pressure measurement	The integrated maintenance-free Belimo D3 differential pressure sensor is also suitable for very small volumetric flows. It is for this reason that it covers versatile applications in the comfort zone, e.g. in residential construction, offices, hospitals, hotels, cruise ships, etc.
Actuator	Three versions available, depending on the size of the VAV unit: 5 / 10 / 20 Nm. – Rotary actuator, depending on the size – Linear actuator 150 N with 100, 200 or 300 mm linear movement
Control function	VAV-CAV or Open-Loop operation for integration in an external VAV control loop.
Feedback	Damper position for fan optimiser systems, current volumetric flow or pressure value.
VAV – variable volumetric flow	For variable volumetric flow applications with a modulating reference variable, e.g. room temperature controller, direct digital control or bus system, it enables demand-related, energy-saving ventilation of individual rooms or zones. The operating range $\dot{V}$ min $\dot{V}$ max can be connected via selectable mode. The following are available: DC 2 10V / 0 10V / adjustable range / bus operation
CAV – constant volumetric flow	For constant volumetric flow applications, e.g. in step mode, controlled by means of a switch. The following operating modes can be selected from: CLOSED / $\dot{V}_{min}$ / ( $\dot{V}_{mid}$ ) / $\dot{V}_{max}$ / OPEN
Bus function	Up to eight Belimo MP devices (VAV / damper actuator / valve actuator) can be connected together over the MP-Bus and integrated into the following systems: - LONWORKS <sup>®</sup> applications with Belimo UK24LON interface - EIB Konnex applications with Belimo UK24EIB interface - MODBUS RTU applications with Belimo UK24MOD interface - BACnet applications with Belimo UK24BAC interface - DDC controller with integrated MP-Bus protocol - Fan optimiser applications with optimiser COU24-A-MP A sensor (010V or passive), e.g. a temperature sensor or a switch, can optionally be integrated into the higher-level DDC or bus system via the MP-Bus.
Operating and service devices	Belimo PC-Tool or service tool ZTH-GEN, can be plugged into the VAV-Compact (PP connection) or via MP-Bus.
Assembly and connection	The VAV-Compact, which is assembled on the unit by the OEM, is connected using the prefabricated connecting cable.
Test function / test display	The VAV-Compact features two LEDs with a functional readiness display for commissioning and functional checking. Extended information with ZTH-GEN.
OEM factory settings	The VAV-Compact is mounted on the VAV unit by the unit manufacturer, who adjusts and tests it according to the application. The VAV-Compact is sold exclusively via the OEM channel for this reason.

#### Type overview Туре Torque Power consumption Dimensioning Weight LMV-D3-MP 5 Nm 2 W 4 VA (max. 8 A @ 5 ms) Approx. 500 g NMV-D3-MP 10 Nm 3 W 5 VA (max. 8 A @ 5 ms) Approx. 700 g 3 W SMV-D3-MP 20 Nm 5.5 VA (max. 8 A @ 5 ms) Approx. 830 g LHV-D3-MP 150 N 2.5 W 4.5 VA (max. 8 A @ 5 ms) Approx. 550 g



Technical data	
Supply	
Nominal voltage	AC 24V, 50/60 Hz, DC 24 V
Operating range	AC 19.2 28.8V, DC 21.6 28.8V
Differential pressure sensor	
Type, principle of operation	Belimo D3 sensor, dynamic response
Operating range	0 600 Pa
Overload capability	±3000 Pa
Installation position	Any, no reset necessary
Materials in contact with medium	Glass, epoxy resin, PA, TPE
Control function	- VAV-CAV
	- Open-loop operation
Adjustment values	
Vnom	OEM-specific nominal volumetric flow setting, suitable for the VAV unit
Δp @ Vnom	50 450 Pa
Vmax	20 100% of Vnom
Vmin	0 100% of V <sub>nom</sub>
Vmid	50% of V <sub>min</sub> to V <sub>max</sub>
Classic control	
VAV mode for reference value input Y (Connection 3)	<ul> <li>DC 2 10V / (4 20 mA with 500 Ω resistance)</li> <li>DC 0 10V / (0 20 mA with 500 Ω resistance)</li> <li>Adjustable DC 0 10V</li> </ul>
Mode for actual value signal U5	- DC 2 10V
(Connection 5)	- DC 0 10V } max. 0.5 mA
	- Adjustable: volumetric flow, damper position or differential pressure J
CAV operating modes (constant volumetric flow)	CLOSED / Vmin / (Vmid ^) / Vmax / OPEN ^ (^ only with AC 24V supply)
MP-Bus function	
Address in bus operation	MP1 8 (classic operation: PP)
LONWORKS <sup>®</sup> / EIB-Konnex / Modbus RTU / BACnet	With BELIMO Interface UK24LON / UK24EIB / UK24MOD / UK24BAC 1 8 BELIMO MP devices (VAV / damper actuator / valve)
DDC controller	DDC controllers/programmable controller with an integrated MP interface from various manufacturers
Fan optimiser (fan control)	With BELIMO Fan Optimiser COU24-A-MP
Sensor integration	Passive (Pt1000, Ni1000, etc.) and active sensors (010V), e.g. temperature, humidity 2-point signal (switching capacity 16 mA @ 24V), e.g. switches, occupancy switches
Operating and service	Pluggable / PC-Tool (V3.6 or higher) / service tool ZTH-GEN
Communication	PP/MP-Bus, max. DC 15V, 1200 baud
Push-button	Adaption / addressing
LED display	- 24V supply - Status / bus function
Actuator	Brushless, non-blocking actuator with power-save mode
Direction of rotation	ccw / cw or ↑ / ↓
Adaption	Capture of setting range and resolution to control range
Gear disengagement	Push-button self-resetting without functional impairment
Sound power level	Max. 35 dB (A), SMV-D3-MP max. 45 dB (A)
Actuator - rotating	
Angle of rotation	95°⊄, adjustable mechanical or electronic limiting
Position indication	Mechanical with pointer
Spindle driver	<ul> <li>Clamp, spindle round 10 20 mm / spindle square 8 16 mm</li> <li>Form fit in various versions, e.g. 8 x 8 mm</li> </ul>
Actuator – linear	
Stroke	100, 200 or 300 mm, adjustable mechanical or electronic limiting
Connection	Cable, 4 x 0.75 mm <sup>2</sup>
Safety	· · · ·
Protection class	III Safety extra-low voltage
Degree of protection	,
Electromagnetic compatibility	CE according to 89/336/EEC
	<u> </u>



Technical data	(continued)
Safety	
Mode of operation	Type 1 (in acc. with EN 60730-1)
Rated impulse voltage	0.5 kV (in accordance with EN 60730-1)
Control pollution degree	2 (in accordance with EN 60730-1)
Ambient temperature	0 +50°C
Non-operating temperature	-20 +80°C
Ambient humidity	5 95% r.h., non-condensing (in accordance with EN 60730-1)
Maintenance	Maintenance-free

#### Connection

Connecting cable

The connection is made using the connecting cable mounted to the VAV-Compact device.

#### Note

- Supply via safety isolating transformer!
- Connections 1 and 2 (AC/DC 24V) and 5 (MP signal) must be routed to accessible terminals (room temperature controller, floor distributor, control cabinet, etc.) in order to enable access with the tool for diagnostic and service work.

A THE REAL PROPERTY AND A THE	No.	Designation	Wire colour	Functi	ion
Δ	. 1		black	1-	AC/DC 24V
· · AT	2	+ ~	red	~ +	∫ supply
	3	Y	white	Refere	ence signal VAV/CAV
	5	<b>→</b> _ U	orange	– Actu – MP-	al value signal Bus connection

## VAV – Variable operation Vmin...Vmax

Wiring diagrams

## Example 1:

VAV with analogue reference signal



#### Example 2:

VAV with shut-off (CLOSE), 2 ... 10V mode



#### Example 3:

VAV with analogue reference signal supply/exhaust air in parallel operation



# Example 4:

VAV with analogue reference signal, in Master/Slave operation







Contact closed, function active

Contact closed, function active, only in 2 ... 10 V mode

Contact open

\* Not available with DC 24 V supply



## MP-Bus operation – VAV / CAV operation

## Connecting cable

Wiring diagrams

The connection to the MP-Bus is made using the connecting cable mounted to the VAC-Compact device.

#### Note

 Supply via safety isolating transformer!
 Connections 1 and 2 (AC/DC 24V) and 5 (MP signal) must be routed to accessible terminals (room temperature controller, floor distributor, control cabinet, etc.) in order to enable access with the tools for diagnostic and service work.





orange

U

#### Control via MP-Bus

⊥ ~ AC 24 V

For detailed information, see section «MP-Bus integration»

5

#### MP-Bus control with integrated switch

MP-Bus connection

For detailed information on sensor integration, see section «MP-Bus integration»



#### Note

- For further information about the connection, override controls, MP-Bus cables, etc., see section «MP-Bus integration»
- This is a connection description. Depending on the application, the terminal allocation may vary. The connection and commissioning must be carried out by trained personnel.

Dimensioning of supply and connecting cable

– + DC 24 V	MP	
	MP address: 1 8	
L ~ Y U - +	MV-D3-MP	CHARACTER STREET

General	In addition to the actual wire sizing, attention must also be paid to the surrounding area and the cable routing. Signal cables must not be laid in the vicinity of load cables, objects liable to cause EMC interference etc. if possible. Paired or layer stranded cables improve immunity to interference.
24 V supply, dimensioning and cabling	<ul> <li>The dimensioning and installation of the AC 24V supply, the fuse protection and the cables are dependent on the total operated load and local regulations. Account must be taken of the following performance data, including the starting currents of the actuators:</li> <li>Dimensioning values VAV-Compact controller, see Technical data</li> <li>Dimensioning values of further controlling elements etc. can be found in the current data sheets and product information</li> <li>Other devices which are intended to be connected to the same 24 V supply</li> <li>Reserve capacity for subsequent expansion, if planned.</li> </ul>
MP-Bus integration – supply, dimensioning and cabling	See S4-VAV-Compact D3, MP-Bus integration





# VAV-Compact MOD

A pressure sensor, digital VAV controller and damper actuator all in one, providing a VAV-Compact solution with a communications capability for pressure-independent VAV systems in the comfort zone

- Control function: VAV
- Communication via Modbus RTU (RS-485)
- Conversion of sensor signals
- Diagnostic socket for operating devices

#### **Brief description**

Application	The digital VAV-Compact has PI control characteristics and is used for pressure-independent control of VAV units in the comfort zone.
Mode of operation	The actuator is fitted with an integrated interface for Modbus RTU, receives its digital positioning signal from the superordinate Modbus-Master and returns the current status.
Converter for sensors	Connection option for a sensor (passive or active sensor or switching contact). In this way, the analogue sensor signal can be easily digitised and passed along to Modbus.
Parameterisable actuators	The factory settings cover the most common applications. As desired, individual parameters can be adapted for specific systems or servicing with a service tool (e.g. ZTH-GEN). The Modbus communication parameters (address, baud rate,) are set with the ZTH-GEN. Pressing push-button 3 while connecting the supply voltage resets the communication parameters to the factory setting. Quick addressing: The Modbus address can alternatively be set using push-buttons from 1 to 16. The value selected is added to the «Basic address» parameter and results in the effective Modbus address. For example, with a basic address of 140, Modbus addresses between 141 and 156 can be parameterised using quick addressing.
Pressure measurement	Maintenance-free, dynamic, differential pressure sensor, proven in a wide range of applications, suitable for use in offices, hospital wards, alpine hotels or cruise liners.
Actuator	Two versions are available, depending on the size of the VAV unit: 5 or 10 Nm.
VAV – variable volumetric flow	The VAV-Compact is supplied with its modulating setpoint by a room temperature controller via Modbus. This facilitates demand-related, power-saving ventilation in individual rooms or zones of air conditioning systems. The operating range ( $\dot{V}_{min}$ and $\dot{V}_{max}$ ) can be set either locally with PC-Tool or ZTH-GEN or via Modbus.
Operating and service devices	Belimo PC-Tool or Service-Tool ZTH-GEN, pluggable on the VAV-Compact.
Assembly and connection	The VAV-Compact device, which is assembled on the unit by the OEM, is connected using the prefabricated connecting cable.
OEM factory settings	The VAV-Compact is mounted on the VAV unit by the unit manufacturer, who adjusts and tests it according to the application. The VAV-Compact is sold exclusively via the OEM channel for this reason.

Type listing

Туре	Torque	Power consumption	For wire sizing	Weight
LMV-D3-MOD	5 Nm	2 W	4 VA (max. 5 A @ 5 ms)	Арргох. 500 g
NMV-D3-MOD	10 Nm	3 W	5 VA (max. 5 A @ 5 ms)	Approx. 700 g



#### Safety notes

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4	L	!	7	

Register

- The actuator must not be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during installation.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- When calculating the required torque, the specifications supplied by the damper manufacturers (cross-section, design, installation site), and the air flow conditions must be observed.
- The device contains electrical and electronic components and is not permitted to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

#### Modbus overview

	No.	Adr	Register
	1	0	Setpoint [%]
	2	1	Override control
	3	2	Command
Ę	4	3	Actuator type
atio	5	4	Relative position [%]
ber	6	5	Absolute position [°] [mm]
l o	7	6	Relative volumetric flow [%] (only for VAV/EPIV)
	8	7	Absolute volumetric flow (pressure) [m <sup>3</sup> /h] [l/min] [Pa] (only for VAV/EPIV)
	9	8	Sensor value [mv] [Ω] [-]
	101	100	Series number 1st part
	102	101	Series number 2nd part
	103	102	Series number 4th part
<u></u>	104	103	Firmware version (Modbus module)
, Si	105	104	Malfunction and service information
»	106	105	Min [%]
	107	106	Max [%]
	108	107	Sensor type
	109	108	Bus fail position

- Registers in Bold can be written
- Registers <100 (In operation) which can be written are volatile and should therefore be updated periodically
- Registers >100 which can be written are non-volatile

Commands All data is arranged in a table and addressed by 1..n (register) or 0..n-1 (address). No distinction is made between data types (Discrete Inputs, Coils, Input Registers, Holding Registers). As a consequence, all data can be accessed with the two commands for Holding Register. The commands for Discrete Inputs and Input Registers can be used as an alternative.

Standard commands: Read Holding Registers [3] Write Single Register [6]

Optional commands: Read Discrete Inputs [2] Read Input Registers [4] Write Multiple Registers [16]

#### Note regarding Read Discrete Inputs

The command reads one or more bits and can alternatively be used for register 105 (Malfunction and service information). The start address to be used is 1664.



Modbus register description					
Register 1: Setpoint	Setpoin i.e. 01	t for actuator sett 0 000 correspone	ting or volumetric flow in ds to 0100%	hundredths of one percen	t,
Register 2: Override control	Overrid	ing the setpoint v	vith defined values		
	Overri	de control			
	0	None			
	1	Open			
	2	Close			
	3	Min			
	5	Max			
Register 3: Command	Initiatio	n of actuator fund	ctions for service and test	; the register is reset auto	matically.
	Comm	and			
	0	None			
	1	Adaption			
	2	Test run			
	3	Synchronisation	า		
	4	Reset actuator	malfunctions		
Register 4: Actuator type	Actuato	r type; the alloca	tion may deviate from the	e basic category with som	e actuators.
	Actua	tor type			
	0	Actuator not co	nnected / not known		
	1	Air/water actuat	tors with/without safety fur	nction	
	2	Volumetric flow	controller VAV / EPIV		
	3	Fire damper act	tuator		
Register 5: Relative position	Relative i.e. 0	e position in hund 10 000 correspor	redths of one percent, nd to 0 100%		
Register 6: Absolute position	Absolute position 0 10 000 (65535 if not supported by the actuator) The unit depends on the device: [°] for actuators with rotary movement [mm] for actuators with linear movement				
Register 7: Relative volumetric flow	Relative i.e. 0 This val For all c	e volumetric flow 10 000 correspoi ue is available on other types, 6553	in hundredths of one perond nd to 0 100% Ily for VAV controllers and 5 will be entered.	cent of Vnom, EPIV devices (actuator typ	be: 2).
Register 8: Absolute volumetric flow	Absolute volumetric flow This value is available only for VAV controllers and EPIV devices (actuator type: 2). For all other types, 65535 will be entered. The unit depends on the device: [m <sup>3</sup> /h] for VAV controllers (or [Pa] for pressure applications) [I/min] for EPIV devices				
Register 9: Sensor value	Current sensor value; dependent on the setting in Register 108 The unit depends on the sensor type: $[mv] [\Omega]$ [-]				
Register 101, 103: Series number	Each MP node has an unambiguous series number which is either impressed on or glued to the node. The series number consists of 4 segments, although only parts 1, 2 and 4 are displayed on Modbus. Example: 00839-31324-064-008			l on or glued 1, 2 and 4 are	
		Register 9	Register 10	Register 11	
		1st part	2nd part	4th part	
		00839	31234	008	
Register 104: Firmware Version	Firmwa e.g. 10'	re version of Moc 1 ⊠ V1.01	lbus module (VX.XX)		



Modbus register description	(con	tinued)	
Register 105: Malfunction and service information	The serv	status i ice info	nformation is split into messages about the actuator (malfunctions) and other rmation.
	[	Bit	Description
	ê	0	Excessive utilisation
	bŢ	1	Mechanical travel increased
	No	2	Mechanical overload
	S	3	-
	tio	4	Safety-relevant faults (fire protection only)
	lnc	5	Damper test error (fire protection only)
	alfu	6	Duct temperature too high (fire protection only)
	Σ	7	Smoke detector tripped (fire protection only)
		8	Internal activity (test run, adaption,)
	(te)	9	Gear disengagement active
	- G	10	Bus watchdog triggered
	higl	11	-
	) S	12	-
	Ž	13	-
	လီ	14	-
		15	-
Register 106: Min / Vmin setting Register 107: Max / Vmax setting	Maii Mini i.e. C Caut Mini	mum lii mum lii 010 00 ion: Chi mum lii	nit (position or volumetric flow) in hundredths of one percent, 00 correspond to 0100% anging the setting may result in malfunctions. mit (position or volumetric flow) in hundredths of one percent,
	i.e. z Caut	ion: Ch	anging the setting may result in malfunctions.
Register 108: Sensor type	Sens at th	or type e Y inp	connected to the actuator; in the absence of sensor specification, the switching ut will have the effect of a local compulsion.
	Ser	nsor tv	De
	C	) No	one
Note	1	Ac	tive sensor (mV)
After changing the sensor type, the actuator	2	Pa	assive sensor 1 k ( $\Omega$ )
must always be restarted in order for correct	3	B Pa	assive sensor 1 20 k (Ω)
sensor values to be read out.	4	l Sv	vitching contact (0 / 1)
Register 109: Bus fail position	Mod com The nor t the t Trigg	bus cor munica bus mo he ove bus fail gered b	nmunication is not monitored as standard. In the event of a breakdown in tion, the actuator retains the current setpoint. nitoring controls the Modbus communication. If neither the setpoint (Register 1) rride control (Register 2) is renewed within 120 seconds, the actuator controls to position (closed / open). us monitoring is indicated in Register 105.
		) La	st setpoint (no bus monitoring)

 1
 Fast close if time is exceeded

 2
 Fast open if time is exceeded



Resistance

range

850 ... 1600 Ω

850 ... 1600 Ω

200 ... 50 kΩ

Resolution

1Ω

1Ω

1Ω

#### Electrical installation



#### Connection with passive sensor, e.g. Pt1000, Ni1000, NTC



## Connection with switching contact, e.g. Δp-monitor



Connection with active sensor, e.g. 0 ... 10 V @ 0 ... 50°C





#### **Tool connection**

Setting and diagnostics

Setting and the diagnostics of the connected VAV-Compact controller can be checked and set quickly and easily with the Belimo PC-Tool or the Service-Tool ZTH-GEN.

On-board service connection

The service connection integrated in the VAV-Compact allows the console used to be connected quickly.

## Belimo VAV operating and service devices

- Belimo PC-Tool, with level converter ZIP-USB-MP



MP connection (5) The VAV-Compact can also communicate (connection wire 5) with the Service-Tools via the MP connection. The connection can be established during operation on site, i.e. in the connection socket, at the tool socket of the Belimo room temperature controller CR24 or on

the floor or control cabinet terminals.





#### Operating controls and indicators



**1** Direction of rotation switch

Switching over: Direction of rotation changes

2 Push-button and LED display green

Off:	No power supply or fault
Illuminated:	In operation
Flashing:	Address mode: pulses according to set address (1 16) when
	starting: reset to factory setting (communication)
Press button:	in standard mode: switches on angle of rotation adaptation
	In address mode: confirmation of set address (1 16)
Push-button and	LED display yellow
Off:	The actuator is ready
Illuminated	Adaption or synchronising process active

#### Illuminated: synchronising process or actuator in address mode (green LED indicator flashing) Modbus communication active Flickering: Press button: in operation (>3 s): switch address mode on and off in address mode: address setting by pressing several times when starting (>5 s): reset to factory setting (communication)

#### (4) Gear disengagement button

Press button: Gear disengaged, motor stops, manual override possible Release button: Gear engaged, synchronisation starts, followed by standard operation

## **(5)** Service plug

3

For connecting parameterising and service tools

## Dimensions [mm]

Dimensional drawings LMV-D3-MOD







## **ZTH-ZEN**

Service-Tool for parameterisable and communicative Belimo actuators and VAV controllers. Connection via service socket on the device or MP/PP connection.

#### Information

Belimo Automation AG reserves the right to implement supplements, changes and improvements at any time, i.e. without prior notification.

- version overview,
- release information,
- most up-to-date operating instruction, etc.

Technical data				
Electrical data	Power supply		AC 24V, 50/60 Hz, DC 24V (from actuator)	
	Operating range		AC 19.2 28.8V/DC 21.6 28.8V	
	Power	Operation	1 W	
	consumption	Dimensioning	2 VA	
	Connection		Socket for Belimo PP connection, RJ12	
	Connecting cable		see «Connection»	
Interface	Communication		Point to Point (PP), no bus mode (MP)	
Supported devices	Belimo actuator/VAV controller		with PP/MP connection, see «Supported devices», Scope of function dependent on type of device	
Operating	LCD display		2 x 16 characters, with background illumination	
J				
	Keys			
	Keys Quick start guide			
Safety	Keys Quick start guide Protection class		♪ / ☆ / - / + / OK         enclosed stickers, de/en         III Safety extra-low voltage	
Safety	Keys Quick start guide Protection class Electromagnetic	compatibility	⊕ / ŵ / - / + / OK          enclosed stickers, de/en          III Safety extra-low voltage          CE in accordance with 2004/108/EC	
Safety	Keys Quick start guide Protection class Electromagnetic Operating tempe	compatibility	⊕ / ŵ / - / + / OK          enclosed stickers, de/en             Ⅲ Safety extra-low voltage             CE in accordance with 2004/108/EC             0 50°C, non-condensing	
Safety	Keys Quick start guide Protection class Electromagnetic Operating tempe Non-operating te	compatibility rature emperature	⊕ / ŵ / - / + / OK          enclosed stickers, de/en             Ⅲ Safety extra-low voltage             CE in accordance with 2004/108/EC             0 50°C, non-condensing             -20 50°C, non-condensing	
Safety Dimensions / Weight	Keys Quick start guide Protection class Electromagnetic Operating tempe Non-operating te Dimensions	compatibility rature emperature	⊕ / ŵ / - / + / OK          enclosed stickers, de/en             Ⅲ Safety extra-low voltage             CE in accordance with 2004/108/EC             0 50°C, non-condensing             -20 50°C, non-condensing             L x W x D: 85 x 65 x 23 mm	
Safety Dimensions / Weight	Keys Quick start guide Protection class Electromagnetic Operating tempe Non-operating te Dimensions Weight	compatibility rature emperature	⊕ / Ŷ / - / + / OK             enclosed stickers, de/en             III Safety extra-low voltage             CE in accordance with 2004/108/EC             0 50°C, non-condensing             -20 50°C, non-condensing             L x W x D: 85 x 65 x 23 mm             Approx. 260 g	

#### Supported devices

Damper product range	MF /MP /MFT(2) /LON	
Valve product range	MF /MP /MFT(2) /LON	
EPIV – pressure-independent characterised control valve	P6WC24E	available starting 2011
Fire damper actuator	BF-TopLine with BKN230-24MP	
VAV product range	VRD2 / VRD2-L	available 1992-2007
	VRD3	available starting 2008
	VRP-M (VAV and STP applications)	available starting 2005
	NMV-D2	available 1992 to 2000
	LMV-D2M / NMV-D2M	available 2000 to 2006
	LMV-D2-MP / NMV-D2-MP / SMV-D2-MP, LHV-D2-MP	available 2006 to 2011
	LMV-D2LON / NMV-D2LON	available 2006 to 2011
	LMV-D3-MP / NMV-D3-MP / SMV-D3-MP, LHV-D3-MP	available starting 2011

LMV-D3LON / NMV-D3LON

#### Safety notes



• The device must not be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.

available starting 2011

- Connection permitted only to Belimo devices with 24V safety extra-low voltage and PP/ MP interface.
- Changes of parameters, etc. may not be performed except after consultation/specification of the OEM, device or mechanical/electrical contractor. Operating and adjustment regulations must be observed.



versions, compatibilities						
		This document describes t	he function and handling	) of the new ZTH-GEN V4.xx.		
Current information regarding $\cdot$ Upgrade ZTH-VAV $\rightarrow$ ZTH-GEN		The ZTH-GEN V4.xx contai ZTH-VAV, in addition to the	ns the functionality of all ose of the new VAV-Comp	previous versions of ZTH-GEN and pact D3.		
Firmware upgrade to V4.xx		Previous ZTH versions can be upgraded to a ZTH-GEN V4.xx by means of a simple f download.				
	ZEV	The adjustment tool ZEV (	1992 to 2007) is replace	d by the ZTH-GEN V4.xx		
7	ZTH-VAV	Will be replaced by the new ZTH-GEN V4.xx				
ZTH-GEN V2.xx	: / V3.xx	Will be replaced by the ne	w ZTH-GEN V4.xx			
	,	· ,				
Connection						
connection						
Connection and	d supply	The ZTH-GEN is supplied v • directly at the Service so • via the PP/MP connectio controller CR24	ia the actuator/VAV conti cket of the actuator/VAV n (U5) e.g. connection so	roller. The connection is set up controller or cket, in the control cabinet, room		
Connection and Local connection to service	d supply e socket	The ZTH-GEN is supplied v • directly at the Service so • via the PP/MP connectio controller CR24	ia the actuator/VAV contr cket of the actuator/VAV n (U5) e.g. connection so	roller. The connection is set up controller or cket, in the control cabinet, room		
Connection and Local connection to service Recommendation Wire the PP connection (U5) to the loor distributor/control cabinet.	d supply e socket	The ZTH-GEN is supplied v • directly at the Service so • via the PP/MP connection controller CR24 Connection to VAV:D2-MP / LON VAV:D3-MP / LON MF / MP / LON EPIV: P6WC24E	ia the actuator/VAV contr cket of the actuator/VAV n (U5) e.g. connection so Cable type ZK1-GEN (enclosed)	roller. The connection is set up controller or cket, in the control cabinet, room Connection Direction connection to Service socket - plug in the plug - set up contact with clockwise rotation		
Connection and Local connection to service Recommendation Wire the PP connection (U5) to the loor distributor/control cabinet. "his means there is no need for direct o the device.	d supply e socket access	The ZTH-GEN is supplied v • directly at the Service so • via the PP/MP connection controller CR24 Connection to VAV:D2-MP / LON VAV:D3-MP / LON MF / MP / LON EPIV: P6WC24E VAV: VRP-M 1) F/S: BKN230-24MP (BF- Top)	ia the actuator/VAV conti cket of the actuator/VAV n (U5) e.g. connection so Cable type ZK1-GEN (enclosed)	Connection Direction connection to Service socket - plug in the plug - set up contact with clockwise rotation ZK4-GEN VPP-M VPP-V VPPP-V V V VPP-V V V V		
Connection and Local connection to service Recommendation Wire the PP connection (U5) to the loor distributor/control cabinet. This means there is no need for direct o the device.	d supply e socket access	The ZTH-GEN is supplied v • directly at the Service so • via the PP/MP connectio controller CR24 Connection to VAV:D2-MP / LON VAV:D3-MP / LON MF / MP / LON EPIV: P6WC24E VAV: VRP-M 1) F/S: BKN230-24MP (BF- Top) VAV: VRD3	ia the actuator/VAV contricket of the actuator/VAV n (U5) e.g. connection so Cable type ZK1-GEN (enclosed) ZK4-GEN (Accessories) ZK6-GEN (Accessories)	Connection Direction connection to Service socket - plug in the plug - set up contact with clockwise rotation ZK4-GEN ZTH-GEN		

### Direction connection to terminals



#### Connection in the MP bus system



Direct connection to the MP bus or MP master is not possible with the ZTH-GEN.

Solution: Use the service socket on the actuator/VAV controller or temporarily disconnect the MP connection of the MP device from the MP bus and connect the ZTH-GEN to the MP connection.



Operating	
	The operating device is started and the data of the connected device is read out when the ZTH-GEN is connected to the Belimo actuator/VAV controller. The available adjustment and operating options are displayed in accordance with the device type. The available setting parameters are listed in the respective product documentation for the actuators/VAV controller.
Operating elements	LCD display - Background illumination - Display 2 x 16 characters
	Key function       LMV-D3-MP         ✓ and ▼ Forward/backward, abort entry       Office 12 - SA         - and + Change value/status       ✓ ▲ - + OK         OK Confirm entry       ○ ○ ○ ○ ○ ○
	RJ12 tool socket Supply 24V / PP communication
	<b>Operating instruction</b> A quick start guide and a sticker with the basic functions for the the rear of the unit are enclosed with the ZTH-GEN.
Language setting, unit depiction	Language and units can be set in the Configuration menu.
Operating	Operating is context-related, i.e. the user sees only the options available for the connected device. The corresponding Configuration table is read from the actuator for this purpose. In addition to the parameter type, this table also contains the corresponding divisions, e.g.: minimally adjustable running time/type. Non-relevant options are not displayed.
Menu structure, handling	The operating menu can be run through from both sides $\Im \Omega$ .
	Device identification     Starting / ending       r2     Type       Position     Type       r2     Designation       r2     Designation       r3     Option, Range       Option 1     Option, Range       Option 2     Option X
Starting / ending	The connection to the actuator/VAV controller is started by plugging in the RJ plug and terminated by unplugging it.
Device specifications/Technical data	For a more detailed description, including setting parameters, we draw your attention to the respective separate product information.



## Configuration

#### Start Configuration

## tion 1. Press the key (OK) while simultaneously plugging in the connecting cable

2. Configuration menu display appears

## **Configuration Menu**

Option / Display	Setting	Product	Explanation
		range	
HW Version Vx.x			Display of the current hardware and
FW Version Vx.x			firmware version of the ZTH-GEN
Text	German / English	-	
VAV unit	<b>m³/h</b> / l/s / cfm	VAV	
EPIV unit	m³/h / <b>l/min</b> / gpm	Valves	
Supply			Display of the current AC 24V
AC V VHW: %			supply voltage, with direct
			connection to terminals (ZK2-GEN)
Start MP tester	OK	-	MP bus diagnostics tool for system
			integrators.
			The MP tester is not part of this
			documentation.
PICCV function	0/1	Valves	Belimo US
			Enable PICCV Wizard function
Expert Mode 1)	0/1	VAV	Enable VAV settings:
			– Switching mode,
			– set $\dot{V}$ min / $\dot{V}$ max to original values
			(call up OEM setting)
Advanced Mode <sup>2)</sup>	0/1	VAV	Enable settings:
		Fire	- VAV: Direction of rotation,
		protection	– BF-Top: Adaption
Exit Configuration	ОК		

Activate options 1) and 2) only as needed and with the respective know-how; the adjustment of the respective parameters requires special expertise.

#### **Basic functions**

Device-specific identification

Key	Display examples (Read	Explanation
	only)	
	LMV-D3-MP	Type designation of the actuator/VAV controller
	Office 2.12 Supply air	Position (16 characters) optional
-	LMV-D3-MP	Type designation of the actuator/VAV controller
	DN160 / xxx	Designation (16 characters) optional
+	LMV-D3-MP	Type designation of the actuator/VAV controller
	FW: Vxx.xx.00	Firmware version of the actuator/VAV controller
OK	Address: xx	MP address MP1 8 / PP (PP: no bus operation)
	0073040033146142	Serial number of the actuator/VAV controller

Position and Designation (16 characters) optional.

These display options can be described with the PC-Tool if required.

Set the MP bus address

## Key Display examples (Read/ write) Explanation A MP address: PP -new: MP1 Active setting (PP: no bus operation) Set the desired address MP1...8 (OK)



#### Functions for damper product range/valve product range

The ZTH-GEN recognizes the device generation, i.e. the menu and the setting options are displayed accordingly to the connected device.



Menu tree The following menu tree shows the adjustment/display possibilities of an LM24A-MP.

#### Functions for EPIV - pressure-independent characterised control valve



**Menu tree** The following menu tree shows the adjustment/display possibilities of an EPIV.





#### Information: VAV-Universal actuators

The V-actuators L/N/SM24A-V, L/NMQ24A-SRV-ST, which fit the VAV universal controllers VRD3 / VRP-M (STP) / VRP / VRP-STP, have a tool connection but are nevertheless not tool-capable!

#### Functions for BF-TopLine fire protection actuators

Functions for VAV product range

Menu tree The following menu tree shows the adjustment/display possibilities of a BF-TopLine.





Checking the power supply			
Checking the power supply	The ZTH-GEN offers the possibility of checking the AC 24V power supply (III safety extra-low voltage) of the Belimo devices. Voltages >30V are not permitted! Application e.g. Commissioning, troubleshooting in the event of a malfunction.		
	Measurement procedure		
	Equipment: ZTH-GEN, ZK2-GEN         Connection:       - connect free wires of the ZK2-GEN to AC 24V.         • white on GND       (connection 1 actuator/VAV controller)         • blue on ~       (connection 2 actuator/VAV controller)         • third wire (turquoise)       do not connect         - Do not connect RJ11 plug to ZTH-GEN yet!         Start:       - Press the ZTH-GEN key (OK) while at the same time connecting the RJ12 plug         - Select Supply function with arrow key (▼)         End:       Disconnect ZTH-GEN RJ12 plug or end Configuration function (OK)		
Display	Display		
	SupplyokayAC 24VVHW:88%		
	Quality:okay: AC supply in the division 19.2 28.8VAC value:measured AC voltage (accuracy ±1.0V insofar as VHW >95%)VHW:Relationship of positive to negative half-wave The deviation of the positive half-wave value to the value of the negative half- wave may not be too large. As a rule: positive HW / negative HW x 100 should be >80%.		
	Explanation VHW		



#### Possible problems

- The following items influence the half-wave load:
- Transformer too small in its dimensionslong signal cable length from transformer to VAV controller



# **CB** Electrical duct heater



Duct heater with spigot connection for standard spiral ducts. Manufactured from Aluzinc-coated sheet steel with a heating element in stainless steel. The heater has integral overheating protection with a manual reset function. The CB heater has rubber seals on the connecting spigots. Suitable for control by room thermostat or Pulser.

The minimum air volume is based on a minimum air velocity of 1.5 m/s. These duct heaters are designed for a maximum output air temperature of 50°C. The CB can be installed in a horizontal or vertical duct. In a horizontal duct, the connection box should be installed facing upwards, or rotated 90° to one side. Installation with the connection box facing downwards is not allowed.





Recommended installation positions



CB-2 400V 2~

C 🗖 🗸

#### CB-3 230V 3~ 400V 3~

- 🗌 c

CB-4 12kW, 400V 3~



F = All phase breaker H = Thyristor type Pulser or TTC

A = Heating elements B = Over heat protection with automatic reset

C = Over heat protection with manual reset E = Interlocking

- 🗌 В

L1 L2 L3 N

в 🔄 –





**CBM** Duct heater

#### Description

#### Duct heater with integral control equipment

Duct heater with spigot connection for standard spiral circular ducts. Manufactured from Aluzinc-coated sheet steel with a heating element in stainless steel. The heater has integral overheating protection with a manual reset function. The CBM have rubber seals on the connecting spigots. The temperature is set on the cover of the duct heater. The unit is controlled by an integral electronic temperature regulator, using so-called timeproportional Pulse/Pause technology. This provides extremely precise temperature control. As a thyristor is used for adjusting the temperature, the unit has no moving parts. This means that it is silent and not susceptible to wear and tear. Terminals for interlocking the heater, via a pressureand airflow guard are available in the terminal box. The minimum air volume is based on a minimum air velocity of 1.5 m/s. These duct heaters are designed for a maximum output air temperature of 50°C.

All CBMs are delivered with duct sensor TG-K330 (0-30°C) as standard.





Recommended installation positions

- A = Heating elements
- B = Over heat protection with automatic reset
- C = Over heat protection with manual reset
- E = Interlocking
- F = All phase breaker
- H = Thyristor type Pulse or TTC
- J = Sensor
- T = Air flow switch/Pressure switch

CBM-1 (230V~)



#### CBM-2 (400V 2~)

## CBM-3 (400V 3~)






60 G 6014	ØD	Р	U	I.	Q <sub>min</sub>	m	Controller Line	Wiring
CR & CRW	(mm)	(kw)	(v)	(A)	(m³/h)	(Kg)	Controlled by	diagram
100-0.4	100	0.4	230~	1.7	45	2	Pulser	CB-1
100-0.6	100	0.6	230~	2.6	45	2	Pulser	CB-1
125-0.6	125	0.6	230~	2.6	70	2.5	Pulser	CB-1
125-1.2	125	1.2	230~	5.2	70	2.5	Pulser	CB-1
125-1.8	125	1.8	230~	7.8	65	2.5	Pulser	CB-1
150-1.2	150	1.2	230~	5.2	100	2.5	Pulser	CB-1
150-2.1	150	2.1	230~	9.1	100	3.2	Pulser	CB-1
150-2.7	150	2.7	230~	11.7	100	3.0	Pulser	CB-1
150-5.0	150	5.0	400 2~	12.5	100	3.8	Pulser	CB-2
160-1.2	160	1.2	230~	5.2	115	3	Pulser	CB-1
160-2.1	160	2.1	230~	9.1	115	3.2	Pulser	CB-1
160-2.7	160	2.7	230~	11.7	115	3.5	Pulser	CB-1
160-5.0	160	5.0	400 2~	12.5	115	4	Pulser	CB-2
200-2.1	200	2.1	230~	9.1	180	3.9	Pulser	CB-1
200-3.0	200	3.0	230~	13	180	4	Pulser	CB-1
200-5.0	200	5.0	400 2~	12.5	180	4.5	Pulser	CB-2
250-3.0	250	3.0	230~	13	280	4.8	Pulser	CB-1
250-6.0	250	6.0	400 2~	16	280	5.2	Pulser	CB-2
250-9.0	250	9.0	400 3~	13	280	6.2	TTC	CB-3
315-3.0	315	3.0	230	13	430	6	Pulser	CB-1
315-6.0	315	6.0	400 2~	15	430	6.3	Pulser	CB-2
315-9.0	315	9.0	400 3~	13	430	7.3	TTC	CB-3
315-12.0	315	12.0	400 3~	17.3	430	7.6	TTC	CB-4
355-6.0	355	6.0	400 2~	15	550	7	Pulser	CB-2
355-9.0	355	9	400 3~	13	550	8.2	TTC	CB-3
355-12.0	355	12	400 3~	17.3	550	8.5	TTC	CB-4
400-6.0	400	6	400 2~	15	700	8	Pulser	CB-2
400-9-0	400	9	400 3~	13	700	8.5	TTC	CB-3
400-12.0	400	12	400 3~	17.3	700	9.2	TTC	CB-4

Pressure drop graph







## **VBC** Water heating coil for circular ducts

Water-heating coil for heating air in ventilation systems with circular ducts. Aluzinc-coated casing, heat transmission element with copper tubes and aluminium fins. Removable cover for cleaning the unit.

The water-heating coil can be installed in a horizontal duct. Max operating temperature 150°C. Max operating pressure 1.6 MPa (16 Bar) 2- and 3-rows batteries.







VBC	ØD	В	Н	Ødy	F	G	К	L.	kg
100-2	100	179	225	10	137	40	300	380	3.8
100-3	100	180	238	10	100	40	276	356	3.9
125-2	125	179	225	10	137	40	300	380	3.8
125-3	125	255	313	10	175	40	276	356	5.8
160-2	160	253	300	10	212	40	300	380	5.7
160-3	160	255	313	10	175	40	276	356	5.8
200-2	200	253	300	10	212	40	300	380	5.7
200-3	200	330	398	22	250	40	276	356	8.6
250-2	250	328	385	22	250	40	300	380	8.2
250-3	250	405	473	22	325	40	276	356	11.5
315-2	315	403	460	22	325	40	300	380	10.6
315-3	315	504	557	22	400	40	276	356	14.6
400-2	400	479	534	22	400	65	300	430	13.5
400-3	400	539	707	22	425	65	330	460	20.0
500-2	500	529	707	22	425	65	330	460	17.2

VBC	Air flow	Pressure drop	∆T air at T water 60/40°C	Water flow rate	Water speed	Pressure drop	Power	∆T ait at T water 90/70°C	Water flow rate	Water speed	Pressure drop	Power
	(m³/h)	(Pa)	(K)	(l/s)	(m/s)	(kPa)	(kW)	(K)	(l/s)	(m/s)	(kPa)	(kW)
100-2	0.04	35	16	0.01	0.15	0.1	0.85	32.5	0.02	0.3	1	1.7
125-2	0.06	72	13	0.01	0.2	0.1	1	28.3	0.03	0.4	1	2.2
160-2	0.1	40	19.9	0.03	0.4	3	2.6	35.8	0.06	0.8	8	4.6
200-2	0.15	73	17.3	0.04	0.6	5	3.5	30.4	0.07	1.1	13	6.1
250-2	0.25	68	17.5	0.07	0.5	3	5.7	31.7	0.13	0.9	7	10.3
315-2	0.39	69	18.1	0.11	0.5	3	9.2	32	0.2	1	8	16.3
400-2	0.63	77	17.7	0.18	0.6	4	14.6	31	0.31	1.1	10	25.5
500-2	0.9	45	19.4	0.28	0.7	6.6	22.7	31	0.31	1.1	10	25.5

Coil calculation



VBC 500-2

3 1,0 qv (m³/s)

0,8

VBC 400

0,6

VBC	Air flow	Pressure drop	∆T air at T water 60/40°C	Water flow rate	Water speed	Pressure drop	Power	∆T ait at T water 90/70°C	Water flow rate	Water speed	Pressure drop	Power
	(m³/h)	(Pa)	(K)	(l/s)	(m/s)	(kPa)	(kW)	(K)	(l/s)	(m/s)	(kPa)	(kW)
100-3	0.04	39	25.9	0.02	0.24	0.85	1.35	47.4	0.03	0.45	2.65	2.46
125-3	0.06	17.2	33.4	0.03	0.47	5.33	2.6	56.2	0.05	0.8	14	4.38
160-3	0.1	41	29.3	0.05	0.68	11	3.8	49.7	0.08	1.17	29.5	6.46
200-3	0.15	29	30.7	0.07	0.54	5.36	6	52.1	0.13	0.92	14.1	10.17
250-3	0.25	31.2	30.5	0.12	0.59	6.23	9.93	51.6	0.21	1.02	16.2	16.8
315-3	0.39	35	30.2	0.19	0.69	8.28	15.3	51	0.32	1.17	21.4	25.87
400-3	0.63	36.3	30.3	0.03	0.74	10.10	24.74	50.8	0.51	1.26	26.1	41.6

Coil calculation 3 rows













## **CWK** Water-cooling battery for circular ducts

Casing of galvanised sheet steel with copper tubes and aluminium fins. Inspection covers for easy cleaning and maintenance.

Connection sleeves with rubber seal.

Max operating temperature 150 °C

Max operating pressure 1,6 MPa (16Bar)



\* Condensate drain

CWK	øD	В	Н	ødy	F	G	K	L	kg
100-3-2.5	100	251	180	10	100	40	276	356	4.4
125-3-2.5	125	326	255	10	175	40	276	356	6.5
160-3-2,5	160	326	255	10	175	40	276	356	6.7
200-3-2.5	200	411	330	22	250	40	276	356	9.4
250-3-2.5	250	486	405	22	325	40	276	356	11
315-3-2.5	315	560	504	22	400	40	276	356	14.3
400-3-2.5	400	710	529	22	425	65	330	460	19.5



CWK	Air flow	Air speed	Pressure drop	Air before	Air before	Air after	Capacity	Water Flow	Water Pressure drop
	(m³/h)	m/s	(Pa)	(°C)	(% RH)	(°C)	(kW)	(l/s)	(kPa)
	54	2	7	25	50	14.3	0.2	0.01	< 0.5
	54	2	7	30	45	15.8	0.4	0.01	1
100-3-2.5	100	3.5	22	25	50	16.4	0.3	0.01	1
100-5-2.5	100	3.5	22	30	45	18.5	0.5	0.02	2
	145	5	58	25	50	17.5	0.4	0.02	1
	145	5	58	30	45	20.0	0.6	0.02	3
	85	2	3	25	50	12.6	0.5	0.02	3
	85	2	3	30	45	13.5	0.7	0.03	5
175 2 7 5	150	3	9	25	50	14.5	0.7	0.03	5
123-3-2.5	150	3	9	30	45	15.7	1.1	0.04	10
	215	4.5	18	25	50	15.6	0.8	0.03	7
	215	4.5	18	30	45	17.0	1.4	0.05	16
	145	2	9	25	50	14.4	0.7	0.03	4
	145	2	9	30	45	15.6	1.0	0.04	10
160-3-2.5	250	3.5	24	25	50	16.1	0.9	0.04	8
100-5-2.5	250	3.5	24	30	45	17.4	1.5	0.06	20
	355	5	45	25	50	17.0	1.1	0.04	11
	355	5	45	30	45	18.4	1.3	0.08	32
	225	2	6	25	50	14.1	1.0	0.05	2
	225	2	6	30	45	15.3	1.6	0.06	5
200-3-2.5	390	3.5	17	25	50	15.9	1.4	0.06	4
200-5-2.5	390	3.5	17	30	45	17.3	2.3	0.09	9
	555	5	33	25	50	16.9	1.7	0.07	5
	555	5	33	30	45	18.4	3.1	0.12	15
	360	2	6	25	50	14.2	1.6	0.06	2
	360	2	6	30	45	15.4	2.5	0.10	5
250-3-2 5	630	3.5	18	25	50	16.0	2.2	0.09	4
250 5 2.5	630	3.5	18	30	45	17.3	3.8	0.15	10
	900	5	34	25	50	17.0	2.7	0.11	6
	900	5	34	30	45	18.2	5.1	0.20	17
	560	2	7	25	50	14.5	2.4	0.10	3
	560	2	7	30	45	15.4	3.9	0.16	7
315-3-2.5	985	3.5	20	25	50	16.1	3.4	0.13	5
	985	3.5	20	30	45	17.2	6.1	0.24	14
	1410	5	39	25	50	17.0	4.3	0.17	8
	1410	5	39	30	45	18.1	8.3	0.33	25
	900	2	9	25	50	15.2	3.4	0.14	2
	900	2	9	30	45	16.3	5.8	0.23	5
400-3-2.5	1590	3.5	25	25	50	16.8	4.8	0.19	4
	1590	3.5	25	30	45	17.8	9.3	0.37	12
	2280	5	49	25	50	17.6	6.1	0.24	6
	2280	5	49	30	45	18.6	12.8	0.51	22





## **VBR** Water-heating coil for rectangular ducts

Water-heating coil for heating air in ventilation systems with rectangular ducts. Hot dip galvanized casing, heat transmission element with copper tubes and aluminium fins. In cold conditions, a frost protection device with sensor should be fitted to reduce the risk of damage from freezing. The water-heating coil can be installed in a horizontal duct.



- F Thread G 1/4
- G Airing
- H Water out
- I Connection for immersion sensor
- J Water in
- K Draining

VBR	А	c/c A	В	c/c B	E	kg
40-20-2	438	420	238	220	R¾''	5.5
50-25-2	538	520	288	270	R¾''	7
50-30-2	538	520	338	320	R¾''	8
	А	c/c A	В	c/c B	E	kg
40-20-4	438	420	238	220	R¾''	7
50-25-4	538	520	288	270	R¾''	9
60-35-4	638	620	388	370	R 1"	13
	А	c/c A	В	c/c B	E	kg
70-40-3	738	720	438	420	R 1''	15.5

Max. operating temperature

Max. operating pressure, at water temp. 100°C 16 bar Max. operating pressure, at water temp. 150°C 10 bar

VBR XX-XX-2 = Two pipe rows VBR XX-XX-4 = Four pipe rows VBR XX-XX-3 = Three pipe rows



VBR	Water temp. (in/out)	Air Flow	Air Pressure drop	ΔΤ	Capacity	Water Flow	Water Pressure drop
	(°C)	(m³/h)	(Pa)	(K)	(kW)	(l/s)	(kPa)
40-20-2	60/40	400	9	18.5	2.7	0.03	0.5
40-20-2	60/40	1000	48	12.7	4.6	0.06	1
40-20-4	60/40	400	18	29.5	4.3	0.05	0.5
40-20-4	60/40	1000	96	19.5	7.1	0.09	0.5
40-20-2	80/60	400	9	32.8	4.7	0.06	1
40-20-2	80/60	1000	48	24.5	8.9	0.11	2
40-20-4	80/60	400	18	46.3	6.7	0.08	0.5
40-20-4	80/60	1000	96	38.9	14.0	0.17	1
50-25-2	60/40	600	8	21.7	4.7	0.06	1
50-25-2	60/40	1200	29	18.2	7.9	0.10	2
50-25-4	60/40	600	16	33.1	7.2	0.09	0.5
50-25-4	60/40	1200	59	28.4	12.3	0.15	1
50-25-2	80/60	600	8	36.5	7.9	0.10	2
50-25-2	80/60	1200	29	28.6	12.4	0.15	4
50-25-4	80/60	600	16	54.5	11.8	0.14	1
50-25-4	80/60	1200	59	45.9	19.9	0.24	3
60-35-2	60/40	1200	11	18.7	8.1	0.10	0.5
60-35-2	60/40	3000	61	15.0	16.3	0.20	2
60-35-4	60/40	1200	23	34.2	14.8	0.18	1
60-35-4	60/40	3000	123	28.1	30.4	0.37	4
60-35-2	80/60	1200	11	33.9	14.7	0.18	1
60-35-2	80/60	3000	61	24.1	26.1	0.32	3
60-35-4	80/60	1200	23	53.6	23.2	0.28	3
60-35-4	80/60	3000	123	41.5	45.0	0.55	8
70-40-2	60/40	2000	31	20.1	14.5	0.18	1
70-40-2	60/40	4000	94	16.0	23.2	0.28	1
70-40-3	60/40	2000	46	24.7	17.8	0.22	0.5
70-40-3	60/40	4000	139	21.1	30.5	0.37	1
70-40-2	80/60	2000	31	34.7	25.1	0.31	1
70-40-2	80/60	4000	94	25.1	36.3	0.44	3
70-40-3	80/60	2000	46	45.4	32.8	0.40	1
70-40-3	80/60	4000	139	34.4	49.7	0.61	2

Coil calculation

Data based on supply air temperature of 0°C.





## **RB** Duct heater for rectangular ducts

Manufactured from aluzinc coated sheet steel with a heating element in stainless steel. The heater has integral overheating protection with a manual reset function. Suitable for control by room thermostat or TTC. The minimum air volume is based on a minimum air velocity of 1.5 m/s. These duct heaters are designed for a maximum output air temperature of 40°C.



DD	Power	Voltage	Current	Min.	air flow	Weight
ND	(mm)	(kW)	(V)	(A)	(m³/h)	(kg)
40-20/9	9	400	3~	13	450	9.2
40-20/15	15	400	3~	22	450	16
50-25/15	15	400	3~	22	700	12.7
50-25/22	22	400	3~	31.8	700	19.9
60-35/27	27	400	3~	39	1000	23.1
60-35/45	45	400	3~	65	1000	30.6
70-40/27	27	400	3~	39	1600	23.1
70-40/45	45	400	3~	65	1600	30.3

RB	В	н	D
40-20/9-1	400	200	370
40-20/15-1	400	200	500
50-25/15-1	500	250	370
50-25/22-2	500	250	500
60-35/27-2	600	350	370
60-35/45-3	600	350	500
70-40/27-2	700	400	370
70-40/45-3	700	400	370



F1 Ochrana proti prehriatiu, automatická (60°C) F2 Ochrana proti prehriatiu, ručná (120°C) F2 F1

15/14/13 15 kW 19,9 22,6 Ω 19,9 22,6 A	12 11 10 15 kW 19,9 22,6 Ω 19,9 22,6 A	987 15 kW 19,9 22,6 Ω 19,9 22,6 A	654321	RB 70-40/45-3 RB 60-35/45-3
	121110 17 kW 17,5 19,9 Ω 22,5 25,6 A	987 17 kW 17,5 19,9 Ω 22,5 25,6 A	654321	RB 60-30/34-2
	12 11 10 13,5 kW 22,1 25,1 Ω 17,9 20,3 A	987 13,5 kW 22,1 25,1 Ω 17,9 20,3 A	654321	RB 70-40/27-2 RB 60-35/27-2
	12 11 10 11 kW 27,1 30,8 Ω 14,6 16,5 A	987 11 kW 27,1 30,8 Ω 14,6 16,5 A	6 5 4 3 2 1	RB 50-25/22-2
		987 15 kW 19,9 22,6 Ω 19,9 22,6 A	654321	RB 50-25/15-1 RB 40-20/15-1
		9 8 7 9 kW 33,1 37,6 Ω 11,9 13,5 A	654321	RB 40-20/9-1

Ĺ.

654

987



## **PGK** Cold water coil for rectangular ducts



Casing from galvanised sheet steel. Water-battery from copper tubes and aluminium fins. Air vent and drain valve included. Drip pan from stainless steel and condensate connection (R<sup>1</sup>/<sub>2</sub>"). Max working pressure 1.6 MPa (16 bar). For water connection left or right, Two inspection covers for cleaning and maintenance. Droplet separator DE as an accessory regardless of air direction. Recommended for air velocities from 3m/s





PGK	В	Н	I.	К	М	Ν
400x200-3-2.0	438	238	70	176	43	R 3/4
500x250-3-2.0	538	288	120	176	43	R 3/4
600x350-3-2	638	388	220	176	43	R 3/4
700x400-3-2.0	738	438	250	170	55	R1



PGK	Air flow	Air velocity	Air Pressure drop	Air before	Air before	Air after	Capacity	Water Flow	Water Pressure drop
	(m3/h)	m/s	(Pa)	(°C)	(% RH)	(°C)	(kW)	(I/s)	(kPa)
400x200-3-2.0	576	2	31	25	50	17.0	1.53	0.06	1
	576	2	36	30	45	19.0	2.50	0.10	3
	864	3	66	25	50	18.4	1.89	0.08	2
	864	3	72	30	45	20.2	3.26	0.13	5
	1152	4	113	25	50	19.2	2.20	0.09	2
	1152	4	119	30	45	20.8	4.15	0.17	7
500x250-3-2.0	900	2	31	25	50	17.0	2.38	0.09	2
	900	2	36	30	45	18.6	4.27	0.17	5
	1350	3	66	25	50	18.2	3.02	0.12	3
	1350	3	72	30	45	19.4	6.16	0.25	9
	1800	4	113	25	50	18.9	3.61	0.14	4
	1800	4	119	30	45	19.8	8.34	0.33	15
600x350-3-2	1512	2	31	25	50	17.3	3.86	0.15	1
	1512	2	36	30	45	19.0	6.64	0.26	3
	2268	3	66	25	50	18.6	4.82	0.19	2
	2268	3	72	30	45	19.8	9.48	0.38	6
	3024	4	113	25	50	19.3	5.72	0.23	3
	3024	4	119	30	45	20.1	13.05	0.52	11
700x400-3-2.0	1920	2	47	25	50	17.1	5.02	0.20	1
	1920	2	55	30	45	18.1	8.66	0.35	3
	2880	3	91	25	50	18.5	6.20	0.25	1
	2880	3	100	30	45	18.8	12.94	0.52	4
	3840	4	142	25	50	19.3	7.26	0.29	2
	3840	4	151	30	45	19.0	18.41	0.73	8

Coil calculation, water temp 6/12°C



## **DXRE** Rectangular duct cooling coil (DX)



- Same model for left-hand or right-hand installation (reversible coil)
- Stainless steel condensate drip tray. A droplet eliminator can be fitted regardless of the direction of air flow
- Easily removable drip tray to simplify cleaning and inspection.

DXRE is recommended for central or decentral (zones) cooling of individual rooms. The DXRE is intended for installation in a horizontal duct, with the air flow in either direction (reversible coil).

We recommend that a DE droplet eliminator (accessory) should be installed on theoutlet side of the coil if the air velocity is in excess of 2.5 m/s. This prevents water droplets being entrained by the air flow out into the duct system. Maximum operating pressure 2.4 MPa (24 Bar).





## DE - Droplet separator



Droplet separator for duct cooling coils Droplet separator DE must be ordered extra. Recommended for air velocities from 2.5 m/s

DXRE	В	н	I	0	К
400x200-3-2.5	438	238	70	100	165
500x250-3-2.5	558	288	120	30	165
600x350-3-2.5	638	388	220	30	165
700x400-3-2.5	738	438	250	30	160
DXRE	М	N	S	R	C
DXRE 400x200-3-2.5	M 60	N 19	<b>S</b> 90	R 105	С 1/2"
DXRE 400x200-3-2.5 500x250-3-2.5	M 60 60	N 19 22	<b>S</b> 90 90	<b>R</b> 105 105	C 1/2" 1/2"
DXRE 400x200-3-2.5 500x250-3-2.5 600x350-3-2.5	M 60 60 60	N 19 22 22	<b>S</b> 90 90 90	R 105 105 105	C 1/2" 1/2" 5/8"



DXRE	Air flow	Air pressure drop	Air in	Air in	Air out	Output	Refrigerant flow	Refrigerant Pressure drop
	(m3/h)	(Pa)	(°C)	(% RH)	(°C)	(kW)	(kg/h)	(kPa)
	575	32	25	50	15,8	2,2	Refrigerant flow       V)     (kg/h)       2     51       2     75       7     63       9     90       8     65       4     104       4     80       118     99       3     147       4     103       1     165       1     118       2     99       3     147       4     103       1     165       1     145       1     192       5     164       2     189       4     242       5     189       4     272	3
	575	36	30	50	18,8	3,2		6,1
400,200 2 2 5	865	60	25	50	16,9	2,7	63	4,3
4008200-3-2.5	865	68	30	50	20,4	3,9	90	8,7
	1150	91	25	50	17,5	2,8	65	4,9
	1150	107	30	50	21,2	4,4	104	11,3
	900	32	25	50	15,8	3,4	80	3,2
	900	36	30	50	18,7	5	118	6,6
	1350	60	25	50	16,9	4,2	99	5
500X250-3-2.5	1350	69	30	50	50 21,2 4,4 104   50 15,8 3,4 80   50 18,7 5 118   50 16,9 4,2 99   50 20,1 6,3 147	9,8		
	1800	92	25	50	18	4,4	103	5,2
	1800	108	30	50	21,2	7,1	165	12,1
	1510	32	25	50	15,5	6	Refrigerant flow       (kg/h)       51       75       63       90       65       104       80       118       99       147       103       165       131       192       164       242       189	7,5
	1510	36	30	50	18,4	Output     Refrigera flow       (kW)     (kg/h)       2,2     51       3,2     75       2,7     63       3,9     90       2,8     65       4,4     104       3,4     80       5     118       4,2     99       6,3     147       4,4     103       7,1     165       6     131       8,7     192       7,5     164	192	12,8
	2270	62	25	50	16,7	7,5	164	10,1
0008350-3-2.5	2270	70	30	50	19,8	11	242	18,6
	3025	97	25	50	17,4	8,6	189	12,5
	3025	110	30	50	21	12,4	272	22,6
	2015	40	25	50	14,7	8,6	Refrigerant flow       (kg/h)       51       75       63       90       65       104       80       118       99       147       103       165       131       192       164       242       189       272       188       274	7,6
	2015	44	30	50	17,4	12,5	274	13,3
700-400 2 2 5	3020	72	25	50	16,3	9,6	211	9
700x400-3-2.5	3020	83	30	50	19,3	14,7	323	17,4
	4030	112	25	50	16,5	11,2	246	11,3
	4030	130	30	50	20,2	16,9	370	20

Coil calculation Refrigerant R407C, 5 °C

Refrigerant	R 410A	R 134A	R 404A	R 507A
Factor	1,01	0,93	1,00	0,97

Recalculation of the basic value with different refrigerants



Pressure drop DE, droplet eliminator



# Product range

Systemair has an extensive range of ventilation products, the majority of which are fans and air handling units. Other products include a wide range of air terminal devices for various applications. These products are installed in a variety of locations, including homes, offices, healthcare premises, shops, industrial buildings, tunnels, parking garages, training facilities, sports centres. The most common usage is comfort ventilation, but safety ventilation in various forms is also an important market. Smoke gas ventilation and tunnel ventilation are two examples.



### Fans

Systemair is one of the world's largest suppliers of fans for use in various types of property.

Our range includes everything from duct fans with a round connection – the company's original product to rectangular duct fans, roof fans, axial fans, explosion-proof fans, and smoke gas fans.

These fans can be supplied in sizes suitable for everything from ducts with a diameter of just 100 mm to large road tunnel fans. All our fans have been developed to comply with stringent requirements and are characterised by user-friendliness, a high level of quality and a long service life.

### Circular duct fans

Duct fans with a circular connection.



**Radial fans** Single-inlet radial fans.



#### Rectangular duct fans

Duct fans with a rectangular connection.



### Box fans

For extract air systems that transport normal or high-temperature media.



#### **Axial fans**

Axial fans for duct connection or wall mounting

Roof fans

Roof fans with a circular or square connection.



Explosion-proof fans

Explosion-proof fans for duct, roof and axial installations.



### Jet fans

The jet fan range includes products for garages and road and rail tunnels.





#### Thermo fans

Systemair supplies high temperature fans that can withstand conditions of up to 600°C for 120 minutes





### Fire safety ventilation

Systemair produces fans, dampers and control equipment for protection against smoke and fire certified for use during normal operation and in the event of a fire. The axial fans are certified for installation inside or outside fire risk areas.

#### Smoke gas fans

High-capacity fans for evacuation of smoke gases.



**Fire dampers** Dampers that reduce the spread of smoke and fire.



### **Residental ventilation**

Complete energy-efficient air handling units with heat recovery and built-in control systems. Designed to be mounted over the cooker, on walls or horizontally in attics.

#### **Residential units**

For homes with living areas of 60-320  $\ensuremath{\mathsf{m}}^2.$ 





Nozzle air devices

**Cooker hoods** 



Optimum air distribution for rooms.

### Air terminal devices

Systemair's range also includes a wide selection of air terminal devices for all possible environments and positions. Development and manufacture take place at a modern factory in Slovakia. Supply, extract & transfer air terminal devices

For mounting in ceilings or walls.



**Supply & extract air ventilators** For mounting in ceilings and walls





**Duct products** Dampers, plenum boxes, and duct accessories.





