OPTIMA-S-FC...BM

VAV Controller, Belimo Modbus Modular

Handbook

systemair

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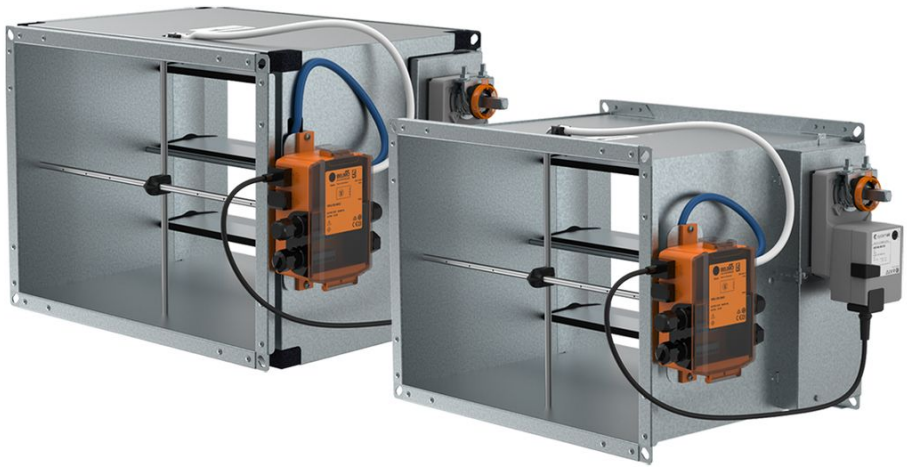


Description

OPTIMA-S-FC...BM is a variable air volume controller with or without an insulation. The product is intended to control the flow volume of supply or return air. The product is installed into rectangular ducts. The product is ideal for all applications, where a variable air flow volume in ventilation, cooling or heating is required (offices, hotel rooms, meeting rooms, health care premisses, residentials, etc.)

Highlights

- Damper tightness class 4 according to EN 1751
- Casing tightness class C according to EN 1751
- High measurement/control accuracy of 5 %
- Air volume range of 144 m³/h to 47500 m³/h
- Operating range of pressure drop up to 1000 Pa
- Actuators with quick transition or safety positioning function available
- Insulated version OPTIMA-SI-FC...BM with external insulation for sound reduction

Types of Product

- **OPTIMA-S-FC...BM**: Non-insulated VAV controller
- **OPTIMA-SI-FC...BM**: Insulated VAV controller

Type of Controller

- **BM**: Modbus-RTU or BACnet MS/TP switchable port for communication of all variables, analog setpoint and feedback signals DC 0 (2)V ... 10 V applicable

Types of Actuators

- **S**: Standard actuator
- **Q**: Actuator with short transition time
- **QE**: Actuator with short transition time and electric safety function
- **F**: Actuator with mechanical safety function – spring return

List of Accessories

- **ZTH-EU**: Handheld Tool
- **ZIP-BT-NFC**: Communication Port Bluetooth/NFC

Design

OPTIMA-S-FC...BM consists of a galvanized steel sheet casing, aluminium profile blades with rubber gaskets and a modular VAV control device. OPTIMA-SI-FC...BM is equipped by an insulation for sound reduction. The insulation is a 19 mm thick closed cell foam mat, protected by galvanized steel sheet. The casing contains a robust flanged mounting frame for installation into ducts. The blades are opposed action. The modular VAV control device consists of an aluminium measurement probe, polyurethane measurement impulse tubes, an air flow transmitter, a modular control unit and an actuator. The measurement probe is a special design cross. It is a multi-point averaging flow sensor for accurate air flow readings. The measurement impulse tubes connect the measurement probe with the air flow transmitter.

Actuators

- **S**: Standard actuator

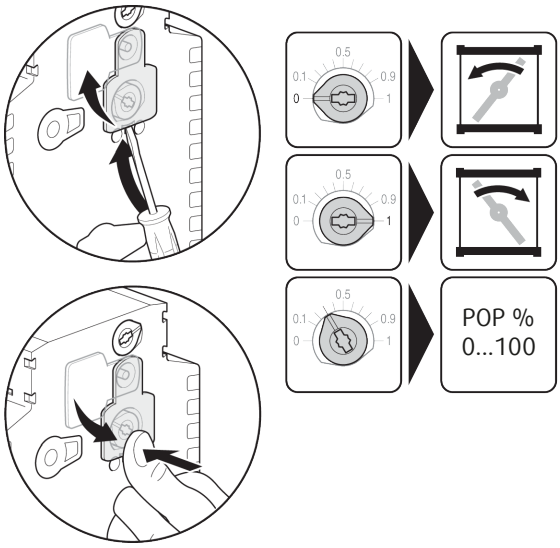
- **Q**: Actuator with short transition time

- **QE**: Actuator with short transition time and electric safety function

The default manufacturer setting of the actuator safety function is **closing after power supply interruption**.

Upon request the manufacturer setting can be changed to **opening after power supply interruption**. Adjustment of intermediate final safety position (0% ... 100% opening) is possible.

The possibility to change the safety function on site is available.



- **F**: Actuator with mechanical safety function – spring return

The default manufacturer setting of the actuator safety function is **closing after power supply interruption**.

Upon request the manufacturer setting can be changed to **opening after power supply interruption**.

OPTIMA-S(I)-FC...BM																						
T_{max} (Nm)		W (mm)																				
		200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
H (mm)	100	4	4	4	4	4	4	4	4	4												
	150	4	4	4	4	4	4	4	4	4	4											
	200	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5						
	250			4	4	4	4	4	4	4	4	5	5	5	5	5	5					
	300			4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5		
	350			4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	
	400					4	4	4	4	5	5	5	5	5	5	5	5	5	5	6	6	6
	450						4	5	5	5	5	5	5	5	5	5	5	5	6	6	6	8
	500							5	5	5	5	5	5	5	5	6	6	6	6	6	8	8
	550								5	5	5	5	5	5	6	6	6	6	8	8	8	8
	600									5	5	6	6	6	6	6	8	8	8	8	8	8
	650										5	6	6	6	6	8	8	8	8	8	8	8
	700											6	6	6	8	8	8	8	8	8	8	8
	750												6	8	8	8	8	8	8	10	10	10
	800													8	8	8	8	8	8	10	10	10
	850														8	8	8	8	10	10	10	10
	900															8	8	8	10	10	10	10
	950																10	10	10	10	10	10
	1000																	10	10	10	10	10

OPTIMA-S(I)-FC...BM-S/Q/QE/F							
S		Q		QE		F	
4	LM24A-VST	4	LMQ24A-VST	4	NKQ24A-VST	4	LF24A-VST
5		5	NMQ24A-VST	5		5	NF24A-VST
6	NM24A-VST	6		6		6	
8		8		8	-	8	
10		10	-	10		10	

	∡	⏱	⏱⊗	P_r (VA)	P (W)
LM24A-VST	90°	↺/↻120 s	-	4	2,5
NM24A-VST	90°	↺/↻120 s	-	6	3,5
LMQ24A-VST	90°	↺/↻2,5 s	-	25	14,5
NMQ24A-VST	90°	↺/↻4 s	-	25	14,5
SMQ24A-VST	90°	↺/↻7 s	-	28	16,5
NKQ24A-VST	90°	↺/↻4 s	↻4 s	24	12,5
LF24A-VST	90°	↺/↻120 s	↻<20 s	7	4
NF24A-VST	90°	↺/↻120 s	↻<20 s	10	6,5

Legend

∡

Positioning angle

⏱

Transition time

⏱⊗

Transition time without power supply (safety funcition)

P_r (VA)

Power rating (actuator + controller VRU...)

P (W)

Power consumption in operation (actuator + controller VRU...)

Noise and thermal insulation material for OPTIMA-SI-FC...BM

Base	NBR/PVC
Cellular Structure	Closed
Colour	Black
Density	80 kg/m³
Water Absorption	2 % < 5 %
Resistence	Air+ U.V.-Good
Thermal Conductivity (t. + 40 °C)	< 0,039 W/m K
	Class 1 (DM 26/06/84)
	UL 94-HF1
Fire Resistance	Class 0 - BS 476 part6-7 UK
	NF certificate n.38 (until mm.32) France
	B-s3,d0 (EN 13501-1) Euroclass
Marine and Shipbuilding	MED B - MED D - DNV type approval
Steam Diffusion	MU > 7.000
Noise Reduction (DIN 4109)	Up to 30 dB
Ecological Compatibility	NO CFC - HCFC, asbest free

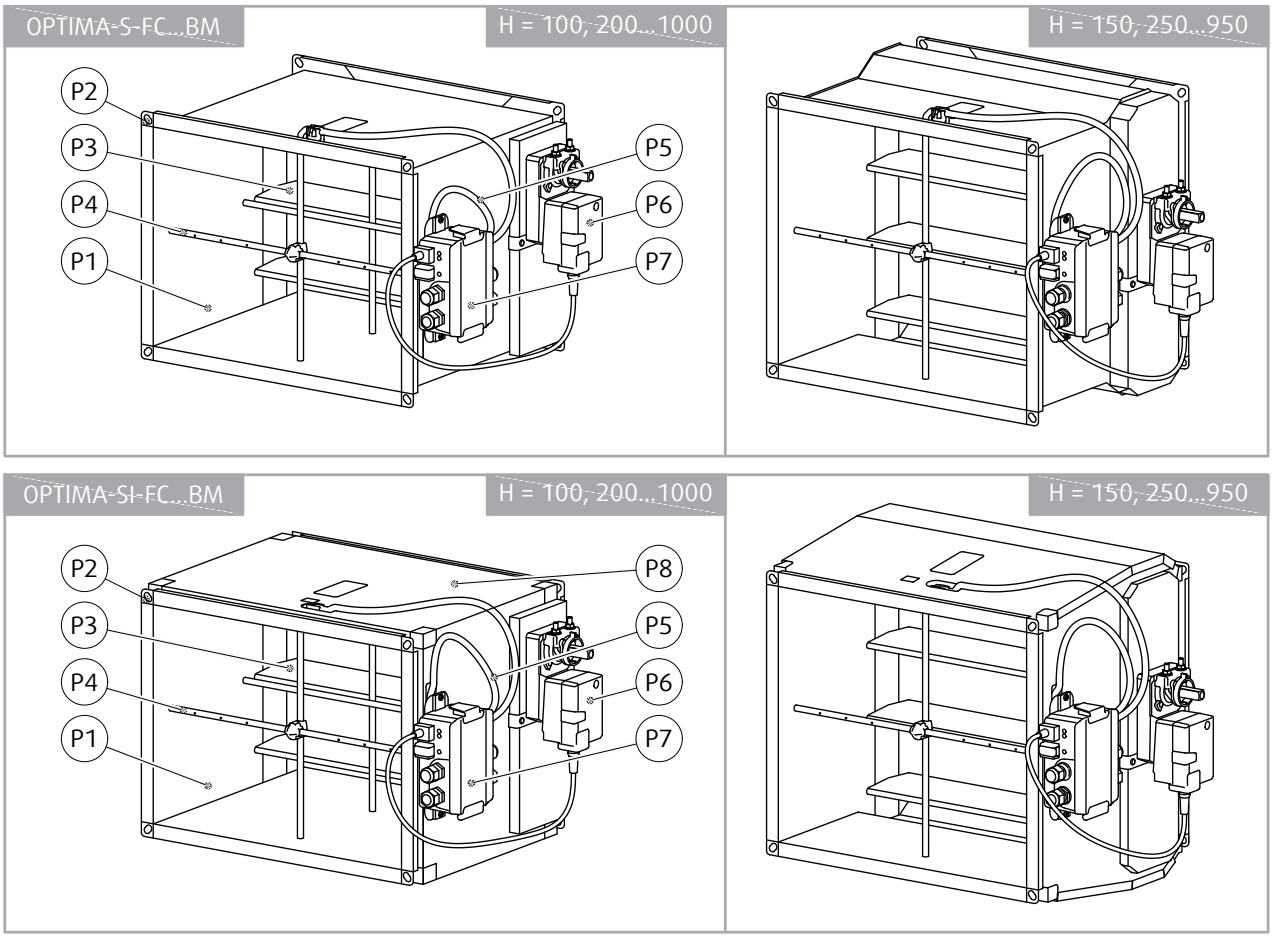
Controls

The VAV controllers are equipped by OEM control module and actuator from Belimo. The control units are factory calibrated as standard to the air volume control range V_{min} ... V_{max}. The dimension table shows this standard setting. Upon request the control range V_{min} ... V_{max} can be adjusted to customized settings prior to dispatch. The air volumes can also be re-adjusted on site with ZTH-EU hand held service tool. If specific air values for V_{min} and V_{max} would be required, this must be indicated prior to order of the units for adequate calibration in the factory.

Modular Control/Actuator Unit Functionality Description

Compact Control/ Actuator Unit	Analog Input	BUS Communi-cation	Parameters Setup	Hard Wired Override	Feedback Signal	Feedback Values	Main BUS Com. Variables	Power Supply
BM-S BM-Q BM-QE BM-F	DC 0 V (2 V) ... 10 V	Modbus-RTU BACnet MS/TP	ZTH-EU ZIP-BT-NFC	OPEN, CLOSE, V_{min}, V_{max}	Modbus-RTU BACnet MS/TP DC 0(2) V ... 10 V	Actual volume, Damper angle, Dynamic pressure	**Read/write**: Setpoint, V_{min}, V_{max}, OPEN, CLOSE **Read**: Actual volume, damper angle, actual pressure, serial number, fault/alarm messages	AC/DC 24 V

Product Parts

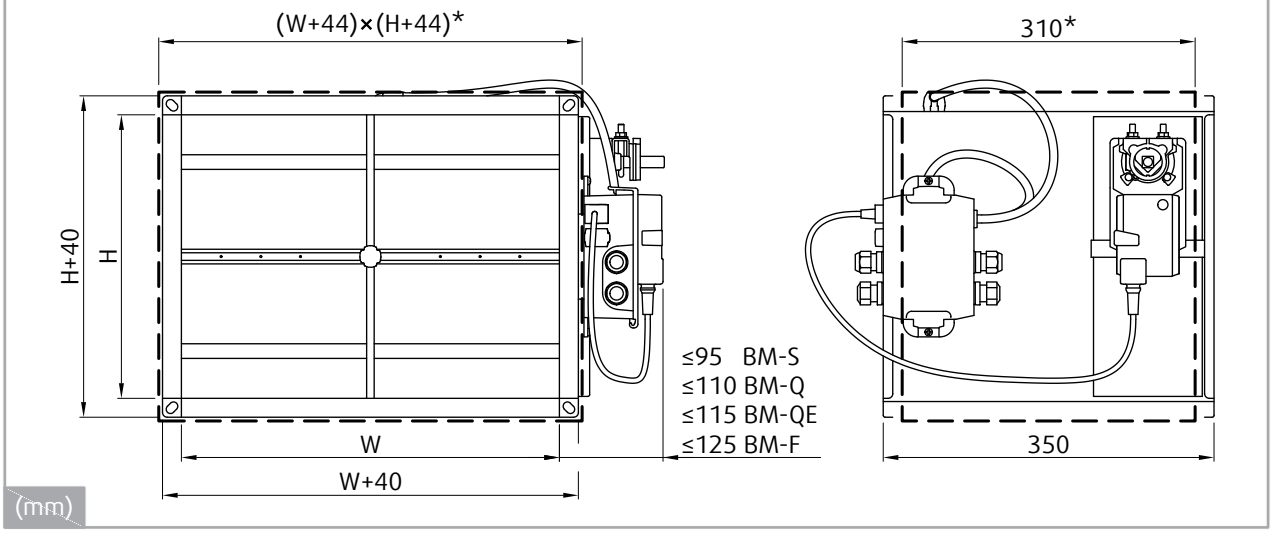


Legend

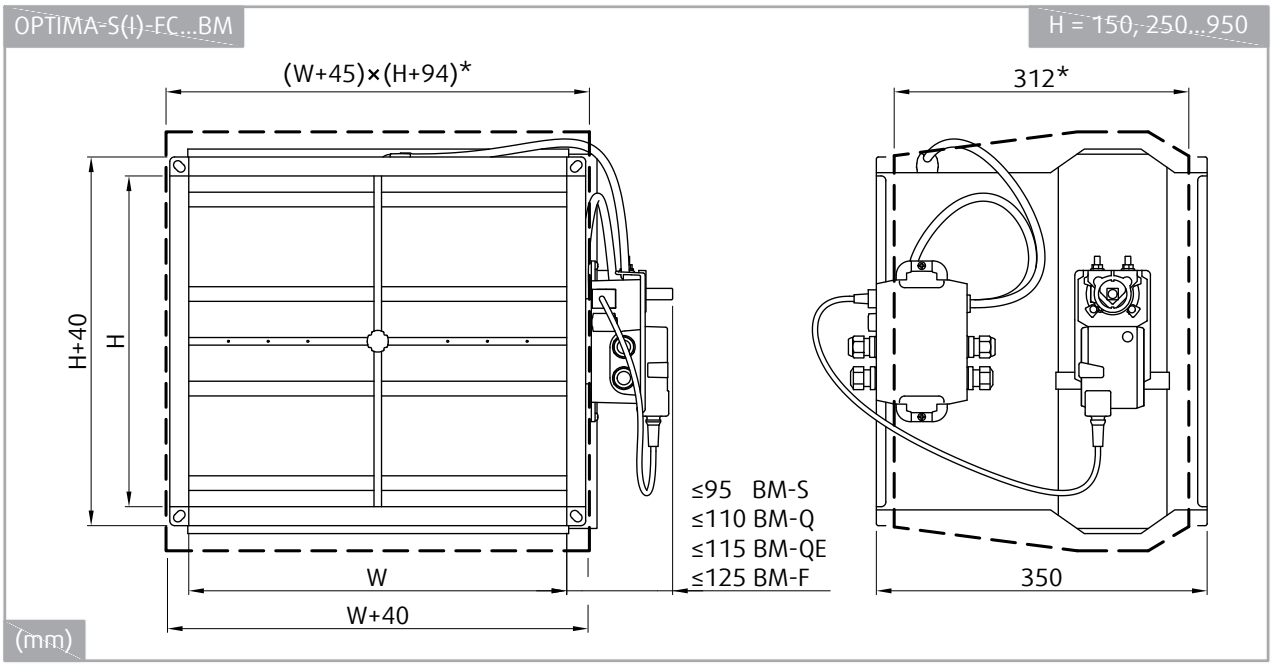
P1 Casing
P2 Duct connection flanges
P3 Damper blade with gasket
P4 Measurement probe
P5 Measurement impulse tubes
P6 Modular control/actuator unit
P7 Air flow transmitter
P8 Insulation

Dimensions & Weights

OPTIMA-S(I)-FC...BM — H = 100, 200...1000



OPTIMA-S(I)-FC...BM — H = 150, 250...950



* Insulation

m (kg) \ H (mm)	OPTIMA-S-FC...BM W (mm)																				
	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
100	2,3	2,3	3,5	4,6	4,6	5,8	5,8	6,9	6,9	-	-	-	-	-	-	-	-	-	-	-	-
150	4,6	5,8	5,8	6,9	6,9	6,9	8,1	8,1	9,2	10,4	-	-	-	-	-	-	-	-	-	-	-
200	6,9	8,1	8,1	9,2	9,2	9,2	10,4	10,4	11,5	11,5	11,5	12,7	12,7	13,8	13,8	-	-	-	-	-	-
250	-	8,1	8,1	10,4	10,4	10,4	10,4	10,4	11,5	11,5	12,7	13,8	13,8	15,0	16,1	16,1	-	-	-	-	-
300	-	-	9,2	10,4	11,5	10,4	10,4	11,5	11,5	12,7	13,8	15,0	16,1	17,3	21,9	21,9	24,2	24,2	25,3	-	-
350	-	-	10,4	11,5	12,7	11,5	11,5	11,5	12,7	13,8	15,0	16,1	17,3	19,6	21,9	23,0	25,3	25,3	27,6	28,8	-
400	-	-	-	-	13,8	13,8	12,7	12,7	13,8	15,0	16,1	17,3	19,6	21,9	23,0	26,5	28,8	29,9	31,1	32,2	33,4
450	-	-	-	-	-	13,8	15,0	15,0	15,0	16,1	18,4	19,6	21,9	24,2	24,2	27,6	29,9	31,1	32,2	33,4	34,5
500	-	-	-	-	-	-	17,3	16,1	17,3	18,4	20,7	21,9	24,2	25,3	26,5	28,8	32,2	33,4	34,5	35,7	36,8
550	-	-	-	-	-	-	-	18,4	19,6	20,7	23,0	24,2	25,3	27,6	27,6	29,9	33,4	34,5	35,7	36,8	39,1
600	-	-	-	-	-	-	-	-	21,9	23,0	24,2	25,3	27,6	28,8	28,8	31,1	34,5	36,8	38,0	39,1	41,4
650	-	-	-	-	-	-	-	-	-	25,3	26,5	27,6	28,8	31,1	31,1	33,4	36,8	38,0	40,3	41,4	43,7
700	-	-	-	-	-	-	-	-	-	-	28,8	29,9	31,1	33,4	33,4	35,7	39,1	40,3	42,6	43,7	46,0
750	-	-	-	-	-	-	-	-	-	-	-	31,1	33,4	34,5	35,7	38,0	41,4	42,6	43,7	46,0	48,3
800	-	-	-	-	-	-	-	-	-	-	-	-	34,5	35,7	36,8	39,1	42,6	43,7	46,0	48,3	49,5
850	-	-	-	-	-	-	-	-	-	-	-	-	-	36,8	39,1	40,3	43,7	44,9	47,2	49,5	51,8
900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40,3	42,6	46,0	47,2	49,5	51,8	54,1
950	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44,9	47,2	49,5	51,8	54,1	56,4
1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49,5	51,8	54,1	56,4	57,5

m (kg) \ H (mm)	OPTIMA-SI-FC...BM W (mm)																				
	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
100	3,5	3,5	5,2	6,9	6,9	8,6	8,6	10,4	10,4	-	-	-	-	-	-	-	-	-	-	-	-
150	6,9	8,6	8,6	10,4	10,4	10,4	12,1	12,1	13,8	15,5	-	-	-	-	-	-	-	-	-	-	-
200	10,4	12,1	12,1	13,8	13,8	13,8	15,5	15,5	17,3	17,3	17,3	19,0	19,0	20,7	20,7	-	-	-	-	-	-
250	-	12,1	12,1	15,5	15,5	15,5	15,5	15,5	17,3	17,3	19,0	20,7	20,7	22,4	24,2	24,2	-	-	-	-	-
300	-	-	13,8	15,5	17,3	15,5	15,5	17,3	17,3	19,0	20,7	22,4	24,2	25,9	32,8	32,8	36,2	36,2	38,0	-	-
350	-	-	15,5	17,3	19,0	17,3	17,3	17,3	19,0	20,7	22,4	24,2	25,9	29,3	32,8	34,5	38,0	38,0	41,4	43,1	-
400	-	-	-	-	20,7	20,7	19,0	19,0	20,7	22,4	24,2	25,9	29,3	32,8	34,5	39,7	43,1	44,9	46,6	48,3	50,0
450	-	-	-	-	-	20,7	22,4	22,4	22,4	24,2	27,6	29,3	32,8	36,2	36,2	41,4	44,9	46,6	48,3	50,0	51,8
500	-	-	-	-	-	-	25,9	24,2	25,9	27,6	31,1	32,8	36,2	38,0	39,7	43,1	48,3	50,0	51,8	53,5	55,2
550	-	-	-	-	-	-	-	27,6	29,3	31,1	34,5	36,2	38,0	41,4	41,4	44,9	50,0	51,8	53,5	55,2	58,7
600	-	-	-	-	-	-	-	-	32,8	34,5	36,2	38,0	41,4	43,1	43,1	46,6	51,8	55,2	56,9	58,7	62,1
650	-	-	-	-	-	-	-	-	-	38,0	39,7	41,4	43,1	46,6	46,6	50,0	55,2	56,9	60,4	62,1	65,6
700	-	-	-	-	-	-	-	-	-	-	43,1	44,9	46,6	50,0	50,0	53,5	58,7	60,4	63,8	65,6	69,0
750	-	-	-	-	-	-	-	-	-	-	-	46,6	50,0	51,8	53,5	56,9	62,1	63,8	65,6	69,0	72,5
800	-	-	-	-	-	-	-	-	-	-	-	-	51,8	53,5	55,2	58,7	63,8	65,6	69,0	72,5	74,2
850	-	-	-	-	-	-	-	-	-	-	-	-	-	55,2	58,7	60,4	65,6	67,3	70,7	74,2	77,6
900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60,4	63,8	69,0	70,7	74,2	77,6	81,1
950	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67,3	70,7	74,2	77,6	81,1	84,5
1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74,2	77,6	81,1	84,5	86,3

Legend

m (kg)

Actuator torque 5 Nm

m (kg)

Actuator torque 10 Nm

Ordering Codes

OPTIMA-S-FC...BM

Non-insulated VAV Controller

OPTIMA-S-FC

Nominal Size

W × H

OEM Belimo, Communication Type

BM Switchable: Modbus-RTU or BACnet MS/TP or MP-Bus or analog setpoint/feedback DC 0 (2) V ... 10 V

Actuator Type

S Standard actuator
Q Actuator with short transition time
QE Actuator with short transition time and electric safety function (only for sizes ≤ DN 400)
F Actuator with mechanical safety function – spring return

OPTIMA-SI-FC...BM

Insulated VAV Controller

OPTIMA-SI-FC

Nominal Size

W × H

OEM Belimo, Communication Type

BM Switchable: Modbus-RTU or BACnet MS/TP or MP-Bus or analog setpoint/feedback DC 0 (2) V ... 10 V

Actuator Type

S Standard actuator
Q Actuator with short transition time
QE Actuator with short transition time and electric safety function (only for sizes ≤ DN 400)
F Actuator with mechanical safety function – spring return

Example of the Ordering Code

OPTIMA-SI-FC-400x300-BM-F

Insulated VAV contoller, nominal size 400 mm x 300 mm, with spring return safety function actuator.

NOTES:

Standard setup of the control module is Modbus communication.

Standard setup of the V_{min} and V_{max} is indicated in the Quick Selection table. It can be changed upon request, if requested as a note to the order.

Accessories

ZTH-EU

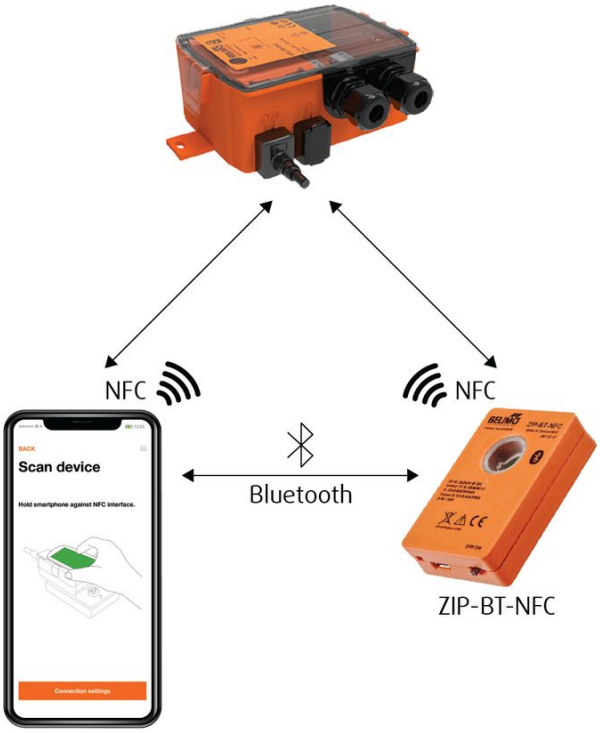
Handheld Tool

ZTH-EU is a handheld tool for VAV controllers and communicative actuators. The product enables the customer to change the configuration of the VAV controllers.

ZIP-BT-NFC

Communication Port Bluetooth/NFC

ZIP-BT-NFC is a wireless interface connecting the smartphone with configuration app Belimo Assistant via Bluetooth to the VAV controller VRU... with NFC communication protocol.



Configuration with ZTH-EU or by Belimo Assistant app via NFC or via Bluetooth through ZIP BT NFC

Parametrisation

			Tool		Authorisation
Parameter/Function	Unit/Value	Function/Description/ (Area)	Assistant App	ZTH-EU	Expert/OEM
VAV Unit/Air Duct Pressure Control Butterly Valve - Manufacturer Parameters (OEM Values - Not Variable)					
OSN Actuator	xxxxx-xxxxx-xxx-xxx	Actuator series number	r	–	
Rotation Direction	CCW/CW	Actuator direction of rotation setting	r/w	–	E
Range of rotation	Adapted/programmed	Actuator adapted/ programmed 30°...95°	r/w	–	E
Power on behaviour	No action/synch. / adaption	Actuator power on behaviour	r/w	–	E
Parametrisation - Project-specific Settings					
Position	Text string	Plant designation (64 Z./ ZTH 16 Z.)	r/w	r	
Max	m^3/h | l/s | cfm (PC-tool/ ZTH %) % (position)	Operating volumetric flow 0% ... 100% V_{nom} Damper position (pos. ctrl.) 0% ... 100%	r/w	r/w	
Min	m^3/h | l/s | cfm (PC-tool/ ZTH %) % (position)	Operating volumetric flow 0% ... 100% V_{nom} Damper position (pos. ctrl.) 0% ... 100%	r/w	r/w	
Altitude compensation	ON/OFF	Switch function ON/OFF	r/w	–	E
Altitude of installation	0 m	Compensated Δp and volumetric flow values to set the altitude of installation (above sea level)	r/w	–	E
Function	VAV-CAV/position control	Control function	r/w	–	E
Room pressure cascade	ON/OFF	VAV: secondary circuit room pressure cascade	r/w	–	E
Setpoint	Analogue/bus	Analogue and hybrid mode/bus	r/w	–	E
Setpoint offset	0	VAV: ±5% compensation ABL unit	r/w	–	E
Reference signal Y	2 V ... 10 V/0 V ... 10 V/ adjustable	Setting for VAV control	r/w	–	E
Feedback type	Volumetric flow/Δp/ position	VAV: volume/Δp/damper position Pressure: Δp/damper position	r/w	–	E
Feedback U	2 V ... 10 V/0 V ... 10 V/ adjustable	Setting U signal	r/w	–	E

Bus parameter

			Tool		Authorisation
Parameter/Function	Unit/Value	Function/Description/ (Area)	Assistant App	ZTH-EU	Expert/OEM
Parametrisation – Communication					
Bus protocol	BACnet MS/TP / Modbus / MP		r/w	–	E
Bus protocol	BACnet MS/TP				
MAC address	0...127		r/w	–	E
Baudrate	9600 / ... / 115200		r/w	–	E
Terminating resistor	OFF/ON		r/w	–	E
Instance number	1...4194304		r/w	–	E
Device name	VAV universal	(32 Z.)	r/w	–	E
Max master	1...127		r/w	–	E
Bus protocol	Modbus RTU				
Address	1...247		r/w	–	E
Baudrate	9600 / ... / 115200		r/w	–	E
Terminating resistor	OFF/ON		r/w	–	E
Parity	1-8-N-2/...E-1/...-O-1/...-N-1		r/w	–	E
Bus protocol	Modbus RTU				
MP address	PP/MP1...8	PP (MP off)/MP1...8	r/w	–	E
Bus fail position	0	0% ... 100% (min...max)	r/w	–	E
Compatibility mode	Default/VRP-M	Default: Belimo MP datapool device VRP-M: VRP-M replacement in existing MP system	r/w	–	E

Legend

X Application supports function

r Tool: read

w Tool: write

– Tool: Does not support parameter

E Only visible in Expert Mode Authorisations - functionally relevant settings are only accessible via the Expert Level of the Belimo Assistant App.

Quick Selection

NOTES:

* Standard setup of the Vmin is adjusted corresponding to air flow velocity 2 m/s and standard setup of the Vmax is adjusted corresponding to air flow velocity 9 m/s. It can be changed upon request, if stated in the ordering code.

The V_{min} can be adjusted from 0 m^3/h to V_{nom} value from the table below.

The V_{max} can be adjusted from 20 % to 100 % of the V_{nom} value from the table below.

W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
200	100	792	144	648
	150	1188	216	972
	200	1584	288	1296
250	100	990	180	810
	150	1485	270	1215
	200	1980	360	1620
	250	2475	450	2025
300	100	1188	216	972
	150	1782	324	1458
	200	2376	432	1944
	250	2970	540	2430
	300	3564	648	2916
	350	4158	756	3402
350	100	1386	252	1134
	150	2079	378	1701
	200	2772	504	2268
	250	3465	630	2835
	300	4158	756	3402
	350	4851	882	3969
400	100	1584	288	1296
	150	2376	432	1944
	200	3168	576	2592
	250	3960	720	3240
	300	4752	864	3888
	350	5544	1008	4536
	400	6336	1152	5184
450	100	1782	324	1458
	150	2673	486	2187
	200	3564	648	2916
	250	4455	810	3645
	300	5346	972	4374
	350	6237	1134	5103
	400	7128	1296	5832
	450	8019	1458	6561

W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
500	100	1980	360	1620
	150	2970	540	2430
	200	3960	720	3240
	250	4950	900	4050
	300	5940	1080	4860
	350	6930	1260	5670
	400	7920	1440	6480
	450	8910	1620	7290
	500	9900	1800	8100
550	100	2178	396	1782
	150	3267	594	2673
	200	4356	792	3564
	250	5445	990	4455
	300	6534	1188	5346
	350	7623	1386	6237
	400	8712	1584	7128
	450	9801	1782	8019
	500	10890	1980	8910
	550	11979	2178	9801
600	100	2376	432	1944
	150	3564	648	2916
	200	4752	864	3888
	250	5940	1080	4860
	300	7128	1296	5832
	350	8316	1512	6804
	400	9504	1728	7776
	450	10692	1944	8748
	500	11880	2160	9720
	550	13068	2376	10692
	600	14256	2592	11664

W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
650	150	3861	702	3159
	200	5148	936	4212
	250	6435	1170	5265
	300	7722	1404	6318
	350	9009	1638	7371
	400	10296	1872	8424
	450	11583	2106	9477
	500	12870	2340	10530
	550	14157	2574	11583
	600	15444	2808	12636
	650	16731	3042	13689
700	200	5544	1008	4536
	250	6930	1260	5670
	300	8316	1512	6804
	350	9702	1764	7938
	400	11088	2016	9072
	450	12474	2268	10206
	500	13860	2520	11340
	550	15246	2772	12474
	600	16632	3024	13608
	650	18018	3276	14742
	700	19404	3528	15876
750	200	5940	1080	4860
	250	7425	1350	6075
	300	8910	1620	7290
	350	10395	1890	8505
	400	11880	2160	9720
	450	13365	2430	10935
	500	14850	2700	12150
	550	16335	2970	13365
	600	17820	3240	14580
	650	19305	3510	15795
	700	20790	3780	17010
	750	22275	4050	18225

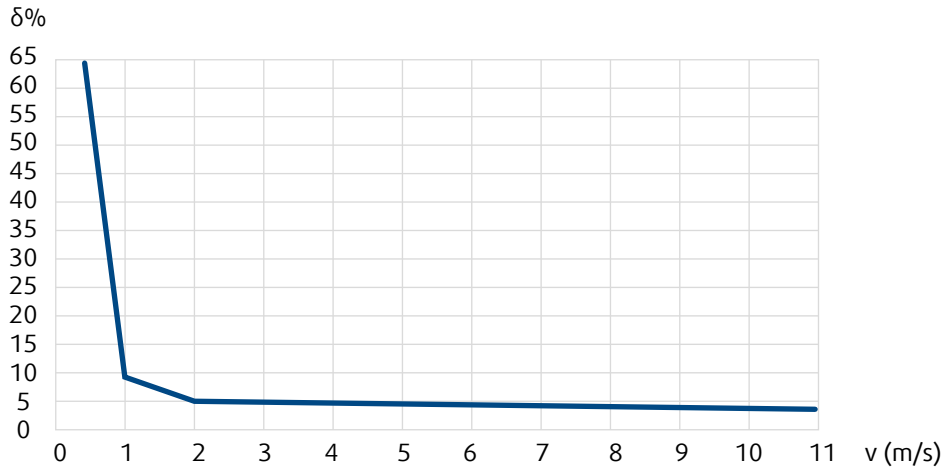
W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
800	200	6336	1152	5184
	250	7920	1440	6480
	300	9504	1728	7776
	350	11088	2016	9072
	400	12672	2304	10368
	450	14256	2592	11664
	500	15840	2880	12960
	550	17424	3168	14256
	600	19008	3456	15552
	650	20592	3744	16848
	700	22176	4032	18144
	750	23760	4320	19440
	800	25344	4608	20736
850	200	6732	1224	5508
	250	8415	1530	6885
	300	10098	1836	8262
	350	11781	2142	9639
	400	13464	2448	11016
	450	15147	2754	12393
	500	16830	3060	13770
	550	18513	3366	15147
	600	20196	3672	16524
	650	21879	3978	17901
	700	23562	4284	19278
	750	25245	4590	20655
	800	26928	4896	22032
	850	28611	5202	23409

W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
900	200	7128	1296	5832
	250	8910	1620	7290
	300	10692	1944	8748
	350	12474	2268	10206
	400	14256	2592	11664
	450	16038	2916	13122
	500	17820	3240	14580
	550	19602	3564	16038
	600	21384	3888	17496
	650	23166	4212	18954
	700	24948	4536	20412
	750	26730	4860	21870
	800	28512	5184	23328
	850	30294	5508	24786
	900	32076	5832	26244
950	250	9405	1710	7695
	300	11286	2052	9234
	350	13167	2394	10773
	400	15048	2736	12312
	450	16929	3078	13851
	500	18810	3420	15390
	550	20691	3762	16929
	600	22572	4104	18468
	650	24453	4446	20007
	700	26334	4788	21546
	750	28215	5130	23085
	800	30096	5472	24624
	850	31977	5814	26163
	900	33858	6156	27702
	950	35739	6498	29241

W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
1000	300	11880	2160	9720
	350	13860	2520	11340
	400	15840	2880	12960
	450	17820	3240	14580
	500	19800	3600	16200
	550	21780	3960	17820
	600	23760	4320	19440
	650	25740	4680	21060
	700	27720	5040	22680
	750	29700	5400	24300
	800	31680	5760	25920
	850	33660	6120	27540
	900	35640	6480	29160
	950	37620	6840	30780
	1000	39600	7200	32400
1050	300	12474	2268	10206
	350	14553	2646	11907
	400	16632	3024	13608
	450	18711	3402	15309
	500	20790	3780	17010
	550	22869	4158	18711
	600	24948	4536	20412
	650	27027	4914	22113
	700	29106	5292	23814
	750	31185	5670	25515
	800	33264	6048	27216
	850	35343	6426	28917
	900	37422	6804	30618
	950	39501	7182	32319
	1000	41580	7560	34020

W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
1100	300	13068	2376	10692
	350	15246	2772	12474
	400	17424	3168	14256
	450	19602	3564	16038
	500	21780	3960	17820
	550	23958	4356	19602
	600	26136	4752	21384
	650	28314	5148	23166
	700	30492	5544	24948
	750	32670	5940	26730
	800	34848	6336	28512
	850	37026	6732	30294
	900	39204	7128	32076
	950	41382	7524	33858
	1000	43560	7920	35640
1150	350	15939	2898	13041
	400	18216	3312	14904
	450	20493	3726	16767
	500	22770	4140	18630
	550	25047	4554	20493
	600	27324	4968	22356
	650	29601	5382	24219
	700	31878	5796	26082
	750	34155	6210	27945
	800	36432	6624	29808
	850	38709	7038	31671
	900	40986	7452	33534
	950	43263	7866	35397
	1000	45540	8280	37260

W	H	V_{nom} @ 11 m/s	V_{min} @ 2 m/s	V_{max} @ 9 m/s
mm		m^3/h		
1200	400	19008	3456	15552
	450	21384	3888	17496
	500	23760	4320	19440
	550	26136	4752	21384
	600	28512	5184	23328
	650	30888	5616	25272
	700	33264	6048	27216
	750	35640	6480	29160
	800	38016	6912	31104
	850	40392	7344	33048
	900	42768	7776	34992
	950	45144	8208	36936
	1000	47520	8640	38880

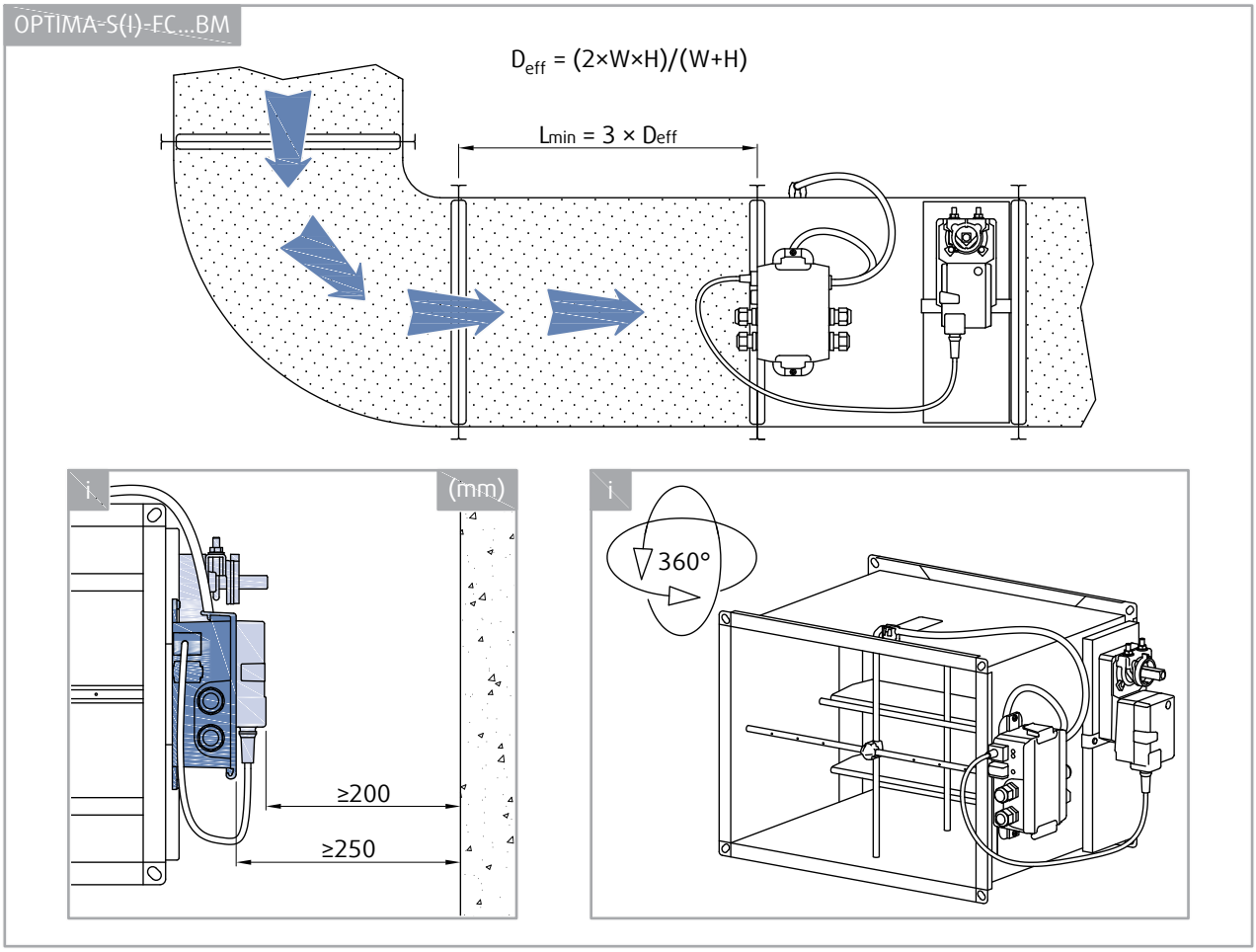


Typical max. absolute control deviation δ from actual air flow dependent on the air flow velocity v in the duct

Technical Parameters

Diagrams and technical parameters are available at design.systemair.com

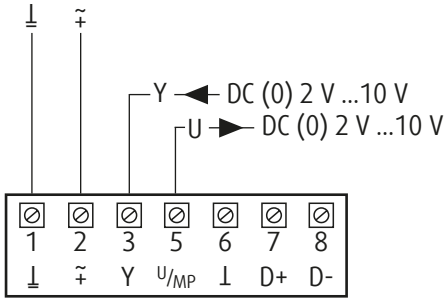
Installation



Electrical Connections

AC/DC 24 V, modulating (VAV)

The VAV controller operates with setpoint adjusted through analog input signal (terminal 3) and feedback signal (terminal 5).



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

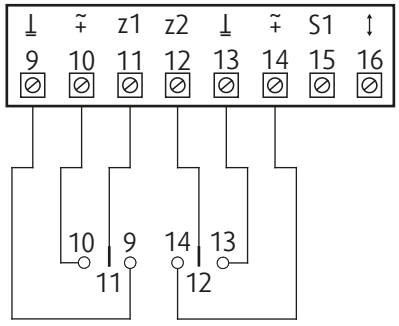
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{max}

11 and 12 without contact = no priority override through z1 or z2



Priority rule - Analog VAV-control

1. z1
2. z2
3. a) adaption (autonomous initializing controller function)
4. b) synchronisation (autonomous initializing controller function)
5. Y-Modulating: V_{min} ... V_{max} (through analog input)

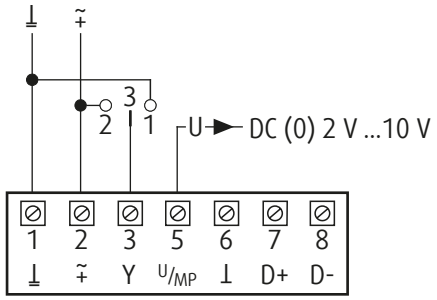
AC/DC 24 V, contactor step control (CAV)

The VAV controller operates with setpoint in discrete steps generated by different potentials connected to the analog input (terminal 3) and analog feedback signal (terminal 5).

Contact 2-3 = V_{max}
3 not connected = V_{min}
Contact 1-3 = damper CLOSE (control signal mode 2...10V)

Contact 1-3 = V_{min} (control signal mode 0...10 V)

The control signal mode can be adjusted in the VAV controller by the handheld configuration tool ZTH-EU.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

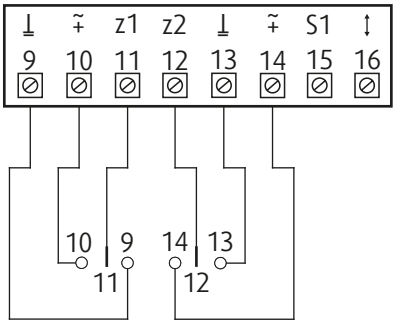
Override control z1

Contact 11-9 = Motor STOP

Contact 11-10 = Damper OPEN

Override control z2Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{max}
11 and 12 without contact = no priority override through z1 or z2



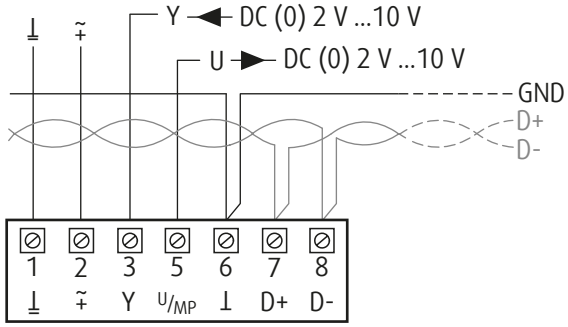
Priority rule - Step-Control

1. z1
2. z2
3. a) adaption (autonomous initializing controller function)
4. b) synchronisation (autonomous initializing controller function)
5. Y-Step Control: Close – V_{min} - V_{max} (through analog input)

BACnet MS/TP or Modbus RTU

(This operation mode requires parametrization)

VAV control in V_{min} ... V_{max} range and other functionalities with all variables communicated through bus (terminals 7, 8) – by Modbus or BACnet protocol.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

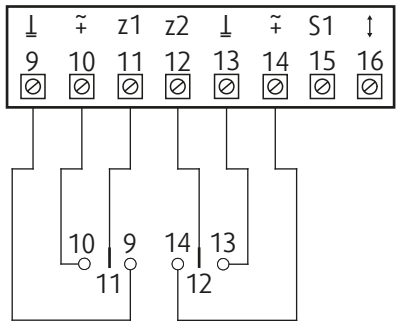
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{max}

11 and 12 without contact = no priority override through z1 or z2



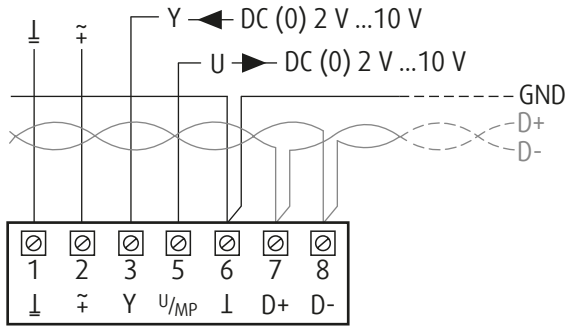
Priority rule – BACnet / Modbus Control

1. z1
2. z2
3. Bus Watchdog
4. a) adaption (autonomous initializing controller function)
5. b) synchronisation (autonomous initializing controller function)
6. Bus Override
7. Bus Setpoint: V_{min} - V_{max}

BACnet MS/TP or Modbus RTU with analog setpoint (hybrid mode)

(This operation mode requires parametrization)

VAV control in V_{min} ... V_{max} range and other functionalities with setpoint reading through analog input (terminal 3) and feedback through analog output (terminal 5). All other variables are communicated through bus (terminals 7, 8) – by Modbus or BACnet protocol.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

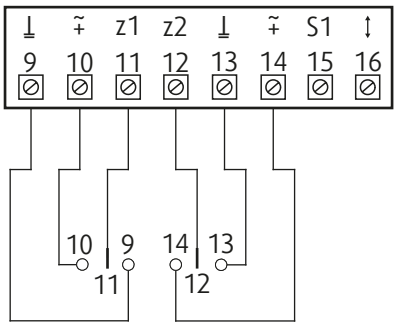
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{max}

11 and 12 without contact = no priority override through z1 or z2



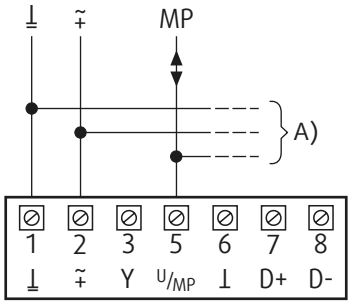
Priority rule – BACnet / Modbus Control

1. z1
2. z2
3. Bus Watchdog
4. a) adaption (autonomous initializing controller function)
5. b) synchronisation (autonomous initializing controller function)
6. Bus Override
7. Y-Step Control: Close – V_{min} - V_{max} (through analog input – see wiring for AC/DC 24V Step Control)
8. Y-Modulating: V_{min} ... V_{max} (through analog input – see wiring for Modulating VAV)

MP-Bus

(This operation mode requires parametrization)

VAV control in V_{min} ... V_{max} range and other functionalities with all variables communicated through bus (terminals 1, 2, 5) – by MP-Bus protocol.



Additional functions can be activated by connecting the override inputs z1 and z2.

The priority of these functions is higher than the VAV modulating operation with analog input.

Override control z1

Contact 11-9 = Motor STOP

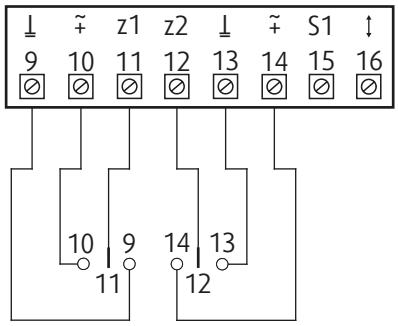
Contact 11-10 = Damper OPEN

Override control z2

Contact 12-13 = Damper CLOSED

Contact 12-14 = V_{max}

11 and 12 without contact = no priority override through z1 or z2



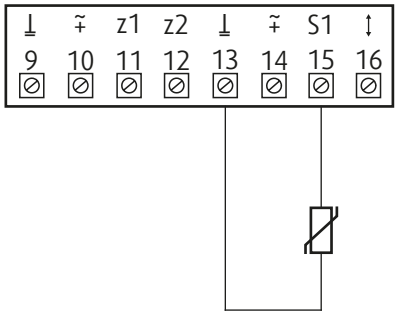
Priority rule – BACnet / Modbus Control

1. z1
2. z2
3. Bus Watchdog
4. a) adaption (autonomous initializing controller function)
5. b) synchronisation (autonomous initializing controller function)
6. Y-Step Control: Close – V_{min} - V_{max} (through analog input – see wiring for AC/DC 24V Step Control)
7. Bus Override
8. Bus Setpoint: V_{min} – V_{max}

Connection of passive sensor

(Available in bus operation)

The value measured by the passive sensor can be communicated as a variable by bus.

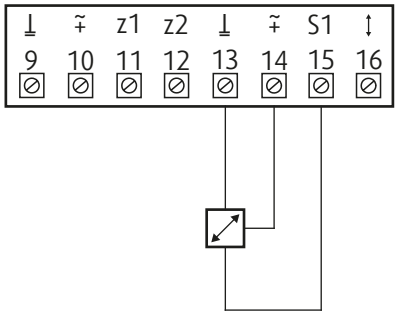


Suitable for Ni1000 and Pt1000

Connection of active sensor

(Available in bus operation)

The value measured by the active sensor can be communicated as a variable by bus.



Possible input voltage range:

DC 0...10 V (resolution 5 mV)

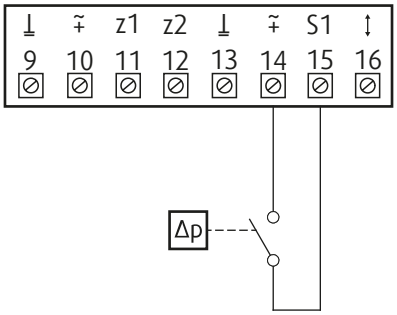
Example:

- Active temperature sensors
- setpoint generator
- humidity sensor

Connection switching contact

(Available in bus operation)

The binary value of the switching contact can be communicated as a variable by bus.



Requirements switching contact:The switch must be capable of switching a current of 10 mA @ 24 V cleanly.

Example:

- dP sensor
- window contact

Transport, Storage and Operation

Transport and storage temperature range: -20 °C to +40 °C, dry indoor conditions.
Opreration temperature range: -20 °C ... +70 °C in the duct, -20 °C ... +50 °C on the actuator.

Supplement

Any deviations from the technical specifications contained herein and the terms should be discussed with the manufacturer. We reserve the right to make any changes to the product without prior notice, provided that these changes do not affect the quality of the product and the required parameters.

Current information on all products is available on design.systemair.com.

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