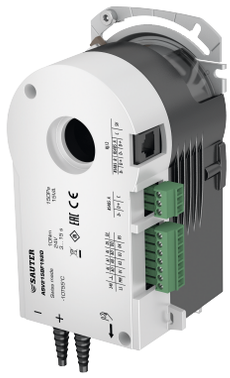
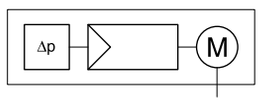
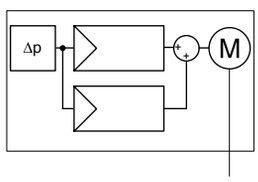
ASV205BF132E, ASV215BF132E: VAV compact controller



ASV205BF132E





How energy efficiency is improved

Demand-based volume flow control in order to optimise energy consumption in ventilation systems. Differential pressures of at least 1 Pa can be controlled to allow minimal volume flows at the lowest duct pressure and energy consumption

Features

- Supply and return air control for individual rooms such as offices, conference rooms and hotel rooms, in conjunction with a VAV box or a damper and flow probe
- Pressure control in supply and return air ducts for low-noise, energy-efficient air distribution
- Static measurement of differential pressure with MEMS sensor
- Can be used for measuring in areas with dirty or contaminated return air
- Low energy consumption and long serviceable life thanks to low-wear stepping motor
- Electromechanical torque-based switch-off for safe operation
- Extremely simple installation due to self-centring shaft adapter
- Disengageable gear unit for manual adjustment and positioning of damper
- Integrated second control loop for the following applications:[1)]:
  - Duct pressure and zone control
  - Room climate regulation
- 2 x RS-485 bus interface on RJ12 and connection terminal
  - Up to 31 subscribers in a segment with SLC (SAUTER Local Communication) protocol
  - Communication within network via BACnet MS/TP
- Input and output signals for connecting:
  - Setpoints and actual values
  - Power outputs for reheaters and recoolers
  - EY-RU 3** digital room operating units
  - Analogue output
- Easy programming of the following applications using the SAUTER CASE VAV software[2)]:
  - Volume flow control
  - Room pressure control
  - Duct pressure control
- Adjustable end values of the differential pressure measuring range[3)]
  - 100...300 Pa
- Efficient control algorithm for fast control loops
- Priority control via switching contacts
- Zero point can be calibrated

Technical data

Power supply		
	Power supply[4)]	24 V~, +/-20%, 50...60 Hz 24 V=, -10%/+20%
Power consumption at nominal voltage 50/60 Hz (~/=)	Power consumption during operation[5)]	4.7 VA/2.5 W
	Power consumption when idle[6)]	1.5 VA/0.7 W

1) *Application support depending on hardware and software version in CASE VAV manual D100316836 (German), D100316957 (English), D100316878 (French)*
2) *Application support depending on hardware and software version in CASE VAV manual D100316836 (German), D100316957 (English), D100316878 (French)*
3) *Available measuring ranges depending on hardware/type*
4) *24 V=: Analogue inputs that are not connected are rated 0 V. The nominal torque is achieved within the specified tolerances.*
5) *Power specified without operating units FCCP 200, EY-RU 3**
6) *Holding torque ASV205*: 4 Nm*
ASV215: 8 Nm*

Parameters		
Integrated damper actuator	Angle of rotation[7)]	90°
	Admissible dimensions of damper shaft	Ø 8...16 mm, □ 6.5...12.7 mm
	Admissible damper shaft (hardness)	Max. 300 HV
	Surge-voltage resistance	500 V (EN 60730)
	Operating noise	< 35 dB (A)
Δp sensor	Measuring range Δp (gain = 1)[8)]	0...500 Pa
	Linearity error	2% (at 25 °C)
	Time constant	0.2 s
	Influence of position[9)]	< 1 Pa
	Reproducibility	0.2% FS
	Zero point stability	0.2% for 1 year
	Admissible positive pressure	±12.5 kPa
	Admissible operating pressure p_{stat}[10)]	±7 kPa
	Low-pressure connections[11)]	Ø i = 3.5...6 mm
Ambient conditions		
	Operating temperature	0...55 °C
	Storage and transport temperature	-20...55 °C
	Admissible humidity	< 85% rh, no condensation
Inputs/outputs		
	Analogue inputs	0...10 V (R_i = 100 kΩ)
	Analogue outputs	0...10 V, load > 10 kΩ
	Digital inputs[12)]	Closed 1 V=, 1 mA, open > 2 V=
	Digital output	0.3 A at 24 V ~/=
	Resistive input	0 to 50 °C Ni1000 (DIN 43760), NTC10k (10k3A1), Pt1000 (EN 60751)
	Resolution	0.3 °C (Ni1000/Pt1000), 0.1 °C (NTC)
	Measuring difference	+/- 0.6 °C
	PWM	0.3 A at 24 V ~/= Period duration 1 s....15 minutes 0...100%
Interfaces and communication		
	RS-485 not electrically isolated	115 kBaud
	Communication protocols	SAUTER Local Communication (SLC), BACnet MS/TP, ¼ load
	Access method	Master/slave
	Topology	Line
	Number of participants[13)]	31 (32) with SLC
	Bus termination	120 Ω (both ends)
Construction		
	Weight	0.8 kg
	Fitting	Self-centring spindle adapter
Standards and directives		
	Type of protection	IP00, IP30 (EN 60529) (with protection set)
	Protection class	III (EN 60730)

7) *Maximum rotation angle 102° (without end stop)*
8) *Available measuring ranges depending on hardware/type*
9) *Zero adjustment recommended during commissioning*
10) *Short-term overload; zero adjustment of sensor is recommended*
11) *Recommended hardness of tubing < 40 Sha (e.g. silicone)*
12) *Digital inputs for external potential-free contacts (gold-plated recommended)*
13) *One participant is always also the parametering tool, hence the maximum number of 31 connectible devices*

Conformity	Machine directive 2006/42/EC, appendix II 1.B
EMC Directive 2014/30/EU	EN 61000-6-1, EN 61000-6-3, EN 61000-6-4, EN 61000-6-2

Overview of types

Type	Measuring range Δp	Running time for 90°	Torque	Holding torque
ASV205BF132E	0...300 Pa	30, 45, 60, 75, 90, 105 s	5 Nm	4 Nm
ASV215BF132E	0...300 Pa	60, 75, 90, 105 s	10 Nm	8 Nm

For a running time of 105 s and an ambient temperature of ≥ 55 °C, the specified torque is reduced by 0.5 Nm.

Current-free holding torque by means of interlocking in gear unit.

Accessories

Type	Description
0372301001	Spindle adaptor for squared end hollow profile (x 15 mm), pack of 10 pcs.
XAFP100F001	Flow probe to measure the air volume in ventilation ducts
0300360001	USB connection set
0297867001	Reference pressure container
0430360100	IP30 protection set
0430360200	Replacement LP connector
0372129001	Torsion protection

Description of operation

The ASV 215 is a VAV compact controller for supply and return air control for individual rooms such as offices, conference rooms and hotel rooms, in conjunction with a VAV box or a damper and flow probe.
The ASV 215 may only be used for the intended purposes stated here.
The pressure difference generated at an orifice plate or Pitot tube is recorded by a static differential pressure sensor and converted to a flow-linear signal. An external command signal $c_{qV.s}$ is limited by the parameterised minimum and maximum settings and compared to the actual volume flow r_{qV}.
Based on the measured control deviation, the actuator moves the damper on the VAV box until the volume flow across the measuring point reaches the required level. If there is no external command signal, the configured $\dot{v}_{min}$ value corresponds to the command variable $c_{qV.s}$. (Factory setting) The application and internal parameters are configured using the SAUTER CASE VAV PC software. The software allows you to configure the compact controller specifically for the application and to set the necessary parameters in bus mode.
The VAV compact controller is shipped from the factory with the following default configuration.
The inputs and outputs are preconfigured according to the table.

Example application VAV.01.101.M

Connection assignment (factory setting). Application VAV.01.101.M

Connection	Function	Designation	Setting range
01	External command variable	cqV.s	0…10 V (0…100% $\dot{v}_{nom}$)
02	Setpoint shift	cqV.p.ad	5 V ± 5 V Ξ ± 100% $\dot{v}$ (not activated)
03	Priority control	cqV.p.1 (actuated condition)	Closed 1 V=, 1 mA Open > 2 V=

Volume flow characteristics

To configure the device, the design data of the VAV box must be loaded to the actuator using the SAUTER CASE VAV software. At least the following data is required for this:

	Box DN	Box C factor	$\dot{v}_{n\ AT}$	$\dot{v}_{nom}$	$\dot{v}_{max}$	$\dot{v}_{min}$
Unit	mm	l/s - m^3/h	l/s - m^3/h	l/s - m^3/h	l/s - m^3/h	l/s - m^3/h

ASV 2*5 connection

Block	Signal	ASV 2x5BF132
1	LS	Power supply
	MM	System ground
	01	AI/AO 0...10 V
	02	AI/AO 0...10 V
	03	DI/RI-1k/10k
	04	DO/PWM oc ~/=
	05	DO/PWM oc ~/=
2	06	RS-485 D-A
	07	RS-485 D+A
	08	RS-485 Common
3	06	RS-485 D-B
	05	RS-485 D+B
	04	RS-485 D-A
	03	RS-485 D+A
	02	C_{out}
	01	5 $V=_{out}$

Setting the operating volume flows

The following functions are available for operating the VAV controller:

Volume flow control setting ranges

Function	Volume flow / damper position	Maximum setting ranges	Recommended setting ranges
Damper closed	Damper fully closed		0° damper position
$\dot{v}_{min}$	Minimum	$\dot{v}_{1Pa}$[14)]...$\dot{v}_{max}$	10…100% $\dot{v}_{max}$
$\dot{v}_{max}$	Maximum	$\dot{v}_{1Pa}$…$\dot{v}_{nom}$	10…100% $\dot{v}_{nom}$
$\dot{v}_{mid}$	Intermediate position	$\dot{v}_{max}$ > $\dot{v}_{mid}$ > $\dot{v}_{min}$	10…100% max
Damper open	Damper fully open		90° damper position
$\dot{v}_{nom}$	Nominal volume flow		Specific value, depending on box type, air density and application
$\dot{v}_{int}$	Internal setpoint	$\dot{v}_{1Pa}$…$\dot{v}_{nom}$	10…100% $\dot{v}_{nom}$

Functions of the ASV with VAV.01.101.M

VAV controller command signal (AI 01)

The $\dot{v}_{min}$ and $\dot{v}_{max}$ values, which must be configured using the software, provide lower and upper limits for the command signal cqV.s.

Analogue input/output (AI/AO 02)

For the analogue input and output terminal AI/AO 02, an input function or one of four output functions can be selected.

Volume flow setpoint shift cpV.p.ad

The setpoint for the volume flow is defined at output AI 01. A room-pressure controller, for example, or the setpoint shift of the VAV compact controller, is controlled by the input signal of terminal AI 02. The input signals can be 0…10 V, 0…100% or user-defined -100…100%.

Flow control deviation -eqV.s

Output AO 02 can be used for notification if the volume flow deviates from the command variable cqV.s. The current control deviation can be recorded as a voltage.
If the setpoint is equal to the actual value, the output voltage is 5 V.

Volume flow actual value rqV

The current volume flow (actual value rqV) via the VAV box can be recorded at terminal AO 02. The value is 0…100% of the set nominal volume flow $\dot{v}_{nom}$. If no specific volume flow is entered for the system, $\dot{v}_{nom}$ corresponds to the value $\dot{v}_{n\ AT}$ set by the box manufacturer, which can usually be found

14) *Volume flow that generates a differential pressure of 1 Pa*

on the type plate of the VAV box. In general, the actual value signal of the volume flow is used for the following functions:

- Displaying the volume flow on the building management system station; room air balancing in the laboratory.
- Master/slave application: The actual-value signal of the master controller is specified as a setpoint for the slave controller.

Damper position rPhi

Output AO 02 can also be changed to indicate the current damper position using CASE Components. The working range of the damper-actuator combination can be scaled freely as 0...100% from a minimum of 0 V to a maximum of 10 V.

Pressure actual value rP

After conversion by the CASE Components software, output AO 02 can provide the current value of the internal differential pressure sensor. The value is freely scalable and refers to the measuring range of the internal sensor. Standard value 0...10 V at ±50% of the measuring range.

Digital input (DI 03) cqV.p.1

Priority control can be implemented using the available digital inputs. Individual functions can be selected easily using the software. The digital inputs can be operated with normally-closed contacts or normally-open contacts. A mixture of NC and NO contacts can be used.

Note
Half slope (±100%, 0.05 V/% compared to 0.1 V/%) results in double the neutral zone (= green zone Ξ no alarm) for alerting.

Feedback for damper position, differential pressure and actual volume flow

Three measured variables are generally available as feedback from the volume flow control loop via the SLC bus: damper position, volume flow and differential pressure. These values can be read using the SAUTER CASE VAV software in *Online Monitoring* mode.

Applications and functions of ASV

You can find detailed information on all the possible applications in the manual D100184112. The parameterisation of these applications and their functions using the CASE VAV software is described in document 7010022001.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the “Description of operation” section.
All related product regulations must also be adhered to. Changing or converting the product is not admissible.

Sensor technology

The pressure transducer used in the VAV compact controller is a micro-electromechanical sensor (MEMS) with a compact design that is produced based on state-of-the-art technology. The production technology and highly-integrated design ensure good position compensation. Thus the VAV compact controller can be operated in any fitting position. The integrated temperature compensation and use-specific temperature pre-handling ensure high zero point stability and measuring accuracy. This high measuring accuracy enables precise control of low volume flows. The static measuring principle means that the sensor can be used for measuring pumped media containing dust or chemicals.
The filter time constant *Sensor damping* can be set in increments from 0…5.22 s using the SAUTER CASE VAV software to stabilise the sensor measuring signal when there are highly fluctuating pressure signals. The zero point can be adjusted if necessary using calibration.

Operating in SLC mode

The VAV compact controller is equipped with an RS-485 interface that is not electrically isolated. The baud rate used is 115.2 kbit/s and is a fixed setting. The SAUTER Local Communication (SLC) protocol specifies the master-slave bus access method, with a maximum of 31 devices permitted in a network segment. The SAUTER CASE Components software is used to parameterise every individual device and to configure the devices within the network segment.

Operating in BACnet MS/TP mode

After the parameterisation of the VAV compact controller, the bus protocol can be changed from SLC to BACnet MS/TP using SAUTER CASE Components. In the BACnet MS/TP mode, the baud rate can be set to 9.6 kbit/s, 19.2 kbit/s, 38.4 kbit/s, 57.6 kbit/s, 76.8 kbit/s or 115.2 kbit/s. In the BACnet

MS/TP mode, the device can only be addressed via BACnet objects. To make changes in the parameterisation, the device must be set to the SLC mode again.
This is performed via a function in the CASE VAV module of the SAUTER CASE Components software or by disconnecting the device from the power and restarting it while pressing down the gear release lock.

Note
It is not admissible to operate actuators in mixed mode in the SLC and BACnet MS/TP modes within a network segment.
All the devices must be switched over at the same time using the function in the CASE VAV module.

BACnet MS/TP protocol implementation

BACnet device profile

Product	Device profile
ASV215BF132E	BACnet Application Specific Controller (B-ASC)

Supported BIBBs

Product	Supported BIBBs	BIBB name
ASV215BF132E	DS-RP-B	Data Sharing-ReadProperty-B
	DS-RPM-B	Data Sharing-ReadPropertyMultiple-B
	DS-WP-B	Data Sharing-WriteProperty-B
	DM-DDB-B	Device Management-DynamicDeviceBinding-B
	DM-DDC-B	Device Management-DeviceCommunicationControl-B

Supported standard objects

Product	Object type	Variable	Deletable
ASV215BF132E	Analog Value	Yes	No
	Device	No	No
	Binary Value	Yes	No
	Multi-state Value	Yes	No

Note
The available BACnet objects depend on the application selected; see SAUTER BACnet PICS ASV2x5 Volume Flow Compact Controller manual (D100332918).

Data Link Layer options

Product	Data Link	Options
ASV215BF132E	MS/TP Slave	9600, 19200, 38400, 57600, 76800, 115200

Device Address Binding

Product	Supports static binding
ASV215BF132E	Yes

Network options

Product	Supports static binding
ASV215BF132E	No

Character set

Product	Supported character set
ASV215BF132E	ANSI X3.4

Functions of CASE VAV

The VAV controller can be configured using the SAUTER CASE VAV software. This software is included in SAUTER CASE Suite and SAUTER CASE Components. This software tool can be used to configure all the values required for operation by means of a convenient user interface. The connection set for parameterising is available as an accessory.

The following functions are available:
- Easy configuration of complex applications
- Saving of device configurations
- Configurable unit range
- Summary screen for quick view of the main parameters
- Integrated access to system diagram and wiring diagram
- Service function for rapid troubleshooting
- Online monitoring of main operating parameters

Fitting notes

The actuator can be installed in any position (including a hanging position). It is plugged directly onto the damper spindle and clipped to the anti-torsion device. The self-centring spindle adapter protects the damper spindle. The damper actuator can be easily detached from the damper spindle without removing the anti-torsion device.
The angle of rotation can be limited on the device to between 0° and 90° and continuously adjusted between 5° and 80°. The limit is fixed using a set screw directly on the actuator and the limit stop on the self-centring spindle adapter. This spindle adapter is suitable for Ø 8...16 mm and □ 6.5...12.7 mm damper spindles.

CAUTION!
The housing must not be opened.

For feedback of the operating status it is a good idea to display the actual value signal (volume flow) on the operating station of the management system.
Specific standards such as IEC/EN 61508, IEC/EN 61511, IEC/EN 61131-1 and -2 were not taken into account. Local requirements regarding installation, use, access, access rights, accident prevention, safety, dismantling and disposal must be observed. Furthermore, installation standards EN 50178, 50310, 50110, 50274, 61140 and similar must be observed.

Outdoor installation

If installed outside of buildings, the devices must be additionally protected from the weather.

Wiring

Power supply

To ensure trouble-free operation, the following cable cross-sections and lengths are required for the 24 V power supply and the ground wire.
All devices within a network segment must be supplied by the same transformer, or if multiple transformers are being used they must be connected in-phase on one side. The power supply must be wired in a star connection with cable lengths not exceeding those in the table below (*1 device* column).

Maximum cable lengths (in m) per number of devices (AC mode)

Conductor cross-section	1 device	Max. 8 devices	Max. 16 devices
0.5 mm²	40	5.0	2.5
0.75 mm²	60	7.5	3.8
1.00 mm²	80	10.0	5.0
1.50 mm²	120	15.0	7.5

Maximum cable lengths (in m) per number of devices (DC mode)

Conductor cross-section	1 device	Max. 8 devices	Max. 16 devices
0.5 mm²	80	10.0	5.0
0.75 mm²	120	15.0	7.6
1.00 mm²	160	20.0	10.0
1.50 mm²	240	30.0	15.0

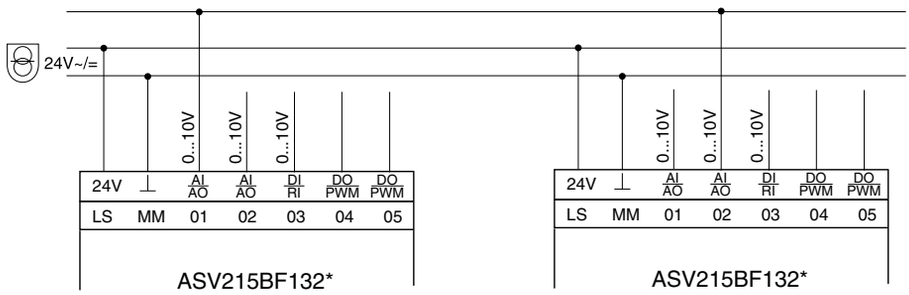
Analogue inputs that are not connected are rated 0 V.
The cable lengths specified here are recommended values that may differ depending on the usage conditions.

Analogue signals

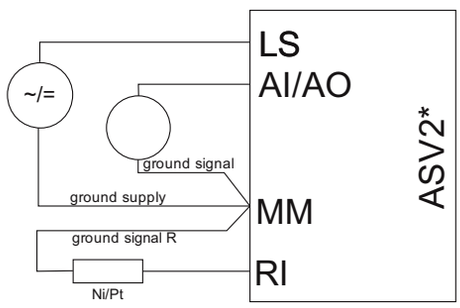
Analogue and digital signals are connected using connection terminals. For trouble-free operation, the ground cable for actuators that are linked to each other for signal exchange must be connected to each other.

Analogue outputs/feedback signals from two or more controllers may not be connected together.

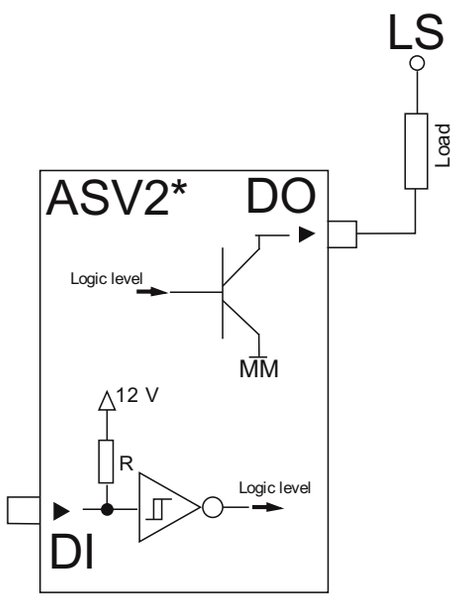
To minimise errors on the command signal when using parallel connection, it is recommended to use star wiring for the ground and signal cables.



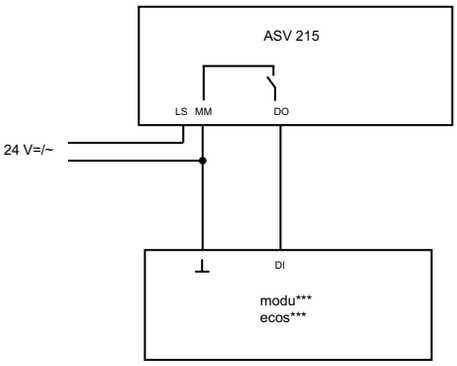
Separation of ground, power supply and signal



Digital inputs and outputs



Connection of DO ASV to DI AS, RC

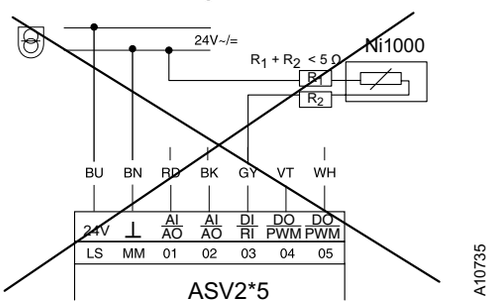


The MM terminal of the ASV 2** to be connected must be connected to the ground of the ecos500 and the modu525.

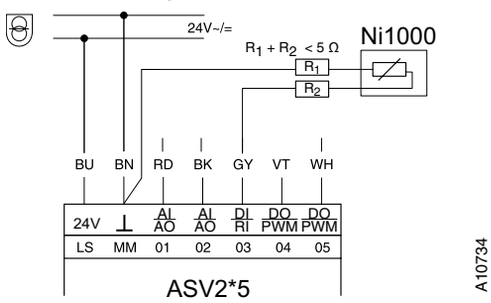
Ni1000 sensor [15)]

The ground of the Ni1000 sensor must be connected directly to the ground terminal (MM) of the ASV 2*5. The ground of the Ni1000 sensor must not be connected directly to the ground of the power supply. In the case of a two-conductor system, the maximum admissible line resistance between the sensor and the Ni1000 input of the ASV 2*5 for both conductors is a total of 5 Ω.

Non-admissible wiring



Admissible wiring

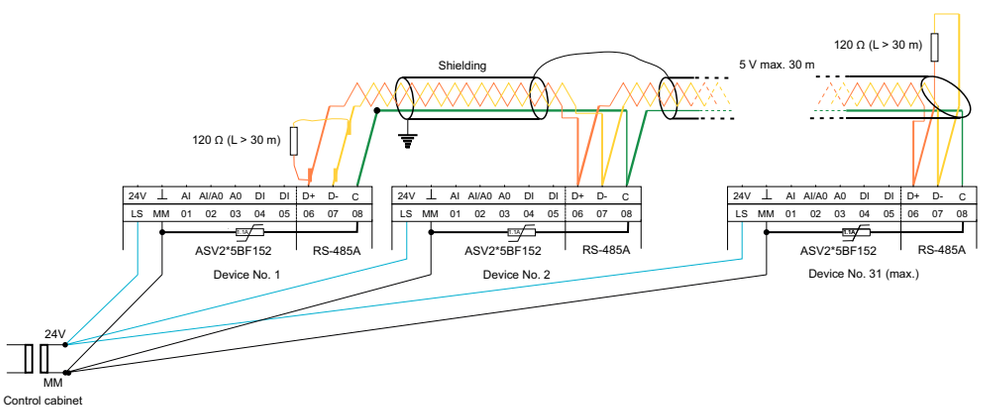


Connection diagram (Ni1000)

RS-485 bus connection

The C08 terminals of all controllers must be connected to each other and to the same potential. The wiring must be implemented purely as a line topography (daisy chain). Spur lines are not permitted; if they cannot be avoided for installation engineering reasons, they may not be more than 3 m long. The digital outputs (DO) of the ASV 2** are not compatible with the inputs of the EY-EM 5***. On these devices the digital inputs (DI) switch against voltage (15 V).

Connection diagram (SLC bus connection)



15) *Use of the input for Ni1000 depending on hardware/application/type.*

The length of the bus wiring is limited by the following parameters:
- Number of connected devices
- Cable cross-section

CAUTION!
Faulty wiring can result in damage to the device.

The following table is valid for twisted-pair wiring:

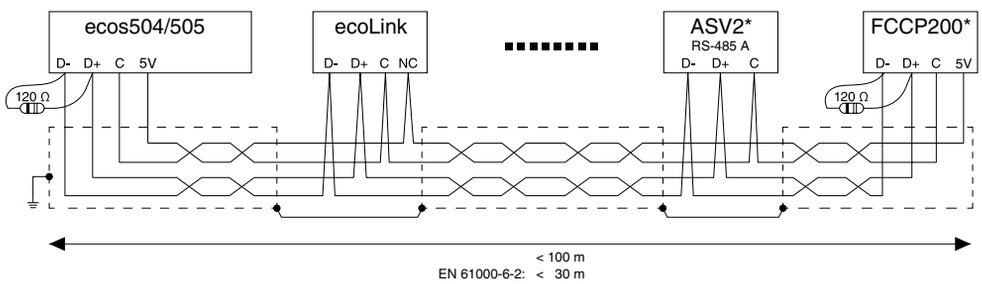
Twisted-pair wiring

Conductor cross-section	Number of devices	Max. cable length
0.20 mm²	31	> 30 m (bus termination required)

When using shielded cables, the shielding must be earthed in the installation:
- Shielding earthed at one end is suitable for protection from electrical interference (from overhead power lines, static charges etc.).
- Shielding earthed at both ends is suitable for protection from electromagnetic interference (from frequency converters, electric motors, coils etc.).

We recommend using twisted-pair wiring.

Connection diagram (SLC bus connection) EY-RC504



Connection of ecoLink and ASV2/FCCP200**

Note
The use of ecoLink510 (EY-EM510) is not possible.

Possible combinations of devices on an ecos504 bus line:

	Max.	Combination options				
ASV2x5BF1xx	12	12	8	4	8	6
EY-RU3xx	4	–	4	4	–	–
FCCP200	4	–	–	–	–	4
ecoLink module	8	–	–	4	4	2
Total RS-485 channel	12	12	12	12	12	12

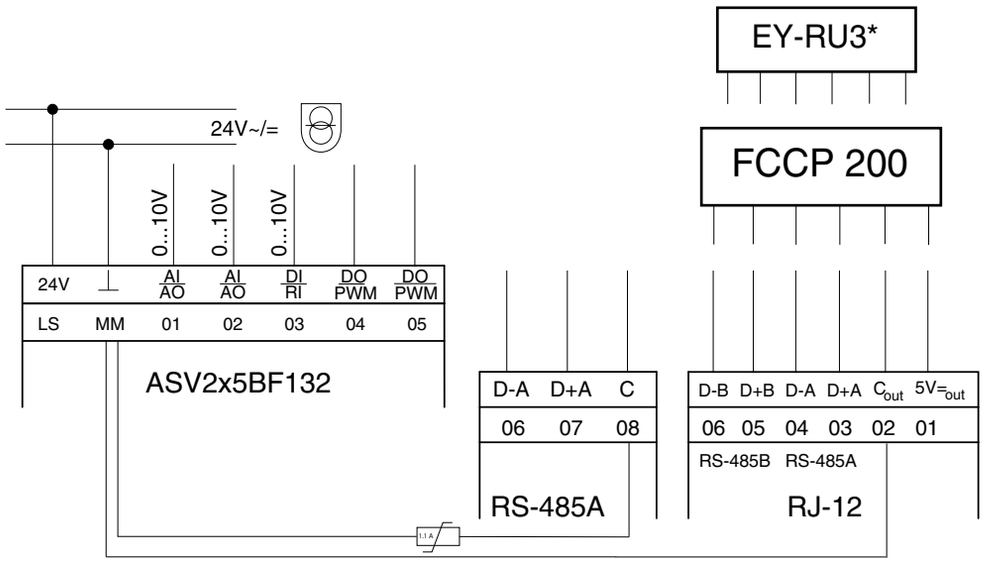
Additional technical information

The upper section of the housing with the cover contains the electronic components and the sensor.
The lower section of the housing contains the brushless DC motor, the maintenance-free transmission, the gear-release lever and the spindle adapter.
The actuators must not be mechanically connected in parallel.
Any connections that are not used must be isolated and may not be grounded.

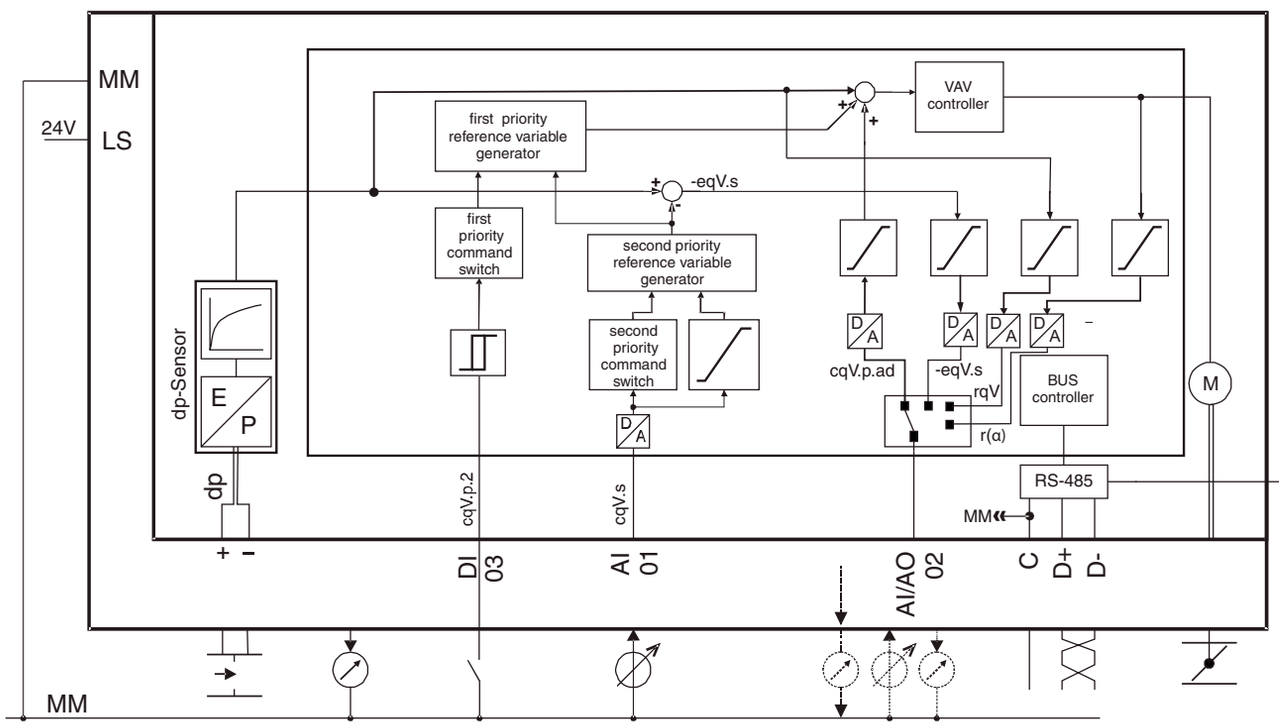
Disposal

When disposing of the product, observe the currently applicable local laws.
More information on materials can be found in the Declaration on materials and the environment for this product.

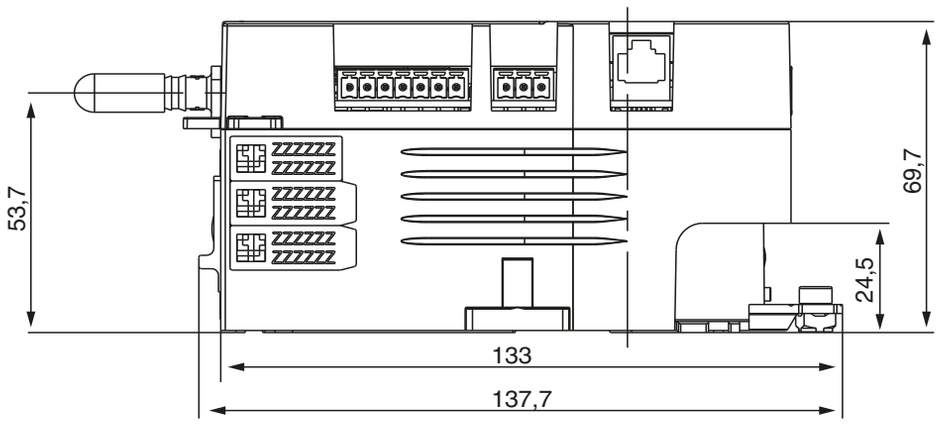
Connection diagram

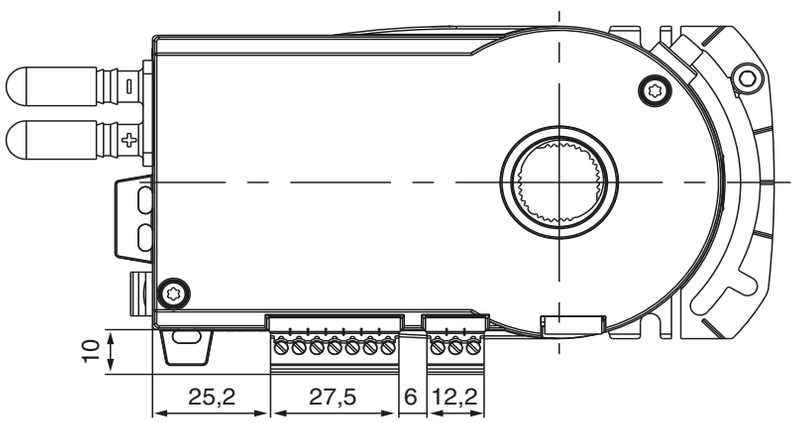


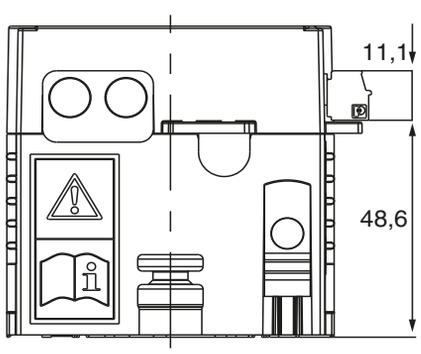
Block diagram for VAV.01.101.M (factory setting)



Dimension drawing

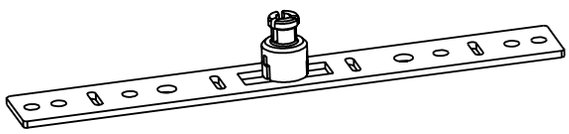




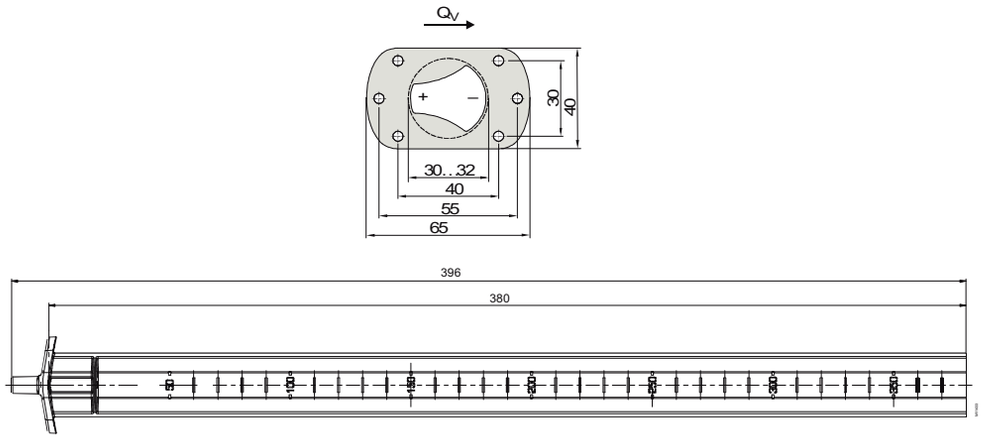


Accessories

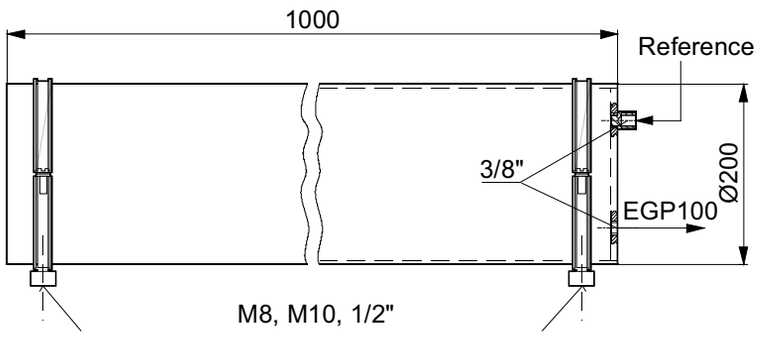
Anti-torsion device 0372129001 (provided)



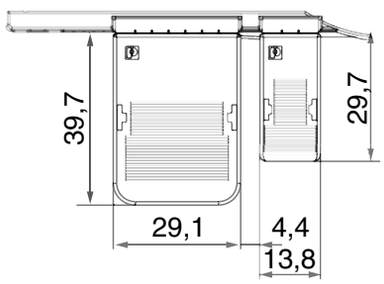
Flow probe to measure the air volume in ventilation ducts XAFP100F001



Reference pressure container 0297867001



IP30 protection set 0430360100



Fr. Sauter AG
Im Surinam 55
CH-4016 Basel
Tel. +41 61 - 695 55 55
www.sauter-controls.com