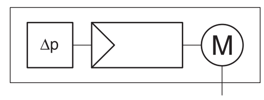
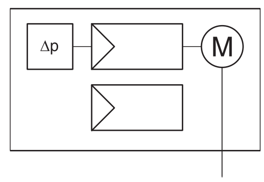
ASV115BF132: BACnet MSTP standard VAV compact controller

ASV115BF132E





How energy efficiency is improved

Allows demand-based volume flow control in order to optimise energy consumption in ventilation systems. Differential pressures of as little as 1 Pa can be controlled to allow minimal volume flows for the lowest possible 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
- Static differential pressure measurement based on the capacitive measurement principle
- Can be used in areas with dirty or contaminated return air
- High-precision measurement of differential pressures with measuring ranges of up to 300 Pa
- Variable running times 30...120 s
- Brushless DC motor guarantees minimum energy consumption and a long service life
- Electronic torque limitation for safe operation
- Disengageable transmission for manual adjustment and damper positioning
- Integrated second controller for additional applications
- Switchable RS-485 bus interface
  - for SLC (SAUTER Local Communication) protocol
  - for BACnet MSTP
- Very easy programming using the SAUTER CASE VAV software
- Constant air volume control via parameterisable inputs
- Adjustable end values of the differential pressure range
  - 100...300 Pa
- Efficient control algorithm
- Analogue input and output signals to connect the setpoints and actual values for:
  - Volume flow control
  - Room temperature control
- Priority control via switching contacts
- Zero point can be calibrated

Technical data

Power supply		
	Power supply[1]	24 V~, ±20%, 50...60 Hz 24 V=, ±20%
Power consumption at nominal voltage 50/60 Hz after 30 s running time (AC/DC)	Power consumption during operation	5.7 VA/3.3 W (10 Nm)
	Power consumption when idle[2]	4.2 VA/2.1 W
Power consumption at nominal voltage 50/60 Hz after 120 s running time (AC/DC)	Power consumption during operation	4.8 VA/3 W (10 Nm)
	Power consumption when idle[3]	4.2 VA/2.1 W
Parameters		
	Torque[4]	10 Nm
	Holding torque[5]	2 Nm
Integrated damper actuator	Angle of rotation[6]	90°
	Running time for 90°[7]	30...120 s

1) *24 V=: Analogue inputs that are not connected are rated 0 V. The nominal torque is achieved within the specified tolerances. Terminal 02 cannot be used with 24 V= power supply.*
2) *Holding torque approx. 5 Nm*
3) *Holding torque approx. 5 Nm*
4) *Current-free holding torque by means of interlocking in gear unit*
5) *Current-free holding torque by means of interlocking in gear unit*
6) *Maximum rotation angle 102° (without end stop)*
7) *Run-time can be set via software*

	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	< 30 dB(A)
Δp sensor	Measuring range Δp (gain = 1) Pressure range type E	0...300 Pa
	Time constant	0.1 s
	Influence of position[8)]	±1 Pa
	Reproducibility	0.2% FS
	Admissible positive pressure	±10 kPa
	Admissible operating pressure p_{stat}[9)]	±3 kPa
	Low-pressure connections[10)]	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 input AI01	0...10 V (R_i = 100 kΩ)
	Analogue input AI02[11)]	0...10 V (R_i = 70 kΩ)
	Digital input DI04[12)]	Closed < 0.5 V, 1.3 mA, open > 2 V
	Ni1000 [13)]	0...50 °C
	Resolution	0.2 °C
	Digital input DI05[14)]	Closed < 0.5 V, 1 mA, open > 3 V
	Analogue outputs[15)]	2 × 0...10 V, load > 10 kΩ
Interfaces and communication		
	RS-485 not electrically isolated	115 kBaud
	Protocol	SAUTER Local Communication (SLC) BACnet MSTP, ¼ load
	Access method	Master/slave
	Topology	Line
	Number of subscribers[16)]	31 (32)
	Length of cable without bus termination	≤ 200 m, Ø 0.5 mm
	Length of cable with bus termination	≤ 500 m, Ø 0.5 mm
	Bus termination	L > 200 m, 120 Ω both sides
	Cable type[17)]	Twisted in pairs
Construction		
	Weight	0.8 kg
	Fitting	Self-centring spindle adaptor
	Power cable	0.5 m long, 10 × 0.32 mm² (fixed to housing)
Standards and directives		
	Type of protection	IP 54 (EN 60529)

[8)] *Zero adjustment recommended during commissioning*
[9)] *Short-term overload; zero adjustment of sensor is recommended*
[10)] *Recommended hardness of tubing < 40 Sh A (e.g. silicone)*
[11)] *Connection 02 can be configured as an analogue input or output using the SAUTER CASE VAV software (function only available with 24 VAC power supply)*
[12)] *Digital inputs for external potential-free contacts (gold-plated recommended)*
[13)] *Connection 04 can be parameterised as an Ni1000 input using the CASE VAV software*
[14)] *Digital inputs for external potential-free contacts (gold-plated recommended)*
[15)] *Connection 02 can be configured as an analogue input or output using the SAUTER CASE VAV software (function only available with 24 VAC power supply)*
[16)] *One subscriber is always the parametering tool, hence the maximum number of 31 connectible devices*
[17)] *Recommendation: Belden 3106A*

Protection class	III (EN 60730)
EMC directive 2004/108/EC	EN 61000-6-1, EN 61000-6-2 EN 61000-6-3, EN 61000-6-4
Software	A (EN 60730)
Mode of operation	Type 1 AB (EN 60730)
Conformity	Machine directive 2006/42/EC, appendix II 1.B

Overview of types

Type	Measuring range Δp
ASV115BF132E	100...300 Pa

Accessories

Type	Description
CERTIFICAT001	Manufacturer's test certificate type M
0372300001	Torsion protection, long (230 mm)
0372301001	Spindle adaptor for squared end hollow profile (x 15 mm), pack of 10 pcs.
XAFP100F001	Flow sensor to measure the air volume in ventilation ducts
0300360001	USB connection set

Description of operation

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 parameterised $\dot{V}_{min}$ value corresponds to the command variable $c_{qV.s}$. 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 a default configuration. The inputs and outputs are preconfigured according to the table.

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 documents must also be adhered to. Changing or converting the product is not admissible.

Connection assignments (factory setting)

Application VAV.01.001.B (factory setting)

Connection	Colour coding	Function
01	Red	AI: External command variable C_q 0…10 V (0…100% $\dot{V}_{nom}$)
02	Black	AI: Setpoint shift $C_{q\ ad}$ 5 V ±5 V (factor 0, disabled)
03	Grey	AO: Actual value r_q 0…10 V (0…100% $\dot{V}_{nom}$)
04	Violet	DI: Priority control $\dot{V}_{min}$ (actuated condition)
05	White	DI: Priority control $\dot{V}_{max}$ (actuated condition)

Application VAV.20.201.B

Connection	Colour coding	Function
01	Red	AI: Temperature setpoint $C_{T.s}$ 0…10 V (0…50 °C)
02	Black	AI: Setpoint shift $C_{q\ ad}$5 V ± 5 V (factor 0, disabled) AO: Damper position rα 0...10 V (0...100%)
03	Grey	AO: Actual value r_{qV} 0…10 V (0…100% $\dot{V}_{nom}$)

Connection	Colour coding	Function
04	Violet	Ni1000: Temperature actual value r_T 0...50 °C
05	White	Priority control $\dot{V}_{min}$ (actuated condition)

Application VAV.50.201.B

Connection	Colour coding	Function
01	Red	AI: External command variable C_q 0…10 V (0…100% $\dot{V}_{nom}$)
02	Black	AI: Actual value of 2nd control loop r_q0...10 V (0...100%)
03	Grey	AO: Actual value r_{qV} 0…10 V (0…100% $\dot{V}_{nom}$)
04	Violet	DI: Priority control $\dot{V}_{min}$ (actuated condition)
05	White	DI: Priority control $\dot{V}_{max}$ (actuated condition)

Volume flow characteristics

i *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.*

	DN box	C factor Box	$\dot{V}_{n\ AT}$	$\dot{V}_{nom}$	$\dot{V}_{max}$	$\dot{V}_{min}$
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

Abbreviations/symbols

$\dot{V}_n$	Nominal volume flow	$\dot{V}_{n\ AT}$	Nominal volume flow, air terminal
$\dot{V}_{n\ effective}$	Effective nominal volume flow	$\dot{V}_{nom}$	Nominal volume flow in the installation
$\dot{V}_{max}$	Maximum volume flow setpoint	$\dot{V}_{mid}$	Volume flow setpoint located between $\dot{V}_{max}$ and $\dot{V}_{min}$
$\dot{V}_{min}$	Minimum volume flow setpoint	$\dot{V}_{int}$	Internal volume flow setpoint
$\dot{V}_{var}$	Variable volume flow setpoint, for example corresponding to 0…10 V command variable	ΔP	Differential pressure at sensor (in Pa)
VAV	Variable air volume	CAV	Constant air volume
cw	**C**lock**w**ise	ccw	**C**ounter-**c**lock**w**ise
r_{qV}	Actual volume flow as per IEC 60050-351 (formerly Xi)	$c_{qV.s}$	Command signal of volume flow controller as per IEC 60050-351 (formerly Xs)
ΔP_{nom}	Nominal pressure in the installation	ΔP_{mid}	Pressure setpoint located between ΔP_{max} and ΔP_{min}
rα	Damper position feedback	$-e_{qV.s}$	Flow control deviation as per IEC 60050-351
$c_{qV.p.ad}$	Command signal shift as per IEC 60050-351 (formerly Δ$\dot{V}$)	$c_{qV.p.2}$	Command signal of VAV controller as per IEC 60050-351 via switching contact 2 (DI05)
$c_{qV.p.1}$	Command signal of VAV controller as per IEC 60050-351 via switching contact 1 (DI04)	$-e_{qP.s}$	Differential pressure control deviation as per IEC 60050-351
$c_{T.s}$	Temperature setpoint	r_T	Temperature actual value
FS	**F**ull **S**cale (maximum measuring range)	◔	Factory setting
❄	Cooling	♨	Heating
c/o	**C**hange-**o**ver	DN	Nominal diameter
p	Index "p" for priority	ad	Index "ad" for additive
s	Index "s" for second priority	T	Index "T" for temperature
q	Index "q" for quantity	V	Index "V" for volume flow

Setting the operating volume flow

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	$\dot{V}_{1Pa}$[18] … $\dot{V}_{max}$	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% $\dot{V}_{max}$
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% $\dot{V}_{nom}$

Volume flow control

The volume flow actual value is mapped by the square root transducer integrated into the ASV 115. The volume flow setpoint is issued by the command signal at analogue input 01. Constant volume flow setpoints can be issued via the priority control to digital inputs 04 and 05, and they have priority over the volume flow setpoint at analogue input 01. The flow control deviations are corrected by the VAV controller, and the damper is adjusted until the control deviation is within the neutral zone of the VAV controller. The actual volume flow and the control deviation can be transferred via two analogue outputs.

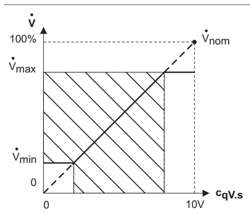
Minimum and maximum volume flow ($\dot{V}_{min}$ and $\dot{V}_{max}$) of the VAV controller command signal (AI01)

The $\dot{V}_{min}$ and $\dot{V}_{max}$ values parameterised using the software provide lower and upper limits for the command signal $c_{qV.s}$. The values to be set for $\dot{V}_{min}$ and $\dot{V}_{max}$ are entered as percentages or absolute values. When absolute values are entered, the specific volume flow values for the installation (in %) are calculated using the equation below. When there is no external command signal, the set $\dot{V}_{min}$ value becomes the setpoint. The volume flow setpoint at analogue input 01 is overridden using digital inputs. The setpoint is also dependent on the logical state of the command variable and the assigned forced control.

Calculating $\dot{V}_{min}$ and $\dot{V}_{max}$

$$V_{min}(\%) = \left(\frac{\dot{V}_{min}}{\dot{V}_{nom}} \right) * 100\% \qquad V_{max}(\%) = \left(\frac{\dot{V}_{max}}{\dot{V}_{nom}} \right) * 100\%$$

$\dot{V}_{min}$ and $\dot{V}_{max}$ in m^3/h



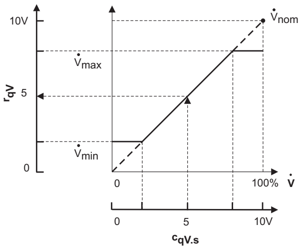
The command signal of the VAV controller $c_{qV.s}$ can be configured in various modes using the software. The ranges 0…10 V, 2…10 V and ‘freely configurable’ are available. The set range refers to the range 0…100% nom. Configurable forced operation is also possible via the analogue input (AI01). See the relevant section in the CASE VAV configuration manual 701022001.

Seepage suppression

To prevent unstable control action in the $\dot{V}_{min}$ range, what is known as seepage is automatically suppressed. This suppression causes the damper to close when the command variable ($c_{qV.s}$) ≤ 6% of the set nominal volume flow.
Control mode resumes when the command variable ($c_{qV.s}$) ≥ 7.8% of the nominal volume flow.

[18] *Volume flow that generates a differential pressure of 1 Pa.*

Functional diagram for $c_{qV.s}$



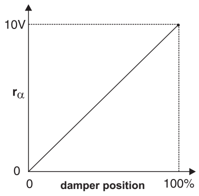
Damper position feedback (AO02) and actual volume flow (AO03)

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

Indicators *Online Monitoring*

Damper position	° Angle of rotation	0…100% available angle of rotation
Volume flow actual value	m³/h	0…100% $\dot{V}_{nom}$
Differential pressure	Pa	0...100% $\mathbf{P}_{nom}$

Functional diagram for damper position feedback rα

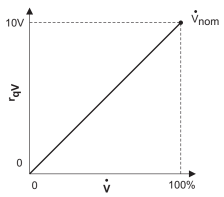


The damper feedback can be read or viewed via BACnet MSTP or by means of the online monitoring function in SAUTER CASE VAV. When the application VAV.20.201.B is being used, the parameterisation of terminal AO02 can also provide the damper feedback as 0…10 V signals. An adaptation of the damper position via *Manual mode – Adapt angle of rotation* – must be carried out before the monitoring of the damper position starts. This determines the angle between the open and closed damper positions.

In general, the actual damper position is used for the following functions:
- Indication on the BMS for monitoring the upstream pressure
- Ventilator control dependent on the individual damper positions within the installation

Additionally, the current volume flow (actual value r_{qV}) can be recorded via the VAV box at terminal AO03. The value is 0…100% of the set nominal volume flow $\dot{V}_{nom}$. If no specific system volume flow is entered, $\dot{V}_{nom}$ corresponds to the value $\dot{V}_{nAT}$, which is set by the box manufacturer and which can usually be found on the type plate of the VAV box.

Functional diagram for actual volume flow r_{qV}



The form of the output signal r_{qV} can be configured in various modes using the SAUTER CASE VAV software. The ranges 0…10 V, 2…10 V and 'freely configurable' are available.
The actual value signal and the command signal always refer to the set volume flow $\dot{V}_{nom}$.

Note
Actual value signals from two or more controllers may not be switched together.

In general, the actual value signal is used for the following functions:

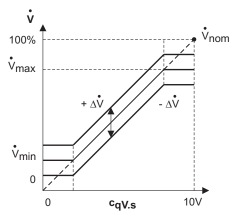
- Indicating the volume flow on the building management system.
- Master-slave application where the actual-value signal of the master controller is specified as a set-point for the slave controller.

The current volume flow can be calculated from the actual value signal r_{qV}. To do this, the voltage at the output AO03 is measured and offset against the set nominal volume flow. For more information on setting the actual volume flow signal, see the CASE VAV parametrisation manual 701022001.

Volume flow shift $\Delta\dot{V}$ (AI02)

When a difference is required between two volume flows, for example the supply air and the return air, a parallel flow shift by a defined value $\Delta\dot{V}$ is an appropriate solution. Because the command signal $c_{qV.s}$ is always based on the nominal volume flow $\dot{V}_{nom}$, it makes sense to set $\dot{V}_{nom}$ to the value of $\dot{V}_{max}$. This ensures that $\dot{V}_{max}$ is always 100% volume flow. If $\dot{V}_{max}$ is identical both as a percentage and as a quantity of the supply air in relation to the return air, an optimum balance between the volume flows is ensured.

Functional diagram for flow shift $\Delta\dot{V}$



The following parameters can be set using the SAUTER CASE VAV software:

Shift factor

The setpoint shift factor is the amplification factor for defining the influence of shift. Normally it should be selected so that the influence of shift is ≤ 20% $\dot{V}_{nom}$. Recommended value: Factor 0.1 Ξ 2% $\dot{V}$ /V (with factory setting AI02). In addition:

- Value = 0: shift disabled | Value ≠ 0: shift enabled

Limitation of shift

The limit is defined as a percentage of the volume flow. The maximum permitted value can be entered here.

If there is a parallel shift of the volume flow value, the set $\dot{V}_{min}$ and $\dot{V}_{max}$ values can be overridden.

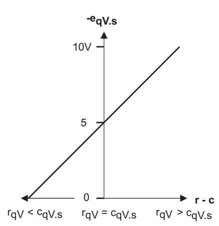
The lower limit of the volume flow is set by the seepage suppression and the upper limit by the maximum possible installation volume flow (damper fully open). To calculate and adjust the parallel setpoint shift, see the relevant section in the CASE VAV parameterisation manual 701022001.

Note
This function is only available with a power supply of 24 V~.

Volume flow control deviation –e (AO02)

Output AO02 can be used for generating an alert if the volume flow deviates from the command variable $c_{qV.s}$. 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. If the actual value is below the setpoint, the output voltage is less than 5 V, depending on the deviation. If the actual value is higher than the setpoint, a value of more than 5 V is displayed.

Functional diagram for flow control deviation -eqV.s



By default, the output is set in CASE VAV to a freely configurable characteristic curve with the following values.

- Start value: 0 V (-50%)
- End value: 10 V (50%)

> Note
> Half slope (-100%...100%, 0.05 V/% compared to 0,1 V/%) results in double the neutral zone (= green zone, no alarm) for alerting. This function is only available with a power supply of 24 V~.

Digital inputs (DI04 & DI05)

Priority control can be implemented using the available digital inputs. Individual functions can be selected 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 also be used. This configuration takes place using the SAUTER CASE VAV software. For more information on priority control with digital inputs and the factory settings, see the relevant section of the CASE VAV configuration manual 701022001.

Room temperature control

A second controller in the ASV 115 VAV compact controller enables it to control the room temperature. In this case, the actual temperature value of an Ni1000 sensor is fed to terminal 04 of the ASV 115. The temperature setpoint can be set externally to analogue input 01. If no external signal is supplied, the internally set temperature setpoint (cTDefault) is activated. The temperature controller integrated into the ASV 115 can be parametrised specifically for the application:

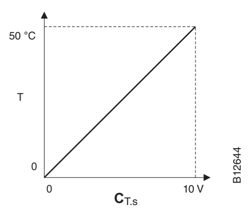
- Heating/cooling by increasing the volume of air (VAV sequence)

Room temperature control can be overridden via the priority control on DI05. A defined volume flow setpoint or a damper position can be specified.

> Note
> When an EGT366F101 is being used, terminal 6 must be connected directly to MM from the ASV 115.

Temperature setpoint (AI01)

The temperature setpoint characteristic can be set using CASE VAV. Ranges 0…10 V, 2…10 V and 'freely configurable' are available for the input voltage. The default temperature setpoint range is 0…50 °C, but it can be adjusted via CASE VAV with the 'freely configurable' option.



Temperature actual value (Ni1000)

The temperature is measured by an Ni1000 sensor connected to terminal 04. The measuring range of the temperature input is 0…50 °C. For more information on setting the temperature setpoint and actual value signals, as well as application-specific control parameters, see the CASE VAV parameterisation manual 0701022001.

Use of the 2nd control loop

A second, freely parameterisable control loop in the ASV 115 enables an additional regulation, which can shift the volume flow, to be taken over by the VAV compact controller. The actual value supplied by an external 0...10V sensor, e.g. temperature, CO_2 or room pressure, is fed to analogue input 02 of the ASV 115. The actual value is compared to the setpoint set internally in the ASV 115 in order to map the control deviation. The volume flow setpoint is adjusted until the parameterised setpoint is reached. The limitation of the volume flow setpoint shift must be set using the CASE VAV software.

> Note
> This function is only available with a power supply of 24 V~.

Note

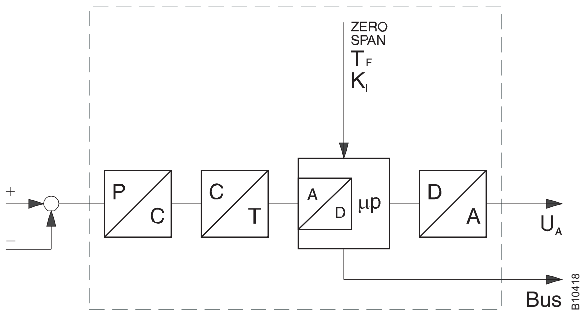
- ▶When the ASV 115 is being used as a room-pressure controller, the direction of operation of the 2nd control loop must be noted.
- ▶If the ASV 115 with integrated room-pressure controller is installed on the return air, the room-pressure controller has direction of operation A (direct) (if the room-pressure control deviation increases, the volume flow setpoint shift increases).
- ▶If the ASV 115 with integrated room-pressure controller is installed on the supply air, the room-pressure controller has direction of operation B (indirect) (if the room-pressure control deviation increases, the volume flow setpoint shift decreases).

For more information on setting the room pressure control loop, as well as application-specific control parameters, see the CASE VAV configuration manual 0701022001.

Sensor technology

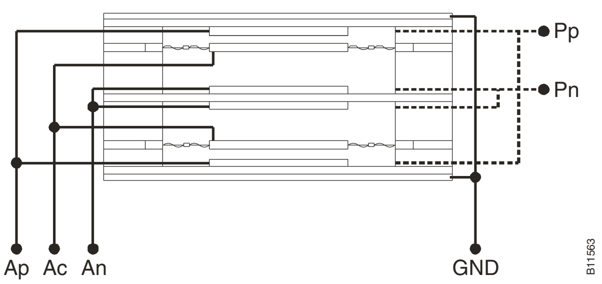
The sensor element in the VAV compact controller is a static twin-membrane sensor with PCB technology. Because of its symmetrical structure with two, principally independent, measuring cells, the sensor is compensated for installation in any position. The differential pressure acting on it is evaluated using a differential, capacitive measuring principle. Its unique design means it has very high measuring accuracy for differential pressures down to < 1 Pa, which means it is ideal for precise regulation of volume flows with a differential pressure of 1 Pa. This enables the operator to set very low $\dot{V}_{min}$ values for reduced mode in order to save energy.
The static measuring principle means that the sensor can also be used for measuring fluids containing dust or chemicals.

Block diagram of sensor



The SAUTER CASE VAV software enables users to adjust the zero point and set attenuation factors as required.

Sensor structure



Key

Pp	Connection for higher pressure
Pn	Connection for lower pressure
Ac	Common pole of differential capacitor
Ap	Positive pole
An	Negative pole
GND	Ground

A filter time constant can be set in a continuous range of 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.

Connecting the power supply

The actuator can be operated with 24 V DC or AC. Automatic connection detection is only available when operating with AC. When operating with DC, the full nominal torque of 10 Nm is available within the specified tolerance range.
The following functions in 24V= controller mode are different to AC mode on AI01 and AI02:

Functions with 24 V=

Connection	Parameterised function	Connection assignment	Function range 0…10 V	Function range 2…10 V	Function freely configurable
AI 01	Standard	NC[19]	Vvar[20]	Damper closed[21]	
AI/AO 02	AI	Not available			
	AO	Not available			

After the power supply is connected, the working range of the damper actuator is determined automatically. To do this, the actuator moves to both end stops and determines the possible angle of rotation (factory setting). Initialisation after a power interruption can be disabled by setting a parameter in the SAUTER CASE VAV software tool.

Function of RS-485 / SLC and BACnet MSTP interface

The VAV compact controller is equipped with an RS-485 interface that is not electrically isolated.
Operating in SLC mode
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 32nd user is the parametering tool. The SAUTER CASE VAV software is used to parameterise every individual device and to configure the devices within the network segment.
Physical access to the bus system is either via the connection in the housing cover or via three separate wires at the end of the cable.
Operating in BACnet MSTP mode
After the parameterisation of the VAV compact controller, the bus protocol can be changed from SLC to BACnet MSTP using SAUTER CASE VAV. In the BACnet MSTP mode, the baud rate can be set to 9.6, 38.4, 57.6 or 115.2 kbit/s. In the BACnet MSTP 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 CASE VAV 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 MSTP modes within a network segment.
All the devices must be switched over at the same time using the function in CASE VAV.

BACnet MSTP protocol implementation

BACnet device profile

Product	Device profile
ASV115BF132E	BACnet Application Specific Controller (B-ASC)

Supported BIBBs

Product	Supported BIBBs	BIBB Name
ASV115BF132E	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

[19] *NC, not connected*
[20] *It is recommended to additionally set forced operation for LOW voltage to Vvar.*
[21] *The connection is detected as LOW voltage and therefore as the factory setting for forced operation; different parameterisation leads to different behaviour.*

Supported standard objects

Product	Object type	Variable	Deletable
ASV115BF132E	Analog Input	No	No
	Analog Value	No	No
	Loop	No	No
	Device	No	No

BACnet Object List

Type	Object ID	Object	Description	Property Identifier	Mode	Unit
$C_{qV.s}$		ai1	Volume flow setpoint	Present value	r	%
$C_{-eqV.s}$		av1	Volume flow deviation	Present value	r	%
rα		av2	Damper position	Present Value	r	%
ΔP		av3	Pressure difference dP sensor	Present value	r	pascal
$C_{qV.p.ad}$		ai4	Volume flow setpoint shift	Present Value	r	%
cw/ccw		loop1	Direction of rotation cw=0/ccw=1	Action	r/w	
$c_{qV.s}$		loop1	Volume flow setpoint	Setpoint	r/w	%
r_{qV}		loop1	Volume flow present value	Controlled_Variable_Value	r	%
$C_{T.s}$		loop2	Room temperature setpoint	Setpoint	r/w	°C
r_T		loop2	Room temperature actual value	Controlled_Variable_Value	r	°C
x_p		loop2	Proportional Constant	Proportional Constant	r/w	none
T_N		loop2	Integral Constant	Integral Constant	r/w	s
C_q		loop2	Setpoint 2nd control loop	Setpoint	r/w	none
r_q		loop2	Actual value 2nd control loop	Controlled Variable Value	r	none
		loop2	Direction of operation	Action	r/w	
r_{qV}		ai2	Volume flow present value	Present value	r	%
r_T		ai3	Room temperature actual value	Present value	r	°C
r_q		ai3	Actual value 2nd control loop	Present value	r	%

Data Link Layer options

Product	Data Link	Options
ASV115BF132E	MSTP Slave	9600, 38400, 57600, 115200

Device Address Binding

Product	Supports static binding
ASV115BF132E	Yes

Network options

Product	Supports static binding
ASV115BF132E	No

Character Set

Product	Supported character set
ASV115BF132E	ANSI X3.4

Functions of CASE VAV

The VAV controller can be configured using the SAUTER CASE VAV software. This software tool can be used to configure all the values required for operation by means of a convenient user interface. The connection is via a USB port on your PC or laptop, as well as via the socket on the actuator or via the RS-485 wires in the actuator cable. The set for configuring the actuator consists of: The software including installation and operating manual, fitting instructions, connection plug, cable (1.2 m long) and interface converter for the PC. The software is designed for OEM manufacturers, commissioning and service engineers, as well as experienced operators. The following functions are available:

- Simple configuration of complex applications
- Saving of device configurations as presets or backups
- Configurable unit range
- Summary screen for quick view of the main parameters
- Tree view for fast navigation to individual configuration screens

- Integrated access to system diagram and wiring diagram
- Device configuration printout
- Service function for rapid troubleshooting
- Structured user guidance
- Online monitoring of main operating parameters
- Parameterisation of the network and MSTP settings
- Integrated BACnet browser

Engineering and 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 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.

Note:
►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 building 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, the installation standards EN 50178, 50310, 50110, 50274, 61140 and similar must be observed.
The RS-485 configuration interface in the housing cover is not designed for continuous operation. After completing the configuration, remove the parameter connector and seal the opening with the plug in order to restore ingress protection.

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 the same network segment must be powered by the same transformer. 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 per number of devices

Conductor cross-section	1 device[22]	Max. 8 devices	Max. 16 devices	Max. 24 devices	Max. 32 devices
0.32 mm²	50	6.2	3.2	2.0	1.6
0.5 mm²	80	10.0	5.0	3.4	2.6
0.75 mm²	120	15.0	7.6	5.0	3.8
1.00 mm²	160	20.0	10.0	6.6	5.0
1.50 mm²	240	30.0	15.0	10.0	7.6

Analogue signals

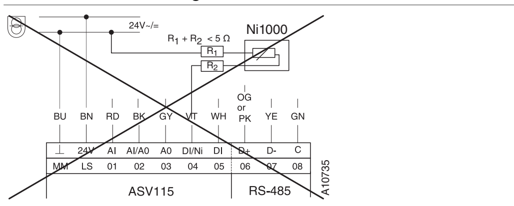
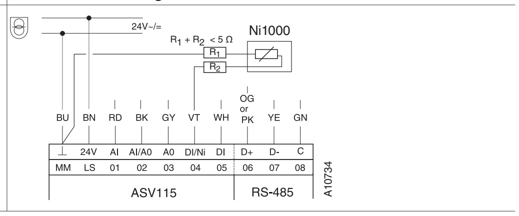
Analogue and digital signals are connected using the connecting cable. For trouble-free operation, the ground cable for actuators connected to each other for signal exchange must be connected to the same potential.
The maximum cable length for analogue signals mainly depends on the voltage drop on the ground wire. A signal cable with 100 Ω resistance produces a 10 mV voltage drop with a connected ASV 115 device. If 10 devices of type ASV 115 are connected in series to this power cable, the voltage drop is 100 mV, i.e. an error of 1%.

[22] *Star wiring recommended.*

Ni1000 sensor

The ground of the Ni1000 sensor must be connected directly to the ground terminal (MM) of the ASV 115. The ground of the Ni1000 sensor must not be connected directly to the ground of the power supply. In a two-conductor system, the maximum admissible line resistance between the sensor and the Ni1000 input of the ASV 115 for the two conductors is a total of 5 Ω.

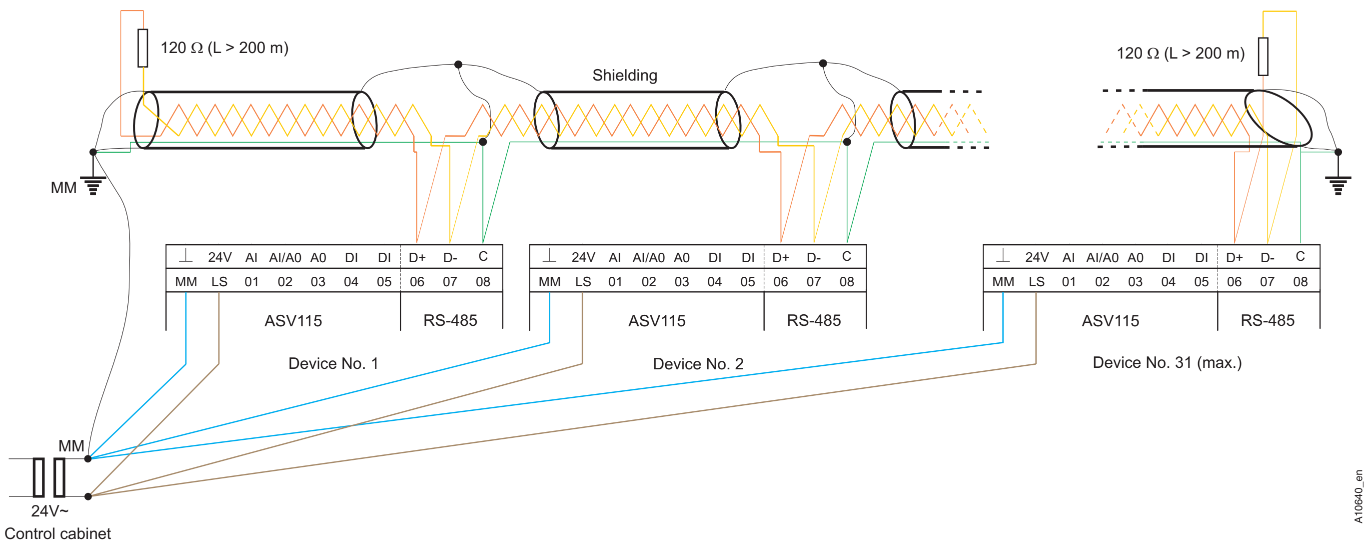
Wiring diagram (Ni1000)

Non-admissible wiring	Admissible wiring
	

Bus connector

The integrated bus is physically specified as a RS-485 interface. Depending on the cable length, up to 31 devices can be connected in a network segment. The C08 terminals of all controllers must be connected to each other and to the same potential. For < 200 m of wiring, neither special cables nor terminating resistors are necessary. 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.

Connection diagram (bus connection)



The length of the bus wiring is limited by the following parameters:

- Number of connected devices
- Cable cross-section

The following table is for twisted-pair wiring:

Twisted-pair wiring

Conductor cross-section	Number of devices	Max. cable length
0.20 mm²	31	< 200 m
0.20 mm²	31	200…500 m With bus termination

When using shielded cables, the shield must be earthed in the installation depending on the prevailing interference field:

- 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.

Additional technical information

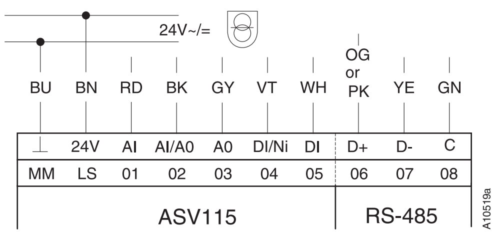
The upper section of the housing with the cover and knob contains the electronic components and the sensor. The lower section of the housing contains the brushless DC motor, the maintenance-free transmission, the transmission release lever and the spindle adapter.
Any connections that are not used must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

Note:
►The bus connections are sensitive to excess voltage and are not protected from the power supply. Faulty wiring can result in damage to the device.

Disposal

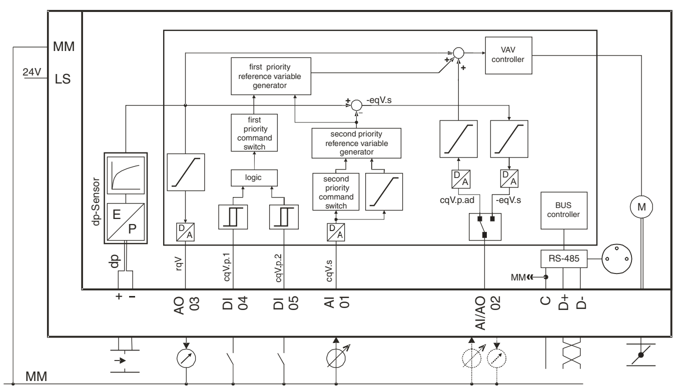
When disposing of the product, observe the currently applicable local laws.
More information on materials can be found in the Declaration on materials and the environment for this product.

Connection diagram

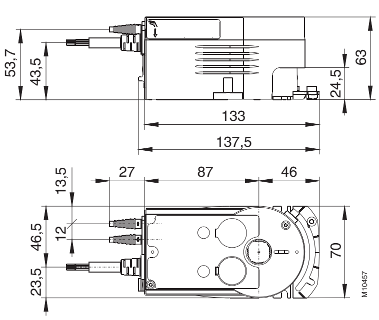


BU = blue
BN = brown
RD = red
BK = black
GY = grey
VT = violet
WH = white
OG = orange
PK = pink
YE = yellow
GN = green

Block diagram (factory setting)

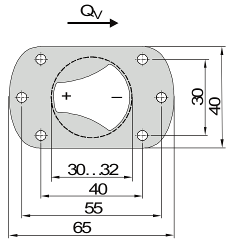


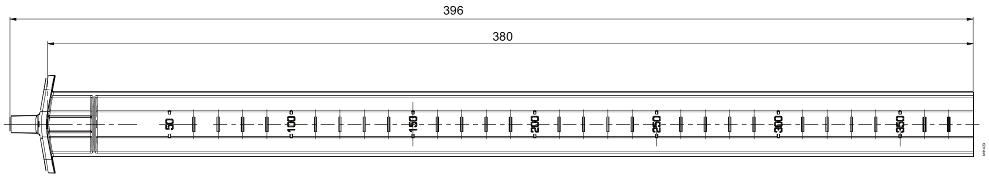
Dimension drawing



Accessories

XAFP100F001





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

