Control component

BTD

VME with control
component BTD

VMR with control
component BTD

MP BUS
TECHNOLOGY BY BELIMO

BACnet
ASHRAE

Modbus

Communication interfaces

Effective pressure transducer for clean air

Effective pressure transducer based on the dynamic measurement principle for
volume flow rate measuring units VME and VMR

- Use in ventilation and air conditioning systems, only with clean air
- Analogue or digital actual value signal for monitoring and evaluation by the
  central BMS
- Suitable for constant and variable volume flows
- No commissioning required as parameters are factory set
- Recording of measured values for the display of volume flow rates or for the
  control of slave controllers
- Service access for PC configuration software
- Access with a smartphone thanks to NFC interface and Bluetooth
- Data transparency due to bus communication with MP bus, Modbus RTU or
  BACnet MS/TP

General information

Application
- Determination of volume flow rates and transmission/ processing as an electrical signal for monitoring/tracking control
- Measurement of an effective pressure and conversion of the volume flow rate actual value into an analogue and digital actual value signal
- For use only with clean air
- Standard filtration in comfort air conditioning systems allows for use of the controller in the supply air without additional dust protection
- Volume flow rate actual value is available as a network data point or linear voltage signal
- Use TROX FlowCheck app and PC tool to configure the controller and the communication parameters
- Transducer factory-set to the unit-related constant (K value) of the measuring unit

With heavy dust levels in the room
- Install appropriate exhaust air filters upstream, as a partial volume flow is routed through the transducer for volume flow rate measurement.

If the air is additionally contaminated, e.g. with fluff or sticky components
- Use of the BTS attachment group instead of the BTD universal controller described here

Interface
Analogue interface
- Analogue interface with adjustable signal voltage range

Digital communication interface (bus)
- MP bus
- Modbus RTU, RS485
- BACnet MS/TP, RS485
- Data points, see bus lists

Factory setting
- Actual value output via analogue interface and Modbus communication interface

Signal voltage ranges
- 0 – 10 V DC
- 2 – 10 V DC

Parts and characteristics
- Effective pressure transducer according to the dynamic measurement principle (dynamic transducer)
- Plug-in terminals for supply line and controls including cover
- NFC and service interface
- Indicator lights for displaying the operating mode
- Controller casing prepared with 4 openings for threaded connections, 2 cable glands M16 x 1.5 for connecting cable in the supply package

Construction
Type VRU-D3-M/B TR for volume flow rate measuring unit
- For VME all dimensions
- For VMR all dimensions

Commissioning
- All parameters are factory-set
- On-site adjusting is not required
- Modbus/BACnet/MP bus interface: additional commissioning steps may be required
- Operating parameters can be adjusted using the TROX FlowCheck app

Useful additions
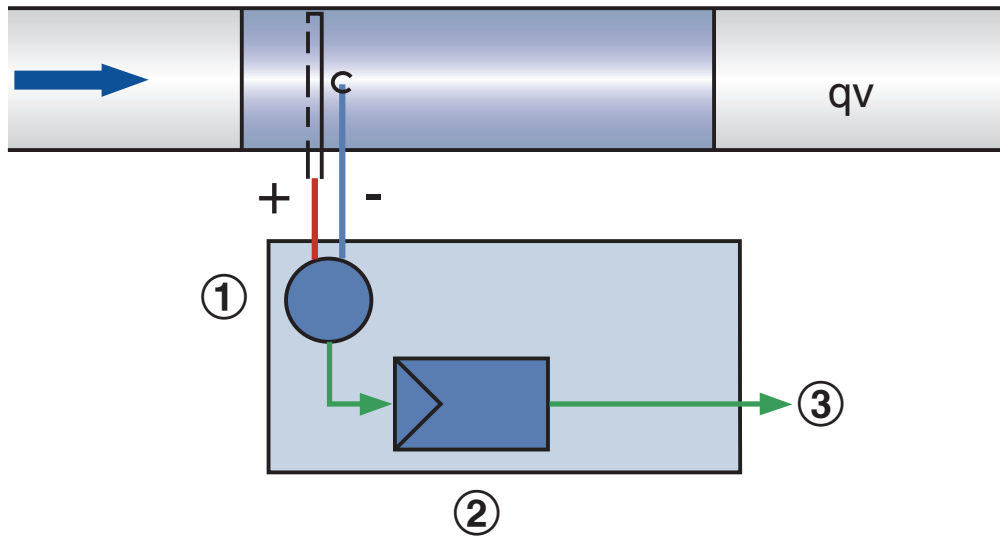TROX FlowCheck app for Android and iOS
- Belimo PC-Tool
- Bluetooth-to-NFC converter ZIP-BT-NFC

Function

The volume flow rate measurement is carried out by measuring an effective pressure. The volume flow rate measuring unit is fitted with an effective pressure sensor for this purpose. The effective pressure is converted into a voltage signal by an effective pressure transducer with a dynamic measurement principle. The volume flow rate actual value is available as a voltage signal and digital information. The factory setting is such that 10 V DC always corresponds to the nominal flow rate (q_{vnom}). Voltage ranges are stored in the transducer.

Principle of operation – volume flow rate measuring unit

① Effective pressure transducer (dynamic measurement principle)

② Transducer for converting the effective pressure signal into a volume flow rate signal
③ Analogue actual value signal

Specification text

This specification text describes the general properties of the product.

Category
- Volume flow rate measuring unit

Application
- Recording of a constant or variable volume flow rate actual value, e.g. for connection to the central building management system for the purpose of monitoring or integration into a room balancing system

Pressure range
- Effective pressure transducer for dynamic pressure measurements in ventilation and air conditioning systems with clean air

Installation orientation
- Either direction

Connection
- Plug-in terminals with cover. No connection box required

Supply voltage
- 24 V AC/DC

Interface/Control
Analogue signal
- 0 – 10 V DC; 2 – 10 V DC

or digital bus connection
- Modbus RTU
- BACnet MS/TP
- MP bus

Interface type can be set and connected by others

Interface information
Analogue signal:
- Volume flow rate actual value

Bus interface:
- Volume flow rate actual value
- Error status

System connections
- Flexible integration into digital bus systems

Parameter setting
- Parameters specific to measuring unit are factory-set
- Signal characteristic factory set

Subsequent adjustment using optional tools:
- TROX FlowCheck app, PC software (wired)

Condition upon delivery
- Electronic transducer is factory mounted on the measuring unit
- Factory-set parameters
- Functional test with air (see sticker)

Order code

```
VMR – P1 / 125 / BTD / 0
 |     |     |      |     |
 1     3     5      7     9
```

1 Type
VMR Volume flow rate measuring unit

3 Material
Galvanised sheet steel (standard construction)
P1 Powder-coated RAL 7001, silver grey
A2 Stainless steel construction

5 Nominal size [mm]
100
125
160
200

250
315
400

7 Attachments (effective pressure transducer)
BTD Effective pressure transducer for measuring units, dynamic

9 Signal voltage range
0 0 – 10 V DC
2 2 – 10 V DC

Order example: VMR/100/BTD/0

Material	Galvanised sheet steel
Nominal size	100 mm
Attachment	Effective pressure transducer for dynamic measurements
Signal voltage range	0 – 10 V DC

Variants

Effective pressure transducer, type VRU-D3-M/B TR

Effective pressure transducer VRU-D3-M/B TR (terminal cover has been removed)

① Effective pressure transducer
② Connection point for effective pressure
③ NFC interface
④ Blank cap (not in use)
⑤ Cable glands (for voltage and signals, respectively)
⑥ Fixing holes
⑦ Connection point for effective pressure sensor

① Address key with yellow status LED
② Magnetic holder for ZIP-BT-NFC
③ Service socket
④ Plug-in terminal strips
⑤ Safety cord for cover

Technical data

Effective pressure transducer for volume flow rate measuring units

VAV measuring units	Type	Part number
VME, VMR	VRU-D3-M/B TR	A00000073650

Effective pressure transducer VRU-D3-M/B TR

Effective pressure transducer VRU-D3-M/B TR

Measurement principle	Dynamic, independent of the transducer's installation orientation
Nominal voltage	AC/DC 24 V
Nominal frequency	50/60 Hz
Functional range	19.2-28.8 V AC / 21.6 - 28.8 V DC
Power requirement (normal operation/when idle)	1.5 W
Power rating	2 VA
Power rating - note	I_{max} 20 A at 5 ms
Bus connection	Modbus RTU*, BACnet MS/TP, MP bus
Adjustable communication parameters with Modbus RTU	Baud rate: 9600, 19200, 38400*, 76800, 115200; Address: 1*,2.3 – 247; Parity: 1-8-N-2*, 1-8-N-1, 1-8-E-1, 1-8-O-1; Number of nodes: max. 32 (without repeater) Terminal resistor: 120 Ω;
Adjustable communication parameters with BACnet MS/TP	Baud rate: 9600, 19200, 38400*, 76800, 115200; Address: 1*,2.3 – 127; Number of nodes: max. 32 (without repeater) Terminal resistor: 120 Ω;
Addressing	By others, with TROX FlowCheck app
Actual value signal output	0 – 10 V, 2 – 10 V, max. 0.5 mA
IEC/EN protection class	III (protective extra-low voltage)
Protection level	IP 42
EMC	CE according to 2014/30/EU
Weight	0.3 kg

* Factory setting

Commissioning

- ▪ On-site adjusting is not required
- ▪ After successful installation and wiring, the measuring transducer is ready for use
- ▪ Only briefly remove the protective cap of the measuring transducer during wiring
- ▪ Observe the volume flow rate ranges of the measuring unit; in particular, the rate may not fall below the minimum volume flow rate

Service tools – range of functions

Function / parameter setting	TROX FlowCheck app	PC-Tool	ZTH-EU
Mode, actual value signal 0 - 10 V, 2 - 10 V DC	R, W	R, W	-
Modbus, BACnet	R, W	R, W	-
MP bus	R, W	R, W	-
Setting bus parameters	R, W	R, W	-
Trend display	Yes	Yes	-

R,W = Read/write access.

- = Not available with this tool.

Communication interface Modbus RTU

Number	Register address	Description	Range	Unit	Scaling	Access
7	6	Relative volume flow rate related to q_{vnom} (reg. address 110). (*6)	0 – 15,000	%	0.01	RD
8	7	Absolute volume flow rate (*6)	0 – q_{vnom}	m³/h	1	RD
9	8	Sensor value (voltage, resistance, switch) Value depends on the setting of the sensor type (reg. address 107).	0 – 65,535	mV, Ω, 0/1,	0.1	RD
11	10	Absolute volume flow rate in selected volume flow unit acc. to (reg. address 117). (Low word) < 16 of 32 bit. (*6)	0 – 500,000,000	UnitSel	0.001	RD
12	11	Absolute volume flow rate in selected volume flow unit acc. to (reg. address 117). (High word) > 16 of 32 bit. (*6)	0 – 500,000,000	UnitSel	0.001	RD
51	50	Relative differential pressure Depending on application case acc. to (reg. address 128).	0 – 20,000	%	0.01	RD
52	51	Absolute differential pressure	-1,000 – 15,000	[Pa]	0.1	RD
53	52	–	–	–	–	[–]
54	53	Absolute differential pressure in selected unit (reg. address 145) (Low word) < 16 of 32 bit.	-10,000,000 – 100,000,000	UnitSel	0.001	RD
55	54	Absolute differential pressure in selected unit acc. to (reg. address 145) (High word) > 16 of 32 bit.	-10,000,000 – 100,000,000	UnitSel	0.001	RD
100	99	Bus terminal resistor Indicates whether the terminal resistor (120 Ω) is active or not active. Can only be set using service tools.	0: Not active 1: Active Factory setting: Not active	–	–	RD
101	100	Serial number, part 1 Example: 00839-31324-064-008. 1st part: 00839 2st part: 31324 3st part: 008	–	–	–	RD
102	101	Serial number, part 2	–	–	–	RD
103	102	Serial number, part 3	–	–	–	RD
104	103	Firmware version Example: 101, version 01.01.	–	–	–	RD

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Number	Register address	Description	Range	Unit	Scaling	Access
105	104	Malfunctions and service information – automatic reset if status has ceased.	Bit 0: – Bit 1: - Bit 2: – Bit 3: – Bit 4: Error of dP sensor Bit 5: Return air flow detected Bit 6: Volume flow rate too low Bit 7: - Bit 8: - Bit 9: - Bit10: Bus monitoring triggered Bit 11: - Bit 12: Pressure sensor incorrectly connected Bit 13: Pressure sensor not reached Bit 14: Error in dP sensor outside of measuring range	–	–	RD
108	107	Type of sensor If reg. address 118 = 0 (analogue), then reg. address 107 = 1 (active) for mV.	0: None 1: Active 2: Passive 3: – 4: Switch Factory setting: None	–	–	WR
110	109	Time until bus timeout monitoring is triggered If reg. 108 ≠ 0, then the initial setting is automatically reg. 108 = 120 s.	0 – 3,600 0: Not active Factory setting: Not active	s	1	WR
111	110	Nominal volume flow rate in m³/h	0 – 60,000	m³/h	1	RD
113	112	Nominal volume flow rate in selected volume flow unit acc. to (reg. address 117) (Low word) < 16 of 32 bit.	0 – 60,000,000	UnitSel	0.001	RD
114	113	Nominal volume flow rate in selected volume flow unit acc. to (reg. address 117) (High word) > 16 of 32 bit.	0 – 60,000,000	UnitSel	0.001	RD
118	117	Unit selection – Unit selection for reg. addresses 11 and 12.	0: – 1: m³/h 2: l/s 3: – 4: – 5: – 6: cfm	-	–	WR
119	118	Output Actual value information	0: Analogue (0 – 10 V, 2 – 10 V) 1: Bus (Modbus, BACnet, MP bus) Factory setting: Analogue	–	–	WR
125	124	Applications	0: Volume flow control 1: Pressure control 2: Room pressure control 3: Flow measurement	–		RD
126	125	Installation altitude	0 – 3,000	m	1	WR

Number	Register address	Description	Range	Unit	Scaling	Access
			Factory setting: 0			
127	126	Nominal differential pressure in the selected unit acc. to (reg. address 145) More in (reg. address 128)	D3: 0 – 50000 M1: 0 – 60000 M1R: 0 – 60000	UnitSel	–	RD
146	145	Selection of the pressure unit The selected unit is displayed in (reg. address 126).	0: Pascal 1: – 2: Water column Factory setting: Pascal	–	–	[–]

RD = Read-only access
WR = Read/write access

Protocol Implementation Conformance Statement – PICS (general information)

Date	2020-11-03
Vendor name	TROX GmbH
Vendor ID	423
Product name	VRU-D3-M/B TR A00000073650 VRU-M1-M/B TR A00000073652" VRU-M1R-M/B TR A00000073654 (Description string preset at factory according to hardware plattform)
Product model number	VRU – BAC
Application software version	01.03.0001
Firmware revision	10.05.0000
BACnet Protocol Revision	12
Product description	Controller for ▪ VAV/CAV application ▪ Pressure application ▪ Measurement application (Description string preset at factory according application)
BACnet Standard Device Profile	BACnet Application Specific Controller (B-ASC)
BACnet Interoperability Building Blocks Supported	Data Sharing – ReadProperty-B (DS-RP-B) Data Sharing – ReadPropertyMultiple-B (DS-RPM-B) Data Sharing – WriteProperty-B (DS-WP-B) Data Sharing – WritePropertyMultiple-B (DS-WPM-B) Data Sharing – COV-B (DS-COV-B) Device Management – DynamicDeviceBinding-B (DM-DDB-B) Device Management – DynamicObjectBinding-B (DM-DOB-B) Device Management – DeviceCommunicationControl-B (DM-DCC-B)
Segmentation Capability	No
Data Link Layer Options	MS/TP master, baud rates: 9600, 19200, 38400, 76800, 115200
Device Address Binding	No static device binding supported
Networking Options	None
Character Sets Supported	ISO 10646 (UTF-8)
Gateway Options	None
Network Security Options	Non-secure Device

Object processing

Object type	Optional properties	Writeable properties
Analogue input [AI]	Description COV Increment	COV Increment
Analogue Output [AO]	Description COV Increment	Present Value COV Increment Relinquish Default
Analogue Value [AV]	Description COV Increment	Present Value COV Increment
Binary Input [BI]	Description Active Text Inactive Text	
Device	Description Location Active COV Subscriptions Max Master Max Info Frames Profile Name	Object Identifier Object Name Location Description APDU Timeout (1000 – 60000) Number Of APDU Retries (0 – 10) Max Master (1 – 127) Max Info Frames (1 – 255)
Multi-state Input [MI]	Description State Text	
Multi-state Output [MO]	Description State Text	Present Value Relinquish Default
Multi-state Value [MV]	Description State Text	Present Value (if marked)

Processing of services

▪ The device does not support the services "Create object" and "Delete object"
▪ The specified maximum length of the writable character strings is based on single-byte characters
1. Object name 32 characters
2. Location 64 characters
3. Description 64 characters
▪ The device supports the DeviceCommunicationControl Services, no password necessary
▪ A maximum of 6 active COV subscriptions with a run time of 1 – 28800 s (maximum of 8 h) is supported

Communication interface BACnet MS/TP

Object Name	Object Type	Description	Values	COV Increment	Access
Device	Device [Inst.No]		0 – 4,194,302 Factory setting: 1	–	WR
RelDeltaP	AI[9]	Relative differential pressure in % related to DeltaPnom_Pa AV[122]	0 – 150	0.01 – 150 Factory setting: 1	RD
RelFlow	AI[10]	Relative volume flow rate in % related to Vnom_m3h AV[112] Status flags: (*4)	0 – 150	0.01 – 150 Factory setting: 1	RD
AbsFlow_m3h	AI[12]	Absolute volume flow rate in m³/h Status flags: (*4)	0 – 60,000	1 – 60,000 Factory setting: 10	RD
DeltaP_UnitSel	AI[18]	Absolute differential pressure in selected unit acc. to UnitSelPressure MV[127]	-10,000 – 100,000	0.001 – 100,000 Factory setting: 1	RD
AbsFlow_UnitSel	AI[19]	Absolute volume flow rate in selected unit acc. to UnitSelAirFlow MV[121] Status flags: (*4)	0 – 500,000	0.01 – 500,000 Factory setting: 1	RD
Sens1Analogue	AI[20]	Sensor 1 as analogue value If Sensor1Type MV[220] = 2 (active), then display = analogue value in 0 – 10 V. If Sensor1Type MV[220] = 3 (passive), then display = resistance value. If RmPCascade MV[10] = 2 (enabled) or 3 (quickly enabled), then the sensor input is not available. Status flags: (*5)	0 – 65535	0.01 – 1000 Factory setting: 1	RD
DeltaP_Pa	AI[29]	Absolute differential pressure in Pa	0 – 600	0.01 – 600 Factory setting: 10	RD
Vnom_m3h	AV[112]	Nominal volume flow rate in m³/h	0 – 50,000	0.01 – 50,000 Factory setting: 1	RD
Vnom_UnitSel	AV[119]	Nominal volume flow rate in selected unit acc. to UnitSel MV[121]	0 – 250,000	0.01 – 1,000: Factory setting: 1	RD
SystemAltitude	AV[120]	Installation altitude in metres above sea level	0 – 3,000	1 – 3,000 Factory setting: 10	WR
DeltaPnom_Pa	AV[122]	Nominal differential pressure in Pa The nominal differential pressure depends on the selected pressure sensor (D3, M1, M1R). Depending on the selected application, the nominal differential pressure serves as dp@Vnom or as the maximum pressure limitation	D3: 0 – 500 M1: 0 – 600 M1R: 0 – 75	1 – 600 Factory setting: 1	RD

Object Name	Object Type	Description	Values	COV Increment	Access
		If ApplicationSel MV[2] = 1 (flow control), then display = nominal differential pressure			
DeltaPnom_UnitSel	AV[129]	Nominal differential pressure in selected unit acc. to UnitSelPressure MV[127] More: see AV[122].		0.01 – 1000 Factory setting: 1	RD
Sens1Switch	BI[20]	Switch status of the switch at the sensor input If SenType MV[220] = 5 (switch), then Sens1Switch BI[20] = active. Status flags: (*6)	0: Inactive 1: Active	–	RD
BusTermination	BI[99]	Terminal resistor Shows whether the terminal resistor (120 Ω) has been activated with a service tool.	0: Not active 1: Active	–	RD
SummaryStatus	BI[101]	Condensed status Groups together the status of the objects: "StatusSensor" MI[103] "StatusFlow" MI[104] "StatusPressure" MI[109] "StatusDevice" MI[110]	Not equal to 1: OK 1: Not OK	–	RD
ApplicationSel	MV[2]	Display of application VRU-D3-M/B TR, VRU-M1-M/B TR - Flow control - Pressure control - Flow measurement VRU-M1R-M/B TR - Room pressure control	1: Flow control 2: Pressure control 3: Room pressure control 4: Flow measurement	–	RD
StatusSensor	MI[103]	Status of the differential pressure sensor If status end = automatic reset	1: OK 2: dP sensor not OK 3: dP sensor outside of measuring range 4: dP sensor incorrectly connected	–	RD
StatusFlow	MI[104]	Volume flow rate status If there is no volume flow rate within 600 s, then StatusFlow MI[104] = 3.	1: OK 2: – 3: No airflow detected	–	RD
StatusPressure	MI[109]	Differential pressure status If the differential pressure is not reached within 180 s, then StatusPressure MI[109] = 3.	1: OK 2: – 3: Pressure not reached	–	RD

Object Name	Object Type	Description	Values	COV Increment	Access
StatusDevice	MI[110]	Status of the device during bus monitoring According to BusWatchdog AV[130].	1: OK 2: Bus timeout monitoring activated	–	RD
UnitSelAirFlow	MV[121]	Selection of the volume flow unit The selected unit is indicated in AI[19] and AV[104]	1: – 2: m³/h 3: l/s 4: – 5: – 6: – 7: cfm	–	WR
SpSource	MV[122]	Selection of actual value output	1: Analogue (0 – 10 V, 2 – 10 V) 2: Bus (Modbus, BACnet, MP bus) Factory setting: Analogue	–	WR
UnitSelPressure	MV[127]	Selection of the pressure unit The selected unit is indicated in DeltaP_UnitSel AI[18] and DeltaPnom_UnitSel AV[129].	1: Pascal 3: Water column Factory setting: pascal	–	WR
Sens1Type	MV[220]	Definition of the sensor type If Sens1Type MV[220] = 2 (active) or 3 (passive), then Sens1Analog AI[20] active. If Sens1Type MV [220] = 5 (switch), then Sens1Schalter BI[20] active.	1: None 2: Active sensor (in hybrid mode) 3: passive sensor 4: – 5: Switch Factory setting: none	–	WR

RD = Read-only access

WR = Read/write access

C = Commendable with priority array

Status flags:

(*5) If Sens1Type MV[220] = 1 (none), then Out of Service = 1

(*6) If Sens1Type MV[220] ≠ 5, then Out of Service = 1

Product details

Analogue interface 0 – 10 V DC or 2 – 10 V DC
The analogue interface can be set for signal voltage range 0 – 10 V DC or 2 – 10 V DC. The assignment of actual flow rates to voltage signals is shown in the characteristic curves.
- The signal voltage range is set in the factory according to the order code
- The signal voltage range can be adjusted by others using the TROX FlowCheck App or PC-Tool

If the digital communication interface is used, the output channel can be changed to Modbus, BACnet or MP bus at any time via the TROX FlowCheck app.

Actual value as feedback for monitoring or tracking control
- The actual volume flow rate measured by the controller can be picked up as a voltage signal at terminal 5
- The selected signal voltage range 0 – 10 V DC or 2 – 10 V DC is mapped on the volume flow rate range $0 – q_{vNom}$
- In analogue mode, there is the parallel option of querying operating data via the digital communication interface (hybrid mode)
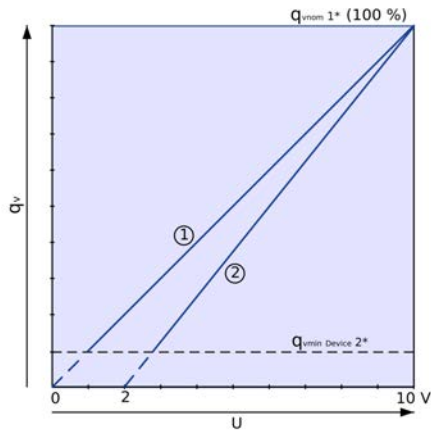
Digital communication interface
To use the digital communication interface, a change by others using the TROX FlowCheck app is required. The bus interface can be set to Modbus, BACnet or MP bus. For a smooth exchange of data in the bus network provided by others, the communication parameters and the user address for the bus interface are required. The communication parameters of the bus systems (address, baud rate, etc.) can be set using the TROX FlowCheck app. The Modbus and BACnet interfaces provide standardised bus register/object access to the available data points. Additional hardware and software from official MP bus partners is required for further processing of the MP bus data.

Actual value as feedback for monitoring or tracking control
- The actual values can be read out in m³/h in both the Modbus and BACnet (factory setting). Other units such as l/s and cfm are possible
- The volume flow rate actual value can also be read out as a relative percentage value via additional data points. 0 – 100 % is mapped on the volume flow rate range $0-q_{vNom}$
- In addition to the actual value of the volume flow rate, further information on the other Modbus registers/BACnet objects can be read out as well
- Overview of the registers/objects in the communication tables
- For diagnostic purposes, the actual value of the volume flow rate can be picked up at terminal 5 in bus mode
- The volume flow rate range $0 – q_{vNom}$ always corresponds to the signal voltage range of (0)2 – 10 V DC

Characteristic of the actual value signal

① Signal voltage range 0 – 10 V
② Signal voltage range 2 – 10 V
1* = q_{vnom} nominal volume flow rate
2* = $q_{vmin\ unit}$ minimum volume flow rate

Calculation of volume flow rate actual value at 0 – 10 V

$$q_{vact} = \frac{U}{10\ V} \times q_{vnom}$$

Calculation of volume flow rate actual value at 2 – 10 V

$$q_{vact} = \frac{U - 2}{10\ V - 2\ V} \times q_{vnom}$$

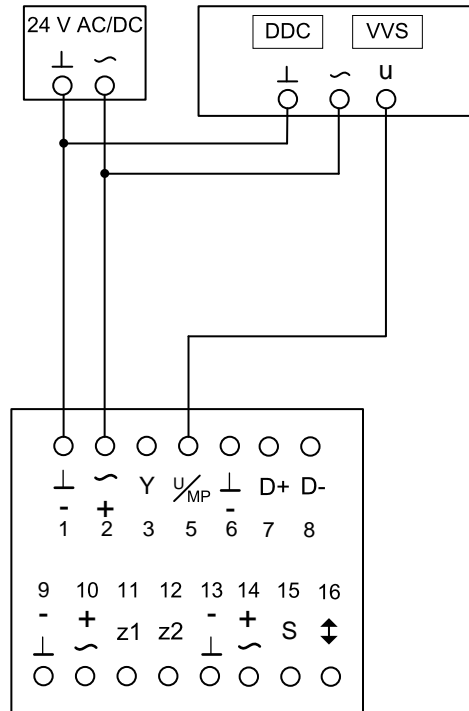Plug-in terminal strips

1	2	3	5	6	7	8
⊘	⊘	⊘	⊘	⊘	⊘	⊘

1	$\overset{-}{\perp}$	$\overset{+}{\sim}$	Y	U/MP	$\overset{-}{\perp}$	D+	D-	8

9	$\overset{-}{\perp}$	$\overset{+}{\sim}$	z1	z2	$\overset{-}{\perp}$	$\overset{+}{\sim}$	S	↕	16

	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	
9	10	11	12	13	14	15	16		

1, 6, 9, 13: $\perp$, – = Ground, neutral

2, 10, 14: ~, + = Supply voltage 24 V

3: Y = Setpoint signal Y and override controls (not when used as effective pressure transducer)

5: U/MP = Actual value signal U or MP bus

7: D- = Modbus/BACnet A, C1

8: D+ = Modbus/BACnet B, C2

11, 12: Override controls (not when used as effective pressure transducer)
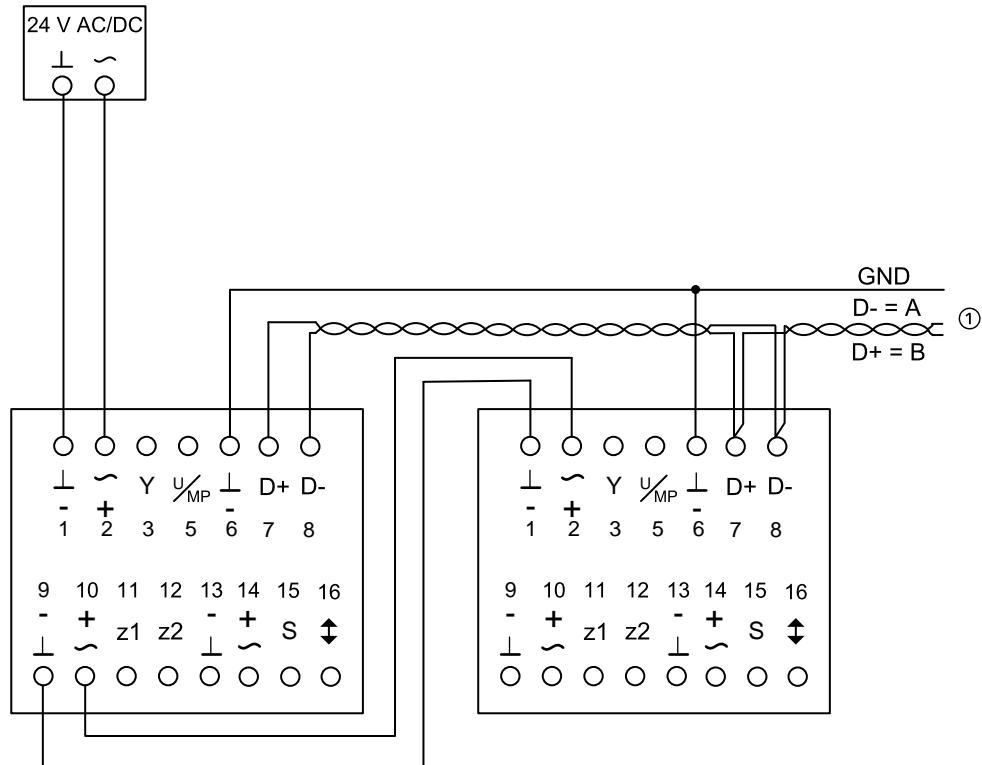
15: External sensor

16: Not used

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Wiring diagram – analogue interface

1: ⊥, – = Ground, neutral
2: ~, + = Supply voltage 24 V AC/DC
5: U: Actual value signal 0 – 10 V DC or 2 – 10 V DC

Note:
DDC = Monitoring, processing actual value signal
VAV = Signalling to slave controller for example

Wiring diagram – bus interface

1: ⊥, – = Ground, neutral

2: ~, + = Supply voltage 24 V AC/DC

7: D- = Modbus/BACnet A, C1

8: D+ = Modbus/BACnet B, C2

6: GND = Common ground potential

Note:

① Other Modbus/BACnet network devices
(up to 32)

Nomenclature

q_{vnom} [m³/h]; [l/s]

Nominal flow rate (100 %): The value depends on product type, nominal size and effective pressure transducer (attachment). Values are published on the internet and in technical leaflets and stored in the Easy Product Finder design program. Reference value for calculating percentages (e.g. q_{vmax}). Upper limit of the setting range and maximum volume flow rate setpoint value for the VAV terminal unit.

q_v [m³/h]; [l/s]

Volume flow rate

Δ_{pw}

Measured variable for the differential pressure active at the sensor. Basis for the calculation of the current volume flow rate or the conversion into a (volume-flow-rate-linear) electrical signal by effective pressure transducers.

Volume flow rate measuring unit

Consists of a basic unit and an optional effective pressure transducer.

Basic unit

Unit for recording a volume flow rate without an attached measuring transducer. The main components include the casing with sensor element(s) to measure the effective pressure and the tube connections at the outside of the casing for capturing the effective pressure. In contrast to a volume flow controller, there is no damper blade. Important differences regarding the basic unit: Unit shape, material and types of connection. The basic unit can be used in two ways: either together with a mobile differential pressure measuring device for manual measurements, or with an effective pressure transducer that converts the effective pressure into an electric signal.

Effective pressure transducer

Electronic unit mounted on the basic unit for measuring the volume flow rate. The electronic unit essentially consists of an effective pressure transducer. Important differences: Transducer that operates according to the dynamic measurement principle and is suitable for clean air or transducer that operates according to the static measurement principle and is suitable for contaminated air, with analogue interface and digital bus interface.