

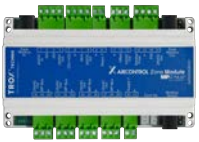
Control components for VAV terminal units

BC0

Bus interface MP-Bus



TVR with attachment BC0



X-AIRCONTROL zone module MP-Bus



Control components for VAV terminal unit with dynamic transducer and analogue and MP-Bus interface

Compact device for use with VAV terminal units

- Controller, effective pressure transducer and actuator in one casing
- Use in ventilation and air conditioning systems, only with clean air
- Operation either with analogue interface or MP-Bus communication
- Suitable for constant and variable volume flow rates and q_{vmin}/q_{vmax} switching
- Activation of override controls, e.g. via external wiring
- Volume flow rates q_{vmin} and q_{vmax} are set in the factory and saved in the controller
- Modification of operating parameters by hand-held setting unit, PC software as well as smartphone and tablet app (TROX FlowCheck app)

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General information

Application

- All-in-one control devices for VAV terminal units
- Dynamic effective pressure transducer, control electronics and actuator combined in a single casing
- For use with clean air only
- Standard filtration in comfort conditioning systems allows for using the controller in the supply air without additional dust protection.
- Choice of various control options based on setpoint value default setting
- The room temperature controller, central BMS, air quality controller or similar units control the variable volume flow control by specifying the setpoint values via a communication interface or analogue signal
- Override controls for activating q_{vmin} , q_{vmax} , shut-off, OPEN position via MP-Bus or switch / relay possible
- Use service tool ZTH-EU, PC-Tool and the TROX FlowCheck app to configure the controller and the communication parameters

With heavy dust levels in the room

- Install suitable extract air filters upstream, as a partial volume flow is routed through the transducer for volume flow rate measurement

If the air is contaminated with dust, fluff or sticky components

- Use an expansion module with static effective pressure transducer, e.g. XD0 (analogue interface) or BUSN (with MP-Bus interface)

Control strategy

- The volume flow controller works independently of the duct pressure
- Differential pressure fluctuations do not result in permanent volume flow rate changes
- To prevent the control from becoming unstable, a dead band is allowed within which the damper blade does not move
- The flow rate range for the controller is set in the factory
 - q_{vmin} : minimum volume flow rate
 - q_{vmax} : maximum volume flow rate
- Operating parameters and signal voltage ranges are set in the factory according to the order code. Subsequently adaptable via service tools.

Interface

Communication interface for the volume flow rate setpoint and actual value, damper blade position and error status

- Analogue interface with adjustable signal voltage range
- Analogue signal for volume flow rate setpoint value
- Analogue signal for volume flow rate actual value (factory setting), alternatively: analogue signal for damper blade position (adjustment by others required)

Alternatively

- MP-Bus communication interface can be activated by others
- Communication interface can be set via service tools

Operating modes

- Variable or constant value

Variable operation (V)

- Setpoint value default setting via analogue interface or MP-Bus
- Signal voltage range corresponds to $q_{vmin} - q_{vmax}$

Constant value mode (F)

- A setpoint signal is not required, setpoint value corresponds to q_{vmin}

Operating parameters

- $q_{vmin} = 0 - 100\%$ of the nominal volume flow rate q_{vNom} can be set
- $q_{vmax} = 20 - 100\%$ of the nominal volume flow rate q_{vNom} can be set

Signal voltage ranges

- 0 – 10 V DC
- 2 – 10 V DC

Parts and characteristics

- Effective pressure transducer with dynamic pressure measurements (dynamic transducer)
- Overload protection
- Release button for the actuator
- Axis connection with clamping fixture or positive-locking mount
- Connecting cable with 4 wires approx. 0.9 m
- Service interface for connection of service tools
- NFC interface for using the TROX FlowCheck app
- Indicator lights for detecting the operating mode
- Addressing key for setting user addresses in bus mode
- Supply and communication not galvanically isolated

Construction

- Type LMV-D3L-MP-F TR for terminal unit LVC
- Type LMV-D3-MP-F TR for terminal unit TVR
- Type LMV-D3-MP TR for terminal units TZ-Silenzio, TA-Silenzio, TVZ, TVA, TVM
- Type NMV-D3-MP TR for terminal unit TVJ
- Type NMV-D3-MP TR for terminal unit TVT up to 1000 x 300 and/or 800 x 400

Commissioning

- Due to the volume flow rates set at the factory, always ensure that the terminal units are only installed at the specified locations
- Operating parameters can be adjusted by others (service tools)
- After successful installation and wiring, the controller is ready for use via the analogue interface
- MP-Bus: additional commissioning steps required

Useful additions

Service tools:

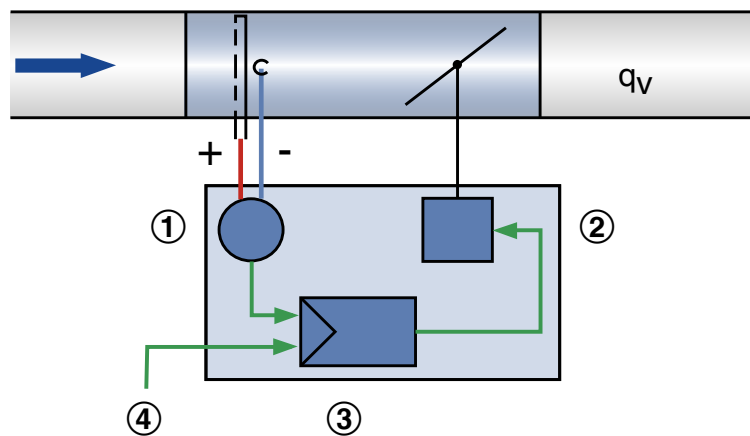
- Adjustment device ZTH (order code AT-VAV-B)
- PC-Tool
- TROX FlowCheck app

Function

VAV terminal units control the volume flow in a closed loop, i.e. measurement – comparison – correction. The volume flow rate is measured via the effective pressure. This is done via an effective pressure sensor. An integrated differential pressure transducer converts the effective pressure into a voltage signal. The volume flow rate actual value is available as a voltage signal. The factory setting is such that 10 V DC always corresponds to the nominal flow rate (q_{vNom}). The volume flow rate setpoint value comes from

a higher-level controller (e.g. room temperature controller, air quality controller, central BMS). Variable volume flow control results in a value between q_{vmin} and q_{vmax} . It is possible to override the room temperature control, e.g. by a complete shut-off of the duct. The controller compares the differential pressure setpoint value to the actual value and controls the actuator accordingly if there is a difference.

Principle of operation



- ① Effective pressure transducer
- ② Actuator
- ③ Volume flow controller
- ④ Setpoint value signal

Specification text

This specification text describes the general properties of the product.

Category

- Compact controller for volume flow rate

Application

- Control of a constant or variable volume flow rate setpoint
- Electronic controller for applying a reference variable and tapping an actual value signal
- The actual value signal relates to the nominal volume flow rate such that commissioning and subsequent adjustment are simplified
- Stand-alone operation or integration with a central BMS

Area of application

- Dynamic transmitter for clean air in ventilation and air conditioning systems

Actuator

- Integrated; slow running (runtime 110 – 150 s for 90°)

Installation orientation

- Either direction

Connection

- Connecting cable with 4 wires

Supply voltage

- 24 V AC/DC

Interface/signalling

- Analogue signal 0 – 10 V DC or 2 – 10 V DC or Belimo MP-Bus

Interface information

- Analogue: Volume flow rate setpoint and actual value signal
 - Actual value signal of volume flow rate set at the factory
 - Actual value signal can be reconfigured at the damper blade position by others
- MP-Bus: Volume flow rate setpoint and actual value, damper blade position, error status, etc.

System connections

MP-Bus for optional extensions:

- Suitable for TROX X-AIRCONTROL zone module X-AIR-ZMO-MP
- Gateways for Modbus, BACnet, EIB, e.g., Belimo UK24xxx
- Fan optimiser, e.g., Belimo COU24-A-MP
- In MP-Bus mode: Integration of a sensor or switch contact into the MP-Bus network

Special functions

- Activation of q_{vmin} , q_{vmid} , q_{vmax} , closed, open by external switch contacts/circuitry or MP-Bus
- Optional activatable operating modes: open loop: actuator with air flow measurement

Parameter setting

- Parameters specific to the VAV terminal unit are factory-set
- Operating values q_{vmin} , q_{vmax} factory-set
- Signal characteristic is factory-set

Subsequent adjustment using optional tools:

- Adjustment device, PC software (wired in each case)
- FlowCheck app (wireless via integrated NFC interface)

Order code

TVR – D / A2 / FL / 200 / G2 / BC0 / V 0 / qvmin – qvmax m³/h
 | | | | | | | | | | |
 1 2 3 4 5 6 7 8 9 10 11

1 Type

TVR VAV terminal unit

2 Acoustic cladding

No entry required: None

D With acoustic cladding

3 Material

Galvanised sheet steel (standard construction)

P1 Powder-coated RAL 7001, silver grey

A2 Stainless steel construction

4 Duct connection

No entry required: Attachment for duct in accordance with EN 1506; with groove for optional seal

FL Both ends (not for TVR-D-P1)

5 Nominal size [mm]

100, 125, 160, 200, 250, 315, 400

6 Accessories

No entry required: None

D2 Double lip seal both ends

G2 Matching flanges both sides

Order example: TVR-D/A2/200/D2/BC0/V0/200-354 m³/h

Acoustic cladding	With
Material	Stainless steel construction
Nominal size	200 mm
Accessories	Double lip seal both ends
Attachment	VARYCONTROL compact controller, dynamic transducer
Signal voltage range	0 – 10 V DC
Operating value	q _{vmin} = 200 m ³ /h q _{vmax} = 354 m ³ /h

Order example: TVR/160/BC0/F2/1100 m³/h

Acoustic cladding	Without
Material	Galvanised sheet steel
Nominal size	160 mm
Attachment	VARYCONTROL compact controller, dynamic transducer
Signal voltage range	2 – 10 V DC
Operating value	q _{vconst} = 1100 m ³ /h

7 Attachments (control components)

BC0 Compact controller, dynamic transducer

8 Operating mode

F Constant value (a setpoint value)

V Variable (setpoint value range)

9 Signal voltage range

0 0 – 10 V DC

2 2 – 10 V DC

10 Operating values for factory setting

Volume flow rates in m³/h or l/s

q_{vconst} (only with operating mode F)

q_{vmin} (only with operating mode V, M)

q_{vmax} (only with operating mode V, M)

11 Volume flow rate unit

m³/h

l/s

Variants

Compact controller BC0 with axis clamping device



- 1: VAV compact controller
- 2: Gear release button
- 3: Tube connections of effective pressure sensor
- 4: Service socket
- 5: Connecting cable

Compact controller BC0 with axis clamping device



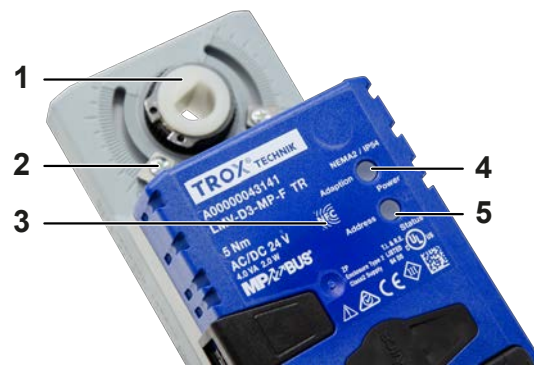
- 1: Axis clamping device
- 2: Rotation stop
- 3: NFC interface
- 4: Power LED
- 5: Status LED

Compact controller BC0, with positive fit



- 1: VAV compact controller
- 2: Gear release button
- 3: Tube connections of effective pressure sensor
- 4: Service socket
- 5: Connecting cable

Compact controller BC0, with positive fit



- 1: Axis clamping device
- 2: Rotation stop
- 3: NFC interface
- 4: Power LED
- 5: Status LED

Technical data

Compact controllers for VAV terminal units

VAV terminal units	Type	Part number
LVC	LMV-D3L-MP-F	A00000043143
TVR	LMV-D3-MP-F	A00000043141
TZ-Silenzio, TA-Silenzio, TVZ, TVA, TVR, spare part for LMV-D3-MP-F	LMV-D3-MP	A00000043140
TVJ, TVT	NMV-D3-MP	A00000043142
TVM	2 × LMV-D3-MP	A00000043140

Compact controllers BC0, LMV-D3L-MP-F (only type LVC)



Compact controllers BC0, LMV-D3L-MP-F

Measurement principle/installation orientation	Dynamic measurement principle, position-independent
Nominal voltage	AC/DC 24 V
Nominal frequency	50/60 Hz
Functional range	AC 19.2 – 28.8 V/DC 21.6 – 28.8 V
Power consumption – when running	2 W
Power rating	3.5 VA
Self-consumption (idle state)	1 W
Adjustable communication parameters for MP-Bus	Address: 1 - 8 (up to 8 MP-Bus participants); addressing: must be performed by others, e.g., with adjustment device or TROX FlowCheck app; topology: star, ring, line, tree and mixed forms are permitted; terminating resistor: not required
Torque	5 Nm
Run time for 90°	120 – 150 s
Setpoint value signal input	0 – 10 V DC or 2 – 10 V DC, input resistance > 100 kΩ
Actual value signal output	0 – 10 V DC or 2 – 10 V DC; max. 5mA
Connections	Connecting cable: approx. 0.9 m, 4 x 0.75 mm ²
IEC protection class	III (protective extra-low voltage)
Protection level	IP 54
EC conformity	EMC to 2014/30/EU, low voltage to 2014/35/EU
Weight	0.5 kg

Compact controllers BC0, LMV-D3-MP



Compact controllers BC0, NMV-D3-MP-F TR


Compact controllers BC0, LMV-D3-MP and LMV-D3-MP-F

Measurement principle/installation orientation	Dynamic measurement principle, position-independent
Nominal voltage	AC/DC 24 V
Nominal frequency	50/60 Hz
Functional range	AC 19.2 – 28.8 V/DC 21.6 – 28.8 V
Power consumption – when running	2 W
Power rating	4 VA
Self-consumption (idle state)	1 W
Adjustable communication parameters for MP-Bus	Address: 1 - 8 (up to 8 MP-Bus participants); addressing: must be performed by others, e.g., with adjustment device or TROX FlowCheck app; topology: star, ring, line, tree and mixed forms are permitted; terminating resistor: not required
Torque	5 Nm
Run time for 90°	110 – 150 s
Setpoint value signal input	0 – 10 V DC or 2 – 10 V DC, input resistance > 100 kΩ
Actual value signal output	0 – 10 V DC or 2 – 10 V DC; 0.5 mA max.
Connections	Connecting cable: approx. 0.9 m, 4 x 0.75 mm ²
IEC protection class	III (protective extra-low voltage)
Protection level	IP 54
EC conformity	EMC to 2014/30/EU
Weight	0.5 kg

Compact controllers BC0, NMV-D3-MP TR



Compact controllers BC0, NMV-D3-MP-F TR


Compact controllers BC0, NMV-D3-MP

Measurement principle/installation orientation	Dynamic measurement principle, position-independent
Nominal voltage	AC/DC 24 V
Nominal frequency	50/60 Hz
Functional range	AC 19.2 – 28.8 V/DC 21.6 – 28.8 V
Power consumption – when running	3 W
Power rating	5 VA
Self-consumption (idle state)	1.5 W
Adjustable communication parameters for MP-Bus	Address: 1 - 8 (up to 8 MP-Bus participants); addressing: must be performed by others, e.g., with adjustment device or TROX FlowCheck app; topology: star, ring, line, tree and mixed forms are permitted; terminating resistor: not required
Torque	10 Nm
Run time for 90°	110 – 150 s
Setpoint value signal input	0 – 10 V DC or 2 – 10 V DC, input resistance > 100 kΩ
Actual value signal output	0 – 10 V DC or 2 – 10 V DC; 0.5 mA max.
Connections	Connecting cable: approx. 0.9 m, 4 x 0.75 mm ²
IEC protection class	III (protective extra-low voltage)
Protection level	IP 54
EC conformity	EMC to 2014/30/EU
Weight	0.7 kg

Commissioning

- On-site adjusting is not required
- As the volume flow rates are factory-set, the terminal units have to be installed at the specified locations
- After successful installation and wiring, the controller is ready for use by using the analogue interface
- Comply with the volume flow rate control ranges of the VAV terminal units, do not set a volume flow rate which is below the minimum flow rate
- For operation with MP-Bus interface: additional commissioning steps such as assigning a participant address are necessary

LED display and operation

Adjustment LED (green):

- Off: No supply voltage
- On: Operation
- Press key: Triggering of the rotation angle adjustment

Address LED (yellow):

- Off: Normal operation
- Flickering: MP communication active
- On: Adjustment or synchronisation in progress
- Flickering: Request for addressing from the MP master
- Press key: Confirmation of addressing

Service tool range of functions

Function/parameterisation	TROX FlowCheck app	PC-Tool	ZTH-EU
Setting qvmin, qvmax	R, W	R, W	R, W
Mode, signal voltage range 0 – 10 V, 2 – 10 V DC	R, W	R, W	R, W
Carry out override controls	Yes	Yes	Yes
MP-Bus address	R, W	R, W	R, W
Trend display	Yes	Yes	-

R,W = Read and write access.

R = Read only

W = Write only

- = Function is not available with this service tool.

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 using the service tools. The assignment of the setpoint value or actual value of the volume flow rate to the voltage signal is shown in the characteristic line displays.

Setpoint value default setting

Variable operation:

- In the variable operating mode, the setpoint value setting is set at cable wire Y with an analogue signal
- The selected signal voltage range 0 – 10 V or 2 – 10 V DC is assigned to the set volume flow rate range $q_{vmin} - q_{vmax}$
- Volume flow rate range $q_{vmin} - q_{vmax}$ is set in the factory according to the order code
- Subsequent adjustment of q_{vmin} or q_{vmax} is possible using service tools, TROX FlowCheck App, adjustment device ZTH-EU or PC-Tool

Constant value mode:

- In the constant value mode operating mode, an analogue signal is not required at cable wire Y
- The set flow rate constant value q_{vmin} is used
- Volume flow rate q_{vmin} is set in the factory according to the order code
- Subsequent adjustment of q_{vmin} is possible using service tools, TROX FlowCheck App, adjustment device ZTH-EU or PC-Tool

Actual value as feedback for monitoring or tracking control

- The actual volume flow rate measured by the controller can be tapped as a voltage signal at cable wire U in the default setting
- The selected signal voltage range 0 – 10 V DC or 2 – 10 V DC is mapped to the volume flow rate range 0 – q_{vNom}
- The actual value output U can be reconfigured by others to output the damper position
- Selected signal voltage range 0 - 10 V DC or 2 - 10 V DC is then mapped to the damper blade position 0% (CLOSED) - 100% (OPEN).

Override control

For special operating situations, the volume flow controller can be put in a special operating mode (override control). The following modes are possible: control q_{vmin} , control q_{vmax} , damper blade in the OPEN position, damper blade CLOSED. Override control can be activated by:

- A suitable connection at signal input Y as per the connection diagrams through connection with external switching contacts/ relays. OPEN and CLOSED are only available if the controller is supplied with alternating current (AC).
- Service tools such as ZTH-EU, PC-Tool or TROX Flow-Check app are activated
- A bus timeout monitoring is activated. (only in MP-Bus operation)
- A control signal at signal input Y is activated (only override control CLOSED). See the following table (only in operation with analogue setpoint value)

Override control CLOSED via control signal on control signal Y

The override control CLOSE can also be activated by observing certain conditions with the command signal. The following table summarises the boundary conditions.

Signal voltage range	0 – 10 V DC		2 – 10 V DC		
	$q_{vmin} = 0$	$q_{vmin} > 0$	$q_{vmin} = 0$	$q_{vmin} > 0$ and setting parameter: 0.1 V	$q_{vmin} > 0$ and setting parameter: 0.5 V
Marginal condition setting parameters q_{vmin} : Factory/customer setting					
Damper closes at Y:	< 0.45 V DC	not possible	< 2.36 V DC	< 0.1 V DC	< 0.5 V DC
Damper closes again from Y:	> 0.55 V DC	> 0 V DC	> 2.44 V DC	> 0.1 V DC	> 0.5 V DC

Note on mode setting 0.1 V DC or 0.5 V DC: If the setpoint value of 0.1 V cannot be safely undershot on a system (DDC output or long cable length), the shut-off threshold can be changed to 0.5 V with the PC-Tool. Only possible for signal voltage range 2 – 10 V DC.

Digital communication interface MP-Bus

General information

The MP-Bus is not an open system, but a manufacturer-dependent bus system for which Belimo and its partner companies provide components and software. Examples include the TROX zone module XAIR-ZMO-MP with corresponding software for the room control system X-AIRCONTROL and the Belimo gateways UK24xxx or the fan optimiser.

Among other things, setpoint and override controls can be specified and actual values such as volume flow rate or damper position can be read out via MP-Bus. With regard to the network topology, there are no restrictions with the MP-Bus. Star, ring, line, tree or mixed forms are permitted.

Neither special cables nor terminal resistors are required for the wiring. However, the cable lengths are limited by:

- The sum of the performance data of the connected MP devices
- The type of power supply 24 V AC or 24 V DC
- Cable cross section

Example: MP-Bus with 5 LMV-D3-MP compact controllers on 24 V AC supply. Total dimensioning power $5 \times 4 \text{ VA} = 20 \text{ VA}$.

- Cable with 0.75 mm^2 results in a maximum cable length of 28 m
- Cable with 1.5 mm^2 results in a maximum cable length of 54 m

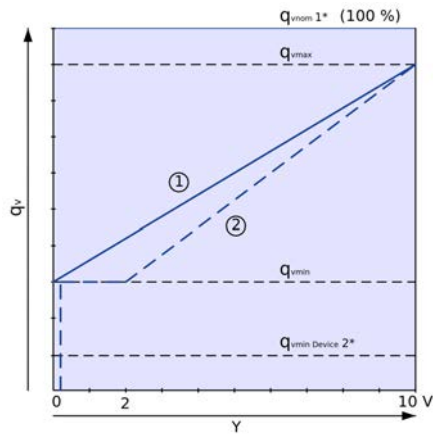
For detailed information on MP-Bus technology, consult the Belimo documentation at <https://www.belimo.com>.

VAV compact controller with MP-Bus

The BC0 control component can be interconnected with up to 8 TROX/Belimo MP devices (damper actuators, valve actuators, VAV controllers) via Belimo MP-Bus using the integrated MP-Bus communication interface. In bus mode, the controller receives its control signal from the higher-level building automation system via the MP-Bus and regulates to the specified volume flow rate.

The changeover to MP-Bus operation takes place automatically as soon as the control component is assigned an MP address with a service tool. By assigning an MP address, the standard compact controller then becomes a bus-compatible system controller with a wide range of additional benefits.

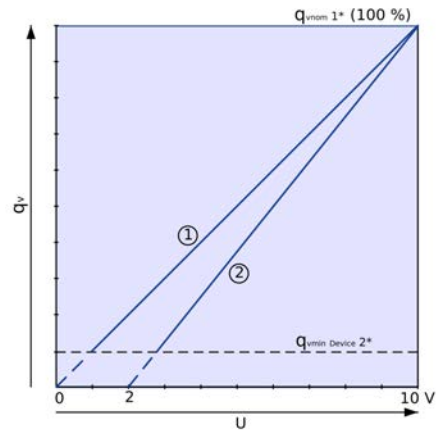
To use the MP-Bus, the U connection must be used. Analogue actual value feedback via this connection is then no longer possible.

Characteristic of the setpoint value signal


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

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

$$q_{vset} = \frac{Y}{10 \text{ V}} \times (q_{vmax} - q_{vmin}) + q_{vmin}$$

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* = $q_{vmin \text{ unit}}$ minimum controllable volume flow rate

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

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

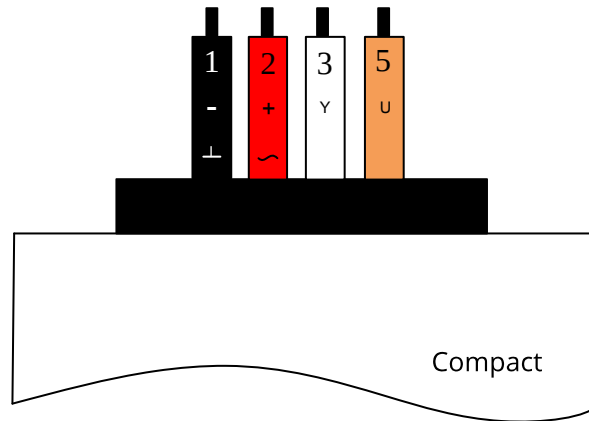
Calculation of nominal volume flow at 2 – 10 V

$$q_{set} = \frac{Y - 2 \text{ V}}{(10 \text{ V} - 2 \text{ V})} \times (q_{vmax} - q_{vmin}) + q_{vmin}$$

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

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

Connecting cable core identification BC0



⊥, - = Earth, neutral

~, + = Supply voltage 24 V AC/DC

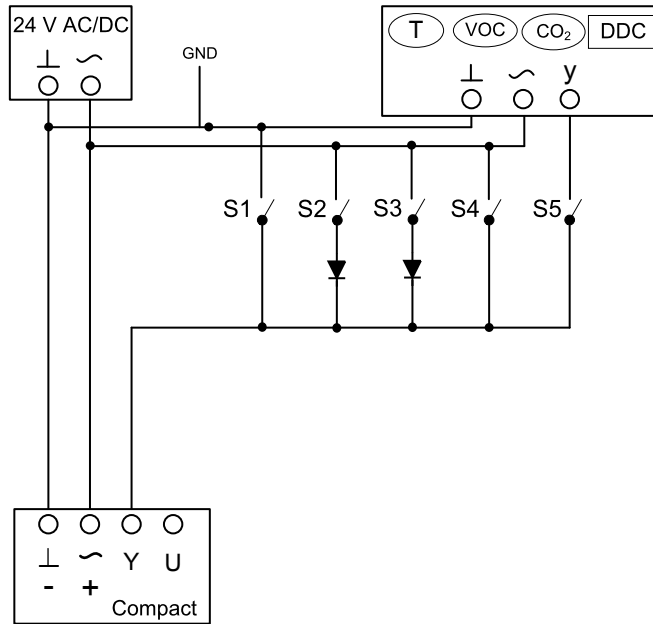
Y = Analogue input (*1) and override control

U = Actual value signal (*1) or MP-Bus or service tool connection

Note

(*1) Signal voltage range depending on setting 0 – 10 V or 2 – 10 V DC

Analogue signalling 0 (2) – 10 V and override control



⊥, – = Earth, neutral
 ~, + = Supply voltage 24 V AC/DC
 Y = Analogue input (*1) and override control
 U = Actual value signal (*1), MP-Bus

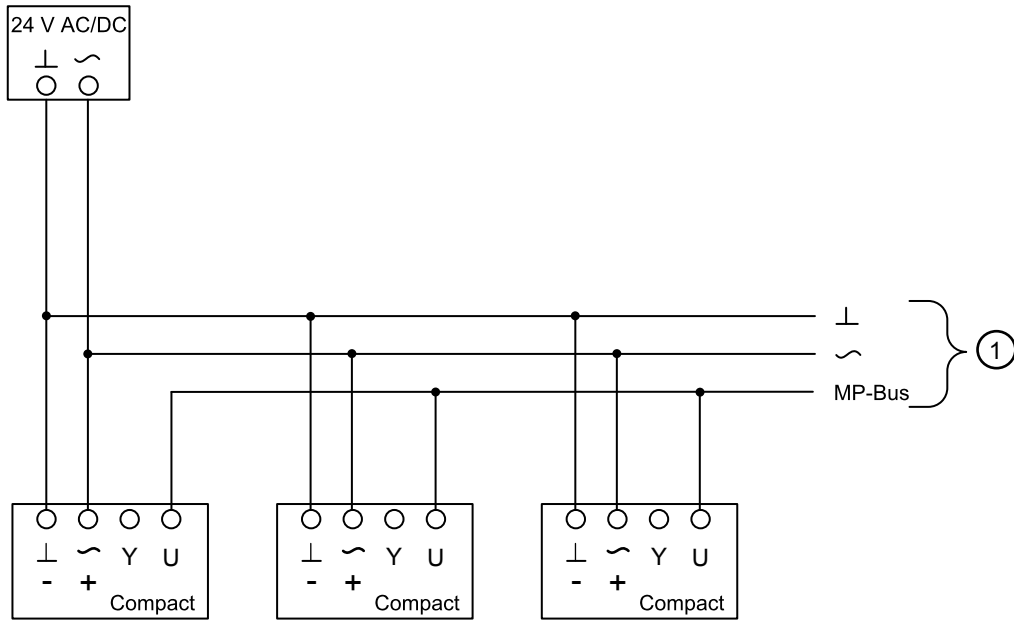
Note:
 (*1) Signal voltage range depending on setting 0 – 10 V DC or 2 – 10 V DC

- S1:
- For signal voltage range 0 – 10 V DC
 Minimum volume flow rate q_{vmin}
 - For signal voltage range 2 – 10 V:
 Damper blade CLOSED
- S2 = Damper blade OPEN (only with supply voltage 24 V AC)
 S3 = Damper blade CLOSED
 S4 = Maximum volume flow rate q_{vmax}
 S5 = Analogue setpoint value (room temperature control)
 All switches OPEN = minimum volume flow rate

T, VOC, CO₂, DDC = Setpoint value setting

When combining several override controls, the switches must be interlocked to prevent short-circuits. Diode e.g. 1N 4007.

Control input signal via MP bus



⊥, - = Earth, neutral

~, + = Supply voltage 24 V AC/DC

U = MP-Bus

① = Maximum of 8 VAV compact controller with MP-Bus

Note:

The number of MP-Bus nodes depends on the type of MP-Bus devices

Nomenclature

 q_{vNom} [m³/h]; [l/s]

Nominal flow rate (100 %): The value depends on product type, nominal size and control component (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.

 $q_{vmin Unit}$ [m³/h]; [l/s]

Technically possible minimum volume flow rate: The value depends on product type, nominal size and control component (attachment). Values are stored in the Easy Product Finder design program. Lower limit of the setting range and minimum volume flow rate setpoint value for the VAV terminal unit. Setpoint values below $q_{vmin unit}$ (if q_{vmin} equals zero) may result in unstable control or shut-off.

 q_{vmax} [m³/h]; [l/s]

Upper limit of the operating range for the VAV terminal unit that can be set by customers: q_{vmax} can be set to less than or equal to q_{vnom} . For analogue signalling to volume flow controllers (typically used), the maximum value of the setpoint signal (10 V) is assigned the set maximum value (q_{vmax}) (see characteristic).

 q_{vmin} [m³/h]; [l/s]

Lower limit of the operating range for the VAV terminal unit that can be set by customers: q_{vmin} should be set to less than or equal to q_{vmax} . Do not set q_{vmin} to less than $q_{vmin unit}$ as the control may become unstable or the damper blade may close. q_{vmin} may equal zero. In case of analogue signalling to volume flow controllers (which are typically used), the set minimum value (q_{vmin}) is

allocated to the minimum setpoint signal (0 or 2 V) (see characteristic).

 q_v [m³/h]; [l/s]

Volume flow rate

VAV terminal unit

Consists of a basic unit with an attached control component.

Basic unit

Unit for controlling a volume flow without an attached control component. The main components include the casing with sensor(s) to measure the effective pressure and the damper blade to restrict the volume flow. The basic unit is also referred to as a VAV terminal unit. Important distinguishing features: Geometry or unit shape, material and types of connection, acoustic characteristics (e.g. acoustic cladding or integral sound attenuator), volume flow rate range.

Control component

Electronic unit(s) mounted on the basic unit to control the volume flow rate or the duct pressure or the room pressure by adjusting the damper blade position. The electronic unit consists basically of a controller with effective pressure transducer (integral or external) and an integral actuator (Easy and Compact controllers) or external actuator (Universal or LABCONTROL controllers). Important distinguishing features: Transducer: dynamic transducer for clean air or static transducer for contaminated air. Actuator: slow-running actuator as standard, spring return actuator for safe position, or fast-running actuator. Interface: analogue interface or digital bus interface for the capturing of signals and data.