

# Control component

## XB0



XB0 for TVE and TVE-Q



XB0 for TVR, TVJ, TVT,  
TZ-Silenzio, TA-Silenzio,  
TVZ, TVA, TVM



## Control components for VAV terminal unit with dynamic transducer

Compact device for use with VAV terminal units

- Controller, dynamic differential pressure transducer and actuator in one casing
- Use in ventilation and air conditioning systems, only with clean air
- Suitable for constant and variable volume flow rates
- Activation of override controls by means of external switch contacts
- Volume flow rates  $q_{vmin}$  and  $q_{vmax}$  are factory-set and stored in the controller
- Change of operating parameters by means of adjustment device
- Service access for manual adjustment devices and PC configuration software
- Simple terminal connection without using additional junction boxes (for types TVE and TVE-Q)

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## General information

### Application

- All-in-one control devices for VAV terminal units
- Dynamic effective pressure transducer, electronic controller and actuator are fitted together in one casing
- Dynamic differential pressure transducer for clean air in ventilation and air-conditioning systems
- Various control options based on setpoint value default setting
- Volume flow rate control is based on setpoint values received from room temperature controller, central BMS, air quality controller or other devices as an analogue signal.
- Override controls for activating  $q_{vmin}$ ,  $q_{vmax}$ , shut-off or OPEN position can be set with a switch or relay
- The actual volume flow rate value is available as a linear voltage signal

If air is contaminated with dust, lint, sticky, moist or slightly aggressive particles:

- Use Compact controller XS0 or XD0 with static effective pressure transducer instead of the Compact controller XB0 described here
- XS0 (for TVE and TVE-Q series)
- XD0 (for TVR, TVJ, TVT, TZ-Silenzio, TA-Silenzio, TVZ, TVA, TVRK)

### Control strategy

- The volume flow controller works dependently 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
- Flow rate range in the controller set in the factory
  - $q_{vmin}$ : Minimum volume flow rate
  - $q_{vmax}$ : Maximum volume flow rate
- Operating parameters are specified via the order code and set in the factory

### Operating modes

- Variable or constant value

#### Variable operation (V)

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

#### Constant value mode (F)

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

### Interface

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)

### Signal voltage ranges

- 0 – 10 V DC
- 2 – 10 V DC

### Parts and characteristics

- Transducer based on dynamic measuring principle. It can only be used with clean air, as a partial volume flow is passed through the transducer
- Actuators with overload protection
- Release button to allow for manual operation (only 227V-024-10-DD3)
- Connecting cable with 4 wires, approx. 0.9 m, halogen-free (only 227V-024-10-DD3)
- Terminals with cover (only TR0V-024T-05I-DD15)
- Service interface

### Construction

- Type 227V-024-10-DD3 for TVR
- Type 227V-024-10-DD3 for TVJ
- Type 227V-024-10-DD3 for TVT up to 1000 × 300 or 800 × 400
- Type 227V-024-10-DD3 for TZ-Silenzio, TA-Silenzio
- Type 227V-024-10-DD3 for TVZ, TVA
- Type 227V-024-10-DD3 for TVM
- Type TR0V-024T-05I-DD15 for TVE and TVE-Q

### Commissioning

- Due to the volume flow rates set at the factory, always ensure that the terminal units are only installed at the specified locations
- After successful installation and wiring, the controller is ready for use
- Operating parameters can be adjusted by the customer (via the adjustment device)

### Useful additions

- Adjustment device GUIV-A (order code AT-VAV-G) for 227V-024-10-DD3
- Adjustment device GUIV3-M (order code AT-VAV-G3) for TR0V-024T-05I-DD15

## Function

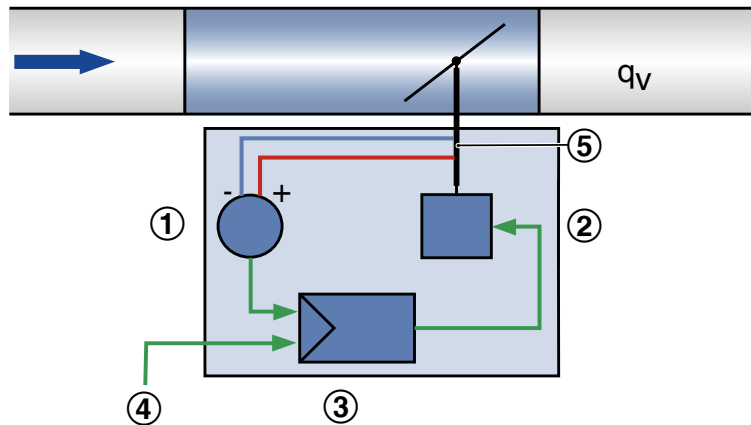
Air terminal units control the volume flow in a closed loop, which means: measurement – comparison – adjustment.

The volume flow rate is obtained by measuring a differential pressure. This is done with a differential pressure sensor. An integrated differential pressure transducer converts differential pressure into a voltage signal. The actual volume flow rate 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 setpoint value is specified by a higher-level controller (e.g. room temperature controller, air quality controller, central BMS). Variable volume flow control can be set between  $q_{vmin}$  and  $q_{vmax}$ . It is possible to override the room temperature control by forced switching, e.g. for a shut-off

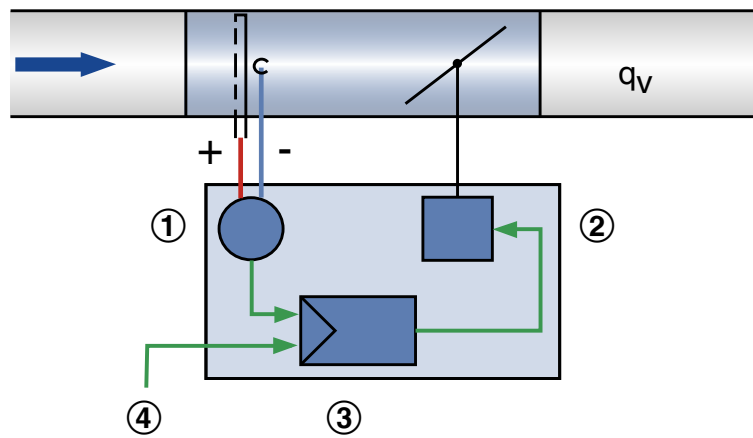
The controller compares the volume flow setpoint with the current actual value and adjusts the internal actuator according to the control deviation.

### Operating principle for type TR0V-024T-05I-DD15 (TVE and TVE-Q series)



- ① Effective pressure transducer
- ② Actuator
- ③ Volume flow controller
- ④ Setpoint value via analogue signal
- ⑤ Shaft with effective pressure channel

## Principle of operation – LVC, TVR, TZ-Silenzio, TA-Silenzio, TVZ, TVA, TVJ, TVT



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

### Application

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

### Supply voltage

- 24 V AC/DC

### Actuator

- Integral; slow-running (run time <150s for 90°)

### Installation orientation

- Either direction

### Interface/signalling

- Analogue signals (0 – 10 V or 2 – 10 V DC)

### Connection

- Terminals with rubber cap cover, no additional terminal box required (control components for TVE)
- Connecting cable with 4 wires (control components for other types)

### Interface information

Analogue:

- Volume flow rate setpoint and actual volume flow rate value
- Factory-set actual value: volume flow rate
- Actual value can be changed to damper position on site

### Special functions

- Activation  $q_{vmin}$ ,  $q_{vmax}$ , closed, open by external switch contacts

### Parameter setting

- Specific parameters for VAV terminal unit are factory-set
- Operating values:  $q_{vmin}$ ,  $q_{vmax}$  and interface type are factory-set
- Subsequent adjustment by means of optional tools: Adjustment tool, PC software (each wired)

### Factory condition

- Electronic controller factory mounted on control unit
- Factory parameter settings
- Functional test under air; certified with sticker

Order code

TVE – D / 200 / D2 / XB0 / V / 0 / qvmin – qvmax m³/h

|   |   |   |   |   |   |   |   |   |   |  
 1   2   5   6   7   8   9   10   11

**1 Type**

**TVE** VAV terminal unit

**2 Acoustic cladding**

No entry: none  
**D** with acoustic cladding

**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**

**6 Accessories**

No entry: none  
**D2** Double lip seal both ends  
**G2** Matching flanges both ends

**Order example: TVE/100/D2/XB0/V0/20-350 m³/h**

Acoustic cladding	without
Material	Galvanised sheet steel
Nominal size	100 mm
Accessories	Double lip seal both ends
Attachment (control component)	Compact controller
Operating mode	Variable operation – signal voltage range 0 –10 V DC
Volume flow rate	20 – 350 m³/h

**Order example: TVJ-D/600×300/XB0/F2/6000 m³/h**

Acoustic cladding	with
Material	Galvanised sheet steel
Dimensions	600 × 300
Accessories	without
Attachment (control component)	Compact controller
Operating mode	Constant value mode, signal voltage range 2 – 10 V DC
Volume flow rate	6000 m³/h

**7 Attachments (control component)**

**XB0** Compact controller with dynamic transducer

**8 Operating mode**

**F** Constant value (one 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**

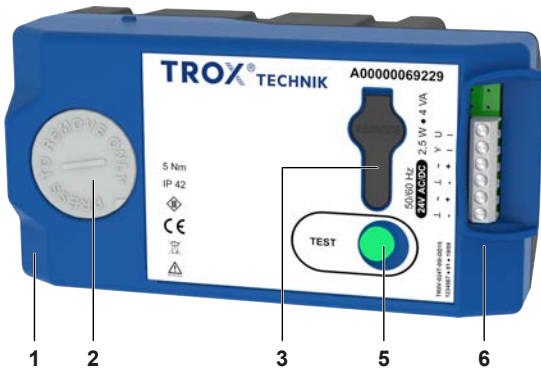
Volume flow rates in m³/h or l/s  
 $q_{vconst}$  (only with operating mode F)  
 $q_{vmin}$  (only with operating mode V)  
 $q_{vmax}$  (only with operating mode V)

**11 Volume flow rate unit**

m³/h  
 l/s

## Variants

Compact controller XB0, type TR0V-024T-05I-DD15 for TVE and TVE-Q



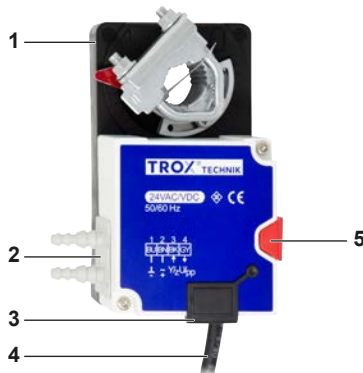
- ① Compact controller
- ② Damper blade position indicator and release button
- ③ Service tool connection
- ⑤ Push-button for test function and LED for display of operating states
- ⑥ Terminal

Compact controller with attached terminal cover



- ① Terminal cover (part of the supply package)

Compact controller XB0, 227V-024-10-DD3



- ① Compact controller
- ② Connections for effective pressure transducer
- ③ Service tool connection
- ④ Connecting cable
- ⑤ Gear release button

Compact controller XB0, 227V-024-10-DD3



Reverse side with rating plate

## Technical data

## Compact controllers for VAV terminal units

Part number	Type of installation component	VAV terminal units
A00000041355	227V-024-10-DD3	TVR, TVJ, TVT, TZ-Silenzio, TA-Silenzio, TVZ, TVA, TVM
A00000069229	TR0V-024T-05I-DD15	TVE, TVE-Q

## Compact controller XB0, 227V-024-10-DD3



## Compact controller XB0, 227V-024-10-DD3

Type of measurement/installation orientation	Dynamic measurement principle, position-independent
Supply voltage (AC)	24 V AC, $\pm 20\%$ , 50/60 Hz
Supply voltage (DC)	24 V DC $\pm 20\%$
Power rating (AC)	5 VA max.
Power rating (DC)	Max. 2.5 W
Power consumption (when running/when idle)	1.5 W
Torque	10 Nm
Run time for 90°	Approx. 120 s
Setpoint value signal input	0 – 10 V DC, $R_a > 100\text{ k}\Omega$ or 2 – 10 V DC, $R_a > 50\text{ k}\Omega$
Actual value signal output	0 – 10 V DC or 2 – 10 V DC, max. 0.5 mA
Connection	Approx. 0.9 m cable, $4 \times 0.75\text{ mm}^2$
IEC protection class	III (Protective extra-low voltage)
Protection level	IP 42
EC conformity	EMC to 2014/30/EU
Weight	0.570 kg

## Compact controller XB0, TR0V-024T-05I-DD15 for TVE

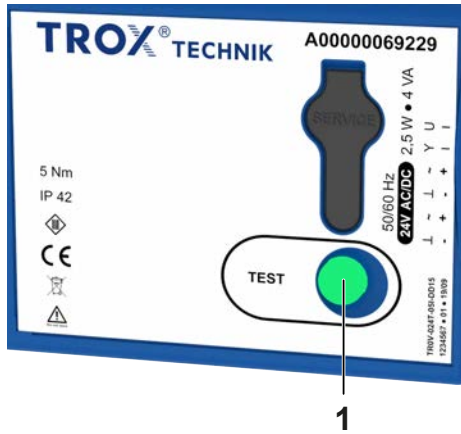




**Compact controller XB0, TR0V-024T-05I-DD15**

Type of measurement/installation orientation	Dynamic measurement principle, position-independent
Supply voltage (AC)	24 V AC, $\pm 20\%$ , 50/60 Hz
Supply voltage (DC)	24 V DC $\pm 20\%$
Power rating (AC)	TVE NW 100 - 160: maximum 4 VA TVE NW 200 - 400: maximum 7 VA TVE-Q up to height 200: maximum 4 VA TVE-Q from height 300: maximum 7 VA
Power rating (DC)	TVE NW 100 - 160: maximum 2.5 W TVE NW 200 - 400: maximum 4 W TVE-Q up to height 200: maximum 2.5 W TVE-Q from height 300: maximum 4 W
Power consumption (when running/when idle)	1 W
Power consumption (when running/when idle)	1.5 W
Torque	10 Nm
Run time for 90°	100 s
Setpoint value signal input	0 – 10 V DC, $R_a > 100\text{ k}\Omega$ or 2 – 10 V DC, $R_a > 50\text{ k}\Omega$
Actual value signal output	0 – 10 V DC or 2 – 10 V DC, max. 5 mA
Connection	Screw terminals (cable cross-section max. 1.5 mm <sup>2</sup> )
IEC protection class	III (Protective extra-low voltage)
Protection level	IP 42 (with attached terminal cover)
EC conformity	EMC to 2014/30/EU
Weight	0.65 kg

**Cut-out LED button**



1: LED push button

Description of status LEDs and error messages regarding control components for terminal unit TVE, TVE-Q

Flashing signal of LED button	Flashing signal in words	Status
	LED off	No supply voltage
	LED lights up permanently.	Regulated. Signalled as long as the actuator does not rotate to readjust the setpoint value.
	LED flashes 1 time in a 2-second interval.	Setpoint value or override control position not yet reached.
	LED flashes 2 times in a 2-second interval.	Override control position reached.
	LED flashes once briefly at 2-second intervals.	Synchronisation drive after Power Up
	LED flashes once briefly at 2-second intervals.	Test mode activated
	LED flashes 2 times in quick succession at 2-second intervals.	Overpressure sensor (overpressure)
	LED flashes 2 times in quick succession at 3-second intervals.	Actuator overload detected (block)
	LED flashes 4 times in quick succession at 2-second intervals.	Inform TROX service technicians

The signal spans 2 seconds. 1 = LED is illuminated, 0 = LED is not illuminated

**Release of a test function**

Pressing the LED push button for > 2 seconds activates the test drive.

## Product details

### Analogue interface 0 – 10 V or 2 – 10 V DC (operating mode V, F)

The analogue interface can be set for signal voltage range 0 – 10 V DC or 2 – 10 V DC. The assignment of the volume flow rate setpoint value or actual value to the voltage signals is shown in the characteristic curves.

- The set signal voltage range always applies equally for setpoint value and actual value signals.
- The signal voltage range is pre-set in the factory according to the order code entries.
- The signal voltage range can be adjusted by others with an adjustment device

### Setpoint value default setting

In the operating mode V (variable operation), the setpoint value is specified with an analogue signal on terminal Y.

- The selected signal voltage range 0 – 10 V or 2 – 10 V DC is assigned to the volume flow rate range  $q_{vmin} - q_{vmax}$ .
- Volume flow rate range  $q_{vmin} - q_{vmax}$  is preset at the factory according to the order code
- Subsequent adjustment of  $q_{vmin}$  or  $q_{vmax}$  is possible with adjustment device
- In operating mode F (constant value mode), an analogue signal at terminal Y is not required.  
The volume flow rate constant value set by  $q_{vmin}$  is controlled
- Volume flow rate  $q_{vmin}$  is preset at the factory according to the order code
- Subsequent adjustment of  $q_{vmin}$  is possible with adjustment device

### Actual value as feedback for monitoring or tracking control

- The actual volume flow rate measured by the controller can be captured as a voltage signal at terminal U
- 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 blade position. The selected signal voltage range, 0 – 10 V DC or 2 – 10 V DC, is then mapped to the damper blade position as a percentage value between 0 % (CLOSED) and 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  $P_{vmin}$ , control  $q_{vmax}$ , damper blade in the OPEN position or damper blade CLOSED.

### Override control via signal input Y

With appropriate wiring on the signal input Y, the override controls can be activated according to the connection diagrams via wiring with external switch contacts/relays. OPEN and CLOSED are only available if the controller is supplied with alternating current (AC).

### Override control CLOSED via command signal at signal input Y

The override control CLOSE can also be activated by observing certain conditions with the command signal.  
for XB0 variant TR0V-024T-05I-DD15 (TVE and TVE-Q series)

- With signal voltage range 0 - 10 V DC and  $q_{vmin}$ -Setting = 0: CLOSE is activated when command signal  $Y < 0.3$  V DC
- With signal voltage range 0 - 10 V DC and  $q_{vmin}$ -Setting > 0: no shut-off possible
- With signal voltage range 2 - 10 V DC and  $q_{vmin}$ -Setting = 0: CLOSED is activated when command signal  $Y < 2.3$  V DC
- With signal voltage range 2 - 10 V DC and  $q_{vmin}$ -Setting > 0: CLOSE is activated when command signal  $Y < 0.8$  V DC. Between 0.9 V and 2 V,  $q_{vmin}$  regulated

For XB0 variant 227V-024-10-DD3 (TVR, TVJ, TVT, TZ-Silenzio, TA-Silenzio, TVZ, TVA, TVM series)

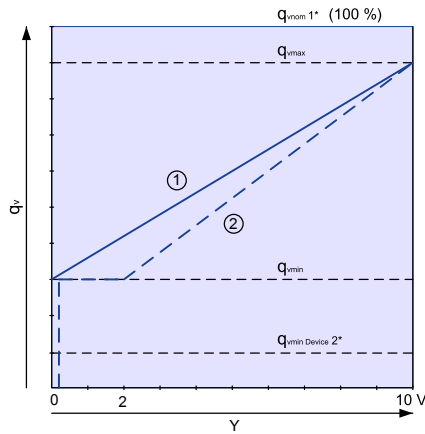
- With signal voltage range 0 - 10 V DC and  $q_{vmin}$ -Setting = 0: CLOSE is activated when command signal  $Y < 0.5$  V DC
- With signal voltage range 0 - 10 V DC and  $q_{vmin}$ -Setting > 0: no shut-off possible
- For signal voltage range 2 - 10 V DC and any  $q_{vmin}$  Setting: CLOSED is activated when command signal  $Y < 0.8$  V DC. 0.8 V DC = factory setting

### Override control for diagnostic purposes

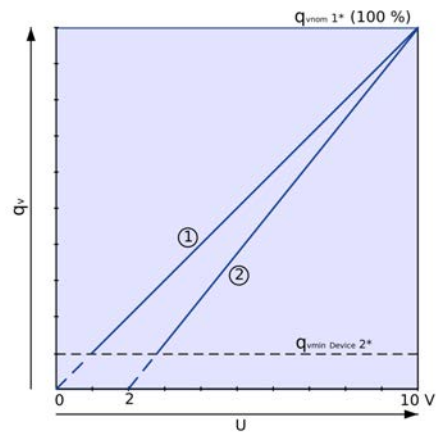
- For test purposes, the override control can also be activated via the service tools (adjustment device, PC software).

### Prioritization of various constraint control options

- High priority: settings via the service connector (adjustment device, PC software) for test purposes
- Low priority: settings via Y signal input of the controller

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

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

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

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

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

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

**Calculation of volume flow rate setpoint value at 2 – 10 V**

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

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

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

**Commissioning**

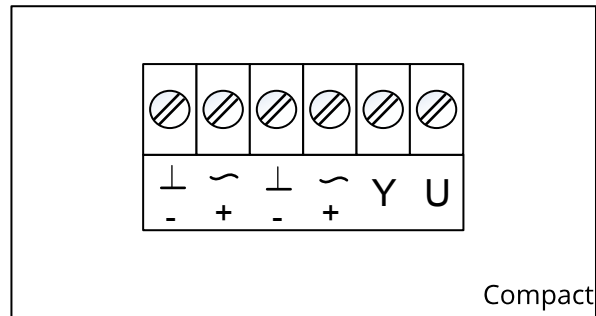
- On-site adjusting is not required
- As the volume flow rates are factory set, the terminal units have to be installed at the specified locations
- After successful installation and wiring, the controller is ready for use
- Remove the terminal cover of the control component only temporarily for wiring (applies only to XB0 for TVE and TVE-Q)

**Observe type-dependent volume flow rate control ranges**

TVE	4 – 100 % of $q_{vnom}$
TVE-Q	10 – 100 % of $q_{vnom}$
TVR, TZ-Silenzio, TA-Silenzio, TVZ, TVA	10 – 100 % of $q_{vnom}$
TVJ, TVT	20 – 100 % of $q_{vnom}$
TVM	30 – 100 % of $q_{vnom}$

**Note:**

In particular, do not set the minimum volume flow rate of the control unit below these values.

**Terminal assignment for TR0V-024T-05I-DD15 (for TVE and TVE-Q)**

$\perp$ , - = Ground, Zero

$\sim$ , + = Supply voltage 24 V AC/DC

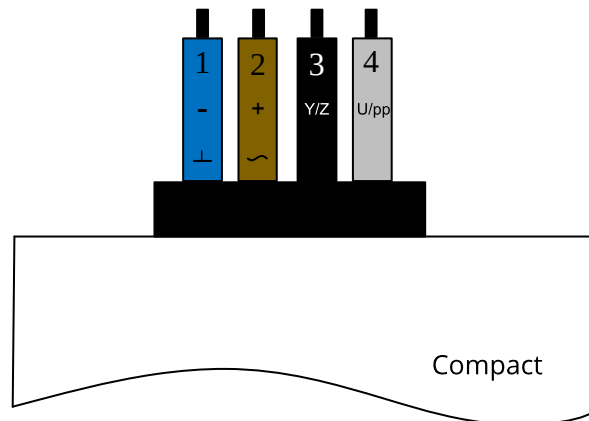
Y:= Setpoint value signal and override control

U: Actual value signal

**Note:**

Setpoint value and actual value signals depend on the signal voltage range, either 0 – 10 V DC or 2 – 10 V DC

Terminal assignment for 227V-024-15-DS3 (for TVR, TVJ,  
TVT, TZ-Silenzio, TA-Silenzio, TVZ, TVA, TVM)



1: BU, ⊥, -: Ground, neutral

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

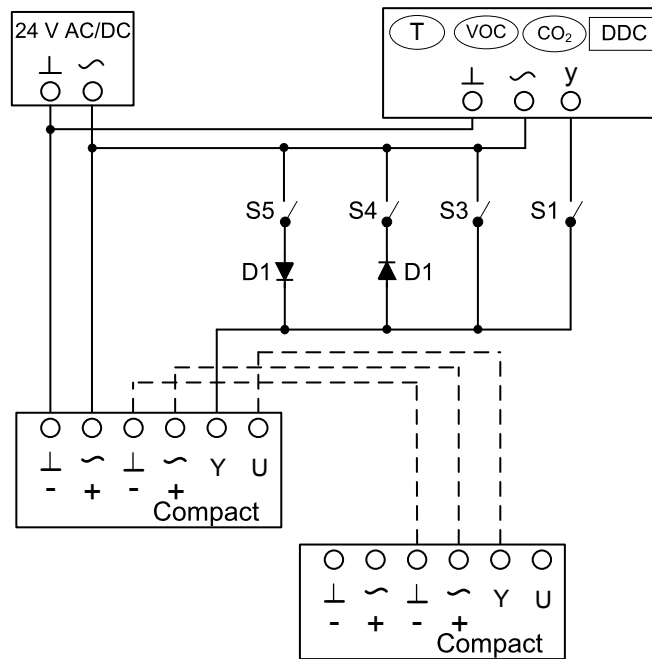
3: BK, Y/Z: Setpoint value signal Y and override control

4: GY, U/pp: Actual value signal or service tool connection

**Note:**

Setpoint value and actual value signals depend on the signal voltage range, either 0 – 10 V DC or 2 – 10 V DC

**XB0, variable volume flow control and override control,  
signal voltage range 0 - 10 V DC**



**Nomenclature**

- ⊥, - = Ground, neutral
- ⊃, + = Supply voltage 24 V AC/DC
- Y = Setpoint value signal and override control
- U = Actual value signal

**Notes**

- T, VOC, CO<sub>2</sub> DDC = Setpoint value default setting  $q_v$
- D1 = Diode for override control, e.g. 1N4007
- When combining several override controls the switches must be interlocked to prevent short-circuits
- Setpoint value and actual value signals depend on the signal voltage range, either 0 – 10 V DC or 2 – 10 V DC

**Wiring variants (valid for both variants of the XB0)**

**Constant value mode  $q_{vmin}$  (override control  $q_{vmin}$ )**

- All switches (connections) S1 - S5 must be open,
- No wiring is required except for the supply voltage

**Regular operation  $q_{vmin} - q_{vmax}$**

- E.g. for room temperature control
- Only S1 has to be closed

**Override control  $q_{vmax}$**

- Only S3 has to be closed

**Override control, damper blade OPEN**

- Only S5 has to be closed
- Only with AC voltage supply

**Override control, damper blade CLOSED**

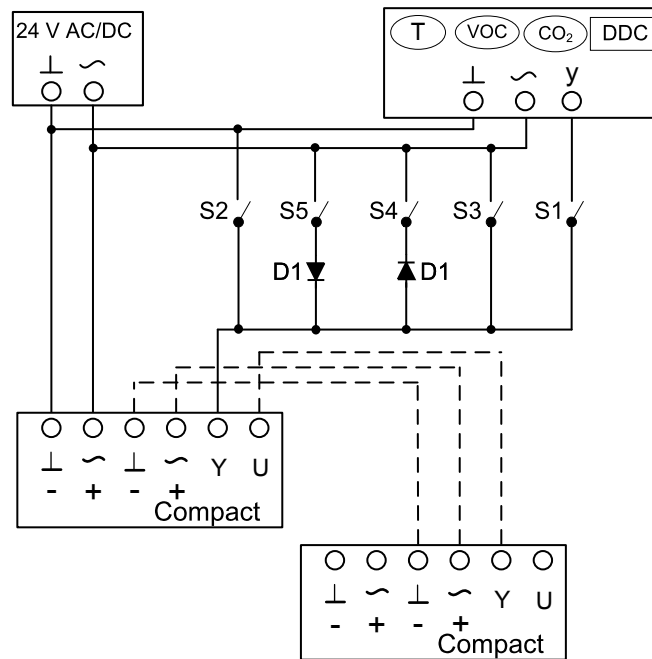
- Only S4 has to be closed
- Only with AC voltage supply

**Damper blade closed per setpoint signal Y**

- Only S1 has to be closed
- For other conditions, e.g. signal voltage range,  $q_{vmin}$ , for setting and shut-off voltage, see product details



## XB0, variable volume flow control and override control, signal voltage range 2 - 10 V DC



### Nomenclature

⊥, – = Ground, neutral

⋈, + = Supply voltage 24 V AC/DC

Y = Setpoint value signal and override control

U = Actual value signal

### Notes

T, VOC, CO<sub>2</sub>, DDC = Setpoint value default setting  $q_v$

D1 = Diode for override control, e.g. 1N4007

- When combining several override controls the switches must be interlocked to prevent short-circuits
- Setpoint value and actual value signals depend on the signal voltage range, either 0 – 10 V DC or 2 – 10 V DC

### Wiring variants (valid for both variants of the XB0)

#### Constant value mode $q_{vmin}$ (override control $q_{vmin}$ )

- All switches (connections) S1 - S5 must be open
- No wiring is required except for the supply voltage

#### Regular operation $q_{vmin} - q_{vmax}$

- E.g. for room temperature control
- Only S1 has to be closed

#### Override control $q_{vmax}$

- Only S3 has to be closed

#### Override control, damper blade OPEN

- Only S5 has to be closed
- Only with AC voltage supply

#### Override control, damper blade CLOSED

- Only S2 has to be closed

#### Override control, damper blade CLOSED (alternative)

- Only S4 has to be closed
- Only with AC voltage supply

#### Damper blade CLOSED with setpoint value signal

- Only S1 has to be closed
- For other conditions, e.g. signal voltage range,  $q_{vmin}$ , for setting and, if necessary, shut-off voltage, see product details

## Nomenclature

### $q_{vNom}$ [m<sup>3</sup>/h]; [l/s]; [CFM]

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 defined in the Easy Product Finder design programme. 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.

### $q_{vmin Unit}$ [m<sup>3</sup>/h]; [l/s]; [CFM]

Technical minimum volume flow: The value depends on product type, nominal size and control component (attachment). Values are defined in the Easy Product Finder design programme 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.

### $q_{vmax}$ [m<sup>3</sup>/h]; [l/s]; [CFM]

Client-adjustable upper limit of the operating range for the VAV terminal unit:  $q_{vmax}$  can be set to less than or equal to  $q_{vNom}$  on the terminal unit. In case of analogue control of volume flow controllers (typically used), the maximum value of the setpoint signal (10 V) is assigned to the set maximum value ( $q_{vmax}$ , see characteristics).

### $q_{vmin}$ [m<sup>3</sup>/h]; [l/s]; [CFM]

Client-adjustable lower limit of the operating range of the VAV terminal unit:  $q_{vmin}$  should be set to less than or equal to  $q_{vmax}$ .  $q_{vmin}$  must not be set 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 control of volume flow controllers (typically

used), the minimum value of the setpoint signal (0 or 2 V) is assigned to the set minimum value ( $q_{vmin}$ , see characteristics).

### $q_v$ [m<sup>3</sup>/h]; [l/s]; [CFM]

Volume flow rate

### Volume flow controller

Consists of a basic unit with an attached control component.

### Basic unit

Unit for controlling volume flow rates without an attached control component. The main components include the casing with sensor(s) to measure the differential 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 connection variants, acoustic characteristics (e.g. optional acoustic cladding or integrated silencers), range of volume flow.

### 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 mainly consists of a controller with differential pressure transducer (integrated or external), and an integrated actuator (Easy and Compact controllers) or external actuator (Universal or LABCONTROL controller). Important distinguishing features: Transducer: dynamic transducer for clean air, or static transducer for polluted air. Actuator: Standard actuator (slow-running), spring return actuator for fail-safe position, or fast-running actuator. Interface technology: analogue interface or digital bus interface for connecting and recording signals and data.