



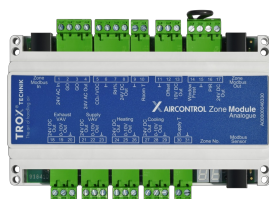
**MP<sup>↑</sup>BUS<sup>↑</sup>**  
TECHNOLOGY BY BELIMO  
**MP-BUS MARKETING  
HIGHLIGHTS IMAGE**



**BACNET MARKETING  
HIGHLIGHTS IMAGE**



**MODBUS MARKETING  
HIGHLIGHTS IMAGE**



**X-AIRCONTROL zone module  
MP bus**

## BUDN

### CONTROL COMPONENT WITH DYNAMIC TRANSDUCER AND SEPARATE ACTUATOR FOR VAV TERMINAL UNITS

Universal device for use with VAV terminal units

- Controller and dynamic differential pressure transducer in one casing
- Separate actuator with simple plug connection
- Use in ventilation and air conditioning systems, only with clean air
- Suitable for constant and variable volume flow rates
- Activation of override controls 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 PC software as well as smartphone and tablet app (TROX FlowCheck app)
- Service access for PC configuration software
- Smartphone access via NFC interface and Bluetooth
- Setpoint value settings, override controls and parameter adjustment via analogue interface or bus communication
- High data transparency through standardised bus communication MP-Bus, Modbus RTU or BACnet MS/TP

## General information

### Application

- All-in-one control device for VAV terminal units

- Dynamic differential pressure transducer and control electronics in one casing
- Separate actuator with prefabricated connection plug
- 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.
- Suitable for different control tasks depending on the specification of the setpoint value
- 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 qvmin, qvmax, shut-off, OPEN position via MP-Bus data points or Modbus/BACnet register or switch/relay possible
- Volume flow rate actual value is available as a network data point or linear voltage signal
- Damper blade position is available as a network data point
- Use TROX FlowCheck app and PC tool to configure the controller and the communication parameters

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 BUSN attachment group instead of the BUDN universal controller described here

### Control concept

- The volume flow controller works independent 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.
- Volume flow rate range in the controller set in the factory
- qvmin: minimum volume flow rate
- qvmax: maximum volume flow rate
- Operating parameters are specified via the order code and set in the factory

### Interface

Analogue interface

- Analogue interface with adjustable signal voltage range
- Analogue signal for volume flow rate setpoint
- Analogue signal for actual volume flow rate

Digital communication interface (Bus)

- MP bus
- Modbus RTU, RS485
- BACnet MS/TP, RS485
- Data points, see bus lists

Hybrid mode

- Mixed mode of analogue and digital interface

Factory setting

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

### Operating modes

Variable operation (V)

- Setpoint value setting via analogue signal, Modbus, BACnet or MP-Bus Work area corresponds to qvmin – qvmax

Constant value mode (F)

- A setpoint signal is not required, setpoint value corresponds to qvmin

### Operating parameters

- Volume flow rate range in the controller set in the factory
- qvmin: minimum volume flow rate
- qvmax: maximum volume flow rate
- qvmin = 0 – 100 % of the nominal volume flow rate qvnom adjustable
- qvmax = 20 – 100 % of the nominal volume flow rate qvenn adjustable

### Signal voltage ranges

- 0 – 10 V DC
- 2 – 10 V DC

### Parts and characteristics

- Transducer for dynamic measurement principle
- Separate overload protection
- Plug-in terminal for supply line and controls including cover
- Socket for the actuator
- NFC and service interface
- Release button to allow for manual operation
- Indicator lights for displaying the operating mode
- Addressing key for setting user addresses in bus mode
- Controller casing prepared with 4 openings for threaded connections, 2 cable glands M16x1.5 for connecting cable in the supply package

### Construction

BUDN with actuator LM24A-VST for:

- TVR, TZ-Silenzio, TA-Silenzio, TVZ, TVA,

BUDN with actuator NM24A-VST for:

- TVJ
- TVT up to dimensions of 1000 × 300 or 800 × 400

BUDN with actuator SM24A-VST for:

- TVT from dimensions of 800 × 500 to 1000 × 600

### Commissioning

- Due to the volume flow rates set in the factory, always ensure that the control units are only installed in the specified locations
- Modbus/BACnet/MP bus interface: additional commissioning steps required
- Operating parameters can be adjusted using the TROX FlowCheck app

### Useful additions

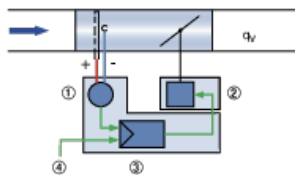
- TROX FlowCheck app for Android and iOS
- Adjustment device type ZTH-EU (order code AT-VAV-B)
- Belimo PC-Tool
- NFC Bluetooth converter ZIP-BT-NF
- X-AIRCONTROL zone modules for room control

## TECHNICAL INFORMATION

A closed control circuit for regulation of the volume flow rate, i.e. measuring - comparing - adjusting, is characteristic of air terminal units.

The volume flow rate is measured by measuring a differential pressure (effective pressure). This is done via a differential 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 an actual output signal of 10 V DC always corresponds to the nominal volume flow rate ( $q_{vnom}$ ). The volume flow rate setpoint value is specified by 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 by override controls, e.g. by a complete shutoff of the duct. The controller compares the volume flow rate setpoint value to the actual value and controls the external actuator accordingly to the system deviation.

**Principle of operation Universal controller: TVR, TVJ, TVT, TZ-/TA-Silenzio, TVZ, TVA, TVRK**



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

This specification text describes the general properties of the product.

### Category

- Universal controller for volume flow rate

### Application

- Control of a constant or variable volume flow rate setpoint
- Electronic controller for connecting a controlled 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 in central building management system

### Area of application

- Differential pressure transducer with dynamic measuring principle for clean air in ventilation and air conditioning systems

### Actuator

- Actuator slow-running; Running time 120s for 90°

### Installation orientation

- Either direction

### Connection

- Pluggable connection terminals; no additional terminal box required

### Supply voltage

- 24 V AC/DC

### Interface/Control

Analogue signal

- 0 – 10 V DC or 2 – 10 V DC

Bus interface

- MP bus
- Modbus RTU
- BACnet MS/TP

### Interface information

Analogue

- Volume flow rate setpoint and actual value

Bus interface

- Volume flow rate setpoint and actual value
- Damper blade position
- Fault status

### System connections

- MP-Bus for optional extensions
- Suitable for TROX X-AIRCONTROL zone module X-AIRZMO-MP
- Gateways for LonWorks, Modbus, BACnet, KNX e.g. Belimo UK24EIB
- Fan optimiser, e.g. Belimo COU24-A-MP

Modbus RTU for optional extensions

- Suitable for TROX X-AIRCONTROL zone module X-AIRZMO-MOD, e.g. in conjunction with X-SENS-SPLITTER

### Special functions

- Activation qvmin, qvmax, Closed, Open, Control Stop by means of external switching contacts/wiring or bus communication

### Parameter settings

Parameters specific to VAV terminal unit set at the factory

- Operating values qvmin, qvmax factory set
- Signal characteristic factory set

Subsequent adjustment

- Via TROX FlowCheck app (NFC or Bluetooth with optional adapter)
- Via PC software

### Factory settings

- Electronic controller factory-mounted on the terminal unit
- Factory parameter settings
- Functional test under air; certified with sticker
- Controller in OPEN position

### 1 Type

**TVR** 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

### 4 Duct connection

### 5 Nominal size [mm]

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

### 6 Accessories

No entry: none

**D2** Double lip seal both sides

**G2** Matching flanges for both ends

### 7 Attachments (control component)

**BUDN** Universal controller with 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 m<sup>3</sup>/h or l/s

qvconst (only with operating mode F)

qvmin (only with operating mode V)

qvmax (only with operating mode V)

### 11 Volume flow unit

m<sup>3</sup>/h

l/s

**Order example: TVR/100/D2/BUDN/V0/50-354 m<sup>3</sup>/h**

**TVR – D / 200 / D2 / BUDN / PRS / V 0 / Pmin – Pmax Pa**

1 2 5 6 7 8 9 10 11