TROX TECHNIK

The art of handling air
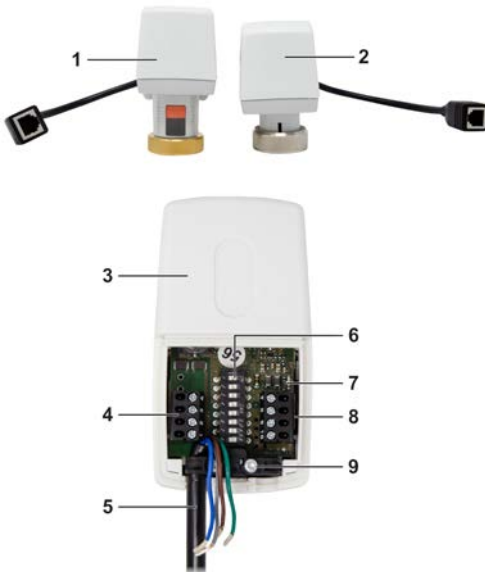
X-AIRCONTROL

X-VALVE

Product overview

Fig. 1: X-VALVE-MOD-KP-MD15-xx-xx

1 X-VALVE-MOD-KP-MD15-RZ-J6
2 X-VALVE-MOD-KP-MD15-Q-J6
3 Casing (with open cover)
4 Pluggable terminal strip
5 4-wire cable at RJ-12 socket
6 DIP switch
7 Status LED green / yellow / red
8 Pluggable terminal strip
9 Strain relief cable

Actuator compatibility

Fig. 2: Actuator compatibility

X-VALVE-MOD-KP-MD15-RZ-J6

■ Valves (1):
  – Kieback & Peter valves of the type RZ / RWZ

X-VALVE-MOD-KP-MD15-Q-J6

■ Pressure-independent valves (2):
  – Oventrop of the type Cocon QTZ
  – Kieback & Peter of the type RBQ
■ Heating circuit distributor (3):
  – Oventrop of the type Mutidis SF (14055XX / 14065XX)

Important notes

Information on the installation manual

This manual enables operating or service personnel to correctly install the product described below and to use it safely and efficiently.

It is essential that these individuals read and fully understand this manual before starting any work. The basic prerequisite for safe working is to comply with the safety notes and all instructions in this manual.

The local regulations for health and safety at work and general safety regulations also apply.

Qualified staff

Skilled qualified electrician

Skilled qualified electricians are individuals who have sufficient professional or technical training, knowledge and actual experience to enable them to work on electrical systems, understand any potential hazards related to the work under consideration, and recognise and avoid any risks involved.

Correct use

X-VALVE actuators may be used in indoor heating, ventilation and air-conditioning systems for PN16, PN25 and DN10-32 valves. Any other use and/or use beyond this use is considered to be incorrect. Operational reliability is only guaranteed if the product is used as intended.

Incorrect use

> ⚠️ **WARNING!**
>
> Risk of serious personal injury and damage to property.
>
> Do not use the enclosure as follows:
>
> – In areas with potentially explosive atmospheres
> – Outdoors without sufficient protection against the effects of weather.
> – In environments that might have a detrimental effect on the X-VALVE.

CE marking

This is to certify that this product conforms to the following EU directives:

- EMC - Electromagnetic compatibility: 2014/30/EU
- RoHS - (Restriction of the Use of Certain Hazardous Substances in Electronic and Electrical Equipment): 2011/65/EU

Applicable standards
EN 61000-6-2 and EN 61000-6-3 Electromagnetic Compatibility (EMC)

Transport and storage

Ensure the correct ambient conditions (see technical data) for storage and transport. Store the product in a dry place and do not exceed the maximum temperature for storage or handling. The product will only be protected as long as the packaging is intact.

Supply package

- Motorised actuator X-VALVE-MOD-KP-MD15-RZ-J6 or X-VALVE-MOD-KP-MD15-Q-J6
- RJ-12 connecting cable
- Additional cover
- 4-wire sensor cable
- Assembly information

Functional description

Electronic actuator for modulating control of the room/extract air temperature in various water applications in combination with compatible valves. For the air handling after-treatment of water-side heating and cooling coils in demand-based zones, offices and meeting rooms, as well as the heating, ventilation and air conditioning of buildings. Signalling is implemented via Modbus RTU communication.

In addition to Modbus RTU communication, two universal inputs (binary and analogue) are available. One of the inputs can be used as an analogue output. The inputs are suitable for internal functions and for further processing of data in an automation station (Modbus master). This actuator is specially adapted to the TROX X-AIRCONTROL system and can be integrated into the system via the RJ-12 cable connection (plug and play).
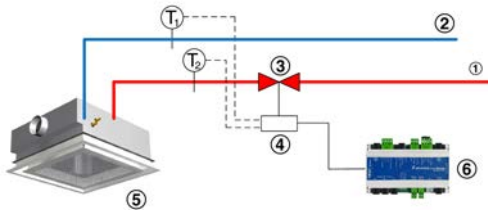

Fig. 3: Installation principle of a TROX Modbus (RTU) small actuator in conjunction with a TROX DID and X-AIR-ZMO-MOD zone module

① Water-side flow (heating)
② Water-side return (heating)
③ Small valve
④ Modbus (RTU) actuator for small valve
⑤ TROX DID604 active chilled beam
⑥ TROX Modbus (RTU) zone module for single room control system
T1 Optional analogue temperature sensor in the water-side return
T2 Optional analogue temperature sensor in the water-side flow

Basic functions

Automatic closing point detection: The valve closing point is detected during the initialisation run. During operation, a cyclical reinitialisation takes place.

Positioning: The actuator is operated with continuous signalling. The control signal (0..100%) is transmitted via Modbus communication. The current position (0..100%/mm) can be queried via Modbus.

Valve blocking protection function (VBS): The actuator has a valve blocking protection function that can be switched on. The cycle time can be configured via the Modbus parameterisation. If the value is 0, this functionality is deactivated. The valve blocking protection function prevents the spindle from seizing during prolonged valve standstill.

Temperature recording: The temperatures of the flow and return lines can be recorded via two connected temperature sensors and queried via Modbus.

Flushing function: The actuator has an automatic flushing function. This temporarily opens the valve completely. The cycle time can be configured in Modbus register 135. If the value is 0, this functionality is deactivated.

Leakage detection: Based on the measured values of flow and return temperature, a possible internal leakage is detected when the valve is closed. A leakage is detected when the measured temperature difference is greater than 8 K for at least 6 hours with the valve closed.

Operating and fault messages are recorded by the actuator and can be queried via Modbus. This data can be used to assess the condition of the hydraulics and detect possible faults and failures at an early stage.

Additional functions of X-VALVE-MOD-KP-MD15-Q-J6

Setting of valve characteristics: Various valve types with their characteristic curves can be selected via mode parameterisation. A minimum and maximum volume flow rate is determined on the basis of these characteristic curves. (Only for valves QTZ, RBQ)

Configuration of the hydraulic volume flow rate balancing values: Via Modbus parameterisation, a maximum volume flow rate (hydraulic volume flow rate balancing) can be set for heating and cooling mode. (Only for valves QTZ, RBQ) Calculation of the volume flow rate in combination with a pressure-independent valve (QTZ, RBQ); the current volume flow rate is calculated on the basis of the set valve characteristic and the current drive position and can be queried via Modbus.

Calculation of the volume flow rate: In combination with a pressure-independent valve (QTZ, RBQ), the current volume flow rate is calculated on the basis of the set valve characteristic and the current drive position and can be queried via Modbus.

Assembly/removal

The actuator is in the assembly position when delivered.
In the assembly position, the spindle is fully retracted and the DIP switches (Bits 1 to 6) are set to "OFF" (Fig. 7 and Fig. 10).

Screwing on the actuator

- When laying the pipes, allow for sufficient free space for installing the actuator.
- Install the actuator before the supply voltage has been established!

1. ▶ Place the actuator on the threaded connection of the valve.

2. ▶ Screw on the union nut by hand, but take care that you do not tilt the thread! Tighten the union nut hand-tight.

❗ NOTICE!

Damage to the actuator

When screwing on the union nut, too high a torque can lead to damage to and a malfunction of the actuator.

– Tighten the union nut only hand-tight.

Unscrewing the actuator

⚠️ **CAUTION!**

Danger of burns on hot components!

Touching hot components can cause burns.

– Allow the valve to cool down before performing work.
– Always wear protective gloves.

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1. ▶ Move the actuator to the assembly position (DIP switch, bits 1 to 6 to "OFF" ⇨Fig. 7).

   ⇨ The LED flashes green rapidly.

2. ▶ Switch off the power supply.

3. ▶ Disconnect all electrical connections.

4. ▶ Loosen the union nut.

5. ▶ Remove the actuator from the valve.

Electrical connection
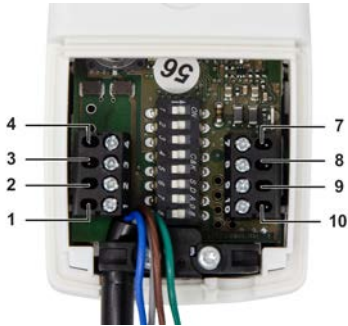
Personnel:

- Skilled qualified electrician

Fig. 4: X-VALVE - open cover

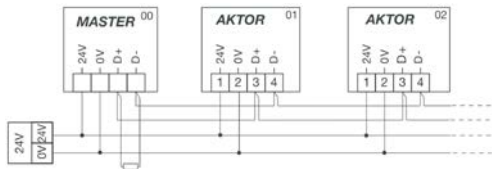| Terminal	Cable colour	Connection on	
1	Blue (BU)	24 VAC /DC	RJ12
2	Brown (BN)	GND 0V	
3	Green (GN)	Modbus RTU D+	
4	Grey (GY)	Modbus RTU D-	
7	White (WH)	P1	Universal input 1
8	Violet (VT)	GND P1	
9	Grey (GY)	P2	Universal input 2
10	Pink (PK)	GND P2	

Wiring example

Fig. 5: X-VALVE wiring example

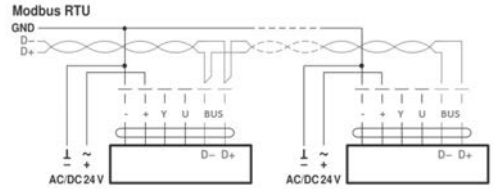### Earth (GND) for multiple supply voltages

Fig. 6

If there are several feeds/supply voltages, make sure that the earth (GND) of all voltage sources is connected.

Commissioning

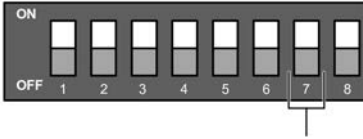### Resetting the Modbus parameters (DIP switch 7)

Fig. 7: DIP switch

The baud rate is reset to default values by switching DIP switch 7 back and forth (approx. 1 sec. for each switching procedure, with the supply voltage switched on). (38400 baud; 8; N ;2)
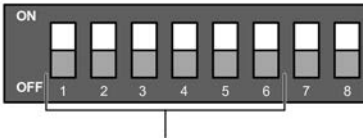
Setting the address

Fig. 8: Setting the address

Addre ss	DIP 6 (Bit 5)	DIP 5 (Bit 4)	DIP 4 (Bit 3)	DIP 3 (Bit 2)	DIP 2 (Bit 1)	DIP 1 (Bit 0)
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
4	0	0	0	1	0	0
...						
63	1	1	1	1	1	1

Initialisation run is carried out when an address is assigned for the first time or when there is a change of address.

Status message (LED, ♻ Fig. 1/7)

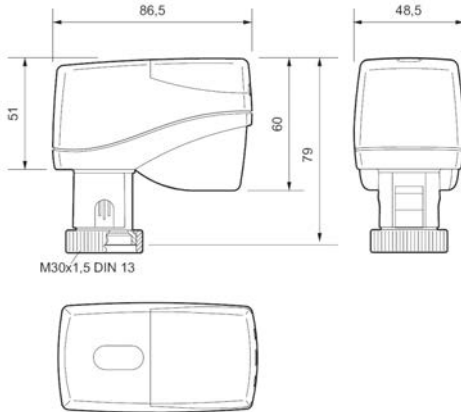| Status LED	Meaning
Green, lit	Normal operation
Green, fast flashing	Assembly position (DIP switches 1-6 to Off)
Green, blinking	Initialisation run
Green, flickering	Modbus communication
Red, lit	Valve adaptation fault (initialisation run without valve, wrong valve)
Off	No power

Technical data

X-VALVE-MOD-KP-MD15-RZ-J6

Fig. 9: X-VALVE-MOD-KP-MD15-RZ-J6

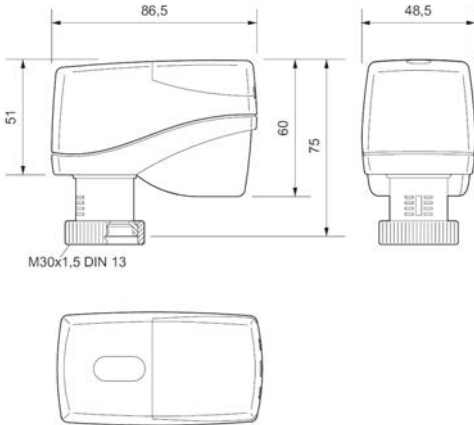| Item	Value
Supply voltage / output	24 V AC/DC ±10% / 3.8 VA / 1.9 W (the supply in the X-AIRCONTROL system comes from zone module RJ-12)
Permissible heat transfer fluid temperature	0 °C to +120 °C
Ambient temperature	0 °C to +50 °C
Ambient humidity	20 to 85% r.h., no condensation
Pre-assembled connecting cable (approx. 30 cm)	RJ-12 socket (screw terminals inside)
Connection of 2 IOs	Screw terminals up to 0.5 mm²
Protection level	IP 54
IEC protection class	III (SELV)
Actuator force / stroke	150 N / max. 9 mm
Assembly / valve seat	360° / M30 x 1.5 DIN 13
Dimensions (HxBxT)	75 x 48.5 x 86.5 mm
Addressing	DIP switch 1-6 (1-63)
Communication	RS485 (Modbus RTU)
Maintenance	Maintenance-free

X-VALVE-MOD-KP-MD15-Q-J6

Fig. 10: X-VALVE-MOD-KP-MD15-Q-J6

Item	Value
Supply voltage / output:	24 V AC/DC ±10% / 3.8 VA / 1.9 W (the supply in the X-AIRCONTROL system comes from zone module RJ-12)
Permissible heat transfer fluid temperature	0 °C to +120 °C
Ambient temperature:	0 °C to +50 °C
Ambient humidity:	20 to 85% r.h., no condensation
Pre-assembled connecting cable (approx. 30 cm):	RJ-12 socket (screw terminals inside)
Connection of 2 IOs:	Screw terminals up to 0.5 mm²
Protection level:	IP 54
IEC protection class:	III (SELV)
Actuator force / stroke:	150 N / max. 9 mm
Assembly / valve seat:	360° / M30 x 1.5 DIN 13
Dimensions (HxBxT):	75 x 48.5 x 86.5 mm
Addressing:	DIP switch 1-6 (1-63)
Communication:	RS485 (Modbus RTU)
Maintenance:	Maintenance-free

Bus communication

Item	Value
Interface	RS485 / Modbus RTU
Baud rates	9600; 19200; 38400 (default); 57600; 115200
Data bits / parity / stop bits	8 / N / 2
Cable termination	Bus termination can be activated in the actuator DIP switch 8 Position 0 = Off Position 1 = On
Recommended cable	Twisted pair with screening (characteristic impedance 120 ohm)
Modbus functions	0x03 Read Holding Register 0x06 Write Holding Register 0x03 Read Holding Multiple 0x10 Write Holding Multiple

Sensor types (P1 / P2)

Sensors	Value
0 - 10 V	0 – 100%
KP10	-50 °C ... +150 °C
Ni 1000 (DIN)	-50 °C ... +150 °C
Ni 1000 (L&G)	-50 °C ... +150 °C
PT1000	-50 °C ... +150 °C (default)

Maintenance

The actuator is maintenance-free.

Disposal

Directive 2012/19/EU WEEE:

Do not dispose of old devices with normal domestic waste, but take them to a designated collection point for the recycling of electrical and electronic devices.

List of data points

Register	Who	Description	R/W
0	Setpoint value	0...10000 (0.00% ... 100.00%) related to setpoint hydraulic volume flow rate balancing	RW
1	Override control	0 = None 1 = Open 2 = Closed 3 = minPos 5 = maxPos	
2	Command	0 = Control operation 1 = Valve initialisation run. The valve is retaught. 2 = One-time test run 3 = Synchronisation of the upper end position 4 = Reset of current faults 5 = One-time setting of communication registers 147 / 148 / 149	R/W
3	Actuator type	201	R
5	Absolute position (mm)	mm (×10)	R
6 [1)]	Relative volume flow rate	0 ...10000 (0.0% ... 100.00%) related to setpoint hydraulic volume flow rate balancing	R
7 [1)]	Volume flow rate actual value	0 l/h (Only whole numbers, without decimal point)	R
8	Flow temperature	°C (×10) current flow temperature	R
107	Return temperature	°C (×10) current return temperature	R
141	Temperature difference P1/P1	K (×10) temperature difference from flow and return	R
125	Correction value P1	V×100; °C ×10	R/W
128	Correction value P2	V×100; °C×10	R/W
145	Configuration of sources for differential temperature calculation	0: Flow and return temperature: bus register value 1: Flow: P1 Return: P2 2: Flow: P2 Return: P1 3: Flow: P1 Return: Bus 4: Flow: P2 Return: Bus 5: Flow: Bus Return: P1 6: Flow: Bus Return: P2	R/W
146 [1)]	Selection of the current valve characteristic	0: Linear (without setpoint setting and volume display, max. stroke 4 mm is used) 1: QTZ15/0.55 30-210 l/h 2: QTZ15/1.7 150-700 l/h 3: OTZ15-20/2.1 200-1300 l/h 4: QTZ20/3.1 250-1800 l/h) 5: QTZ25/4.1 400-2500 l/h 6: QTZ32/8.4 600-4800 l/h 7: RBQ15/0.5 30-210 l/h 8: RBQ15/1.1 90-450 l/h 9: RBQ15-20/1.8 150-1050 l/h 10: RBQ20/2.5 180-1300 l/h 11: RBQ25/4.0 300-2000 l/h 12: RBQ32/6.0 600-3600 l/h	R/W
143 [1)]	Volume flow rate Vnom	l/h	R
144 [1)]	Volume flow rate setting	l/h (hydraulic volume flow rate balancing)	R/W
105	Min. limit of actuator stroke	0-10000 (0-100) (min. stroke limitation) (0; default)	R/W
106	Max. limit of actuator stroke	0-10000 (0-100) (max. stroke limitation) (10000; default)	R/W

Register	Who	Description	R/W
140	Hardware type	0x00XX = MD15MOD-Q / 0x01XX = MD50MOD / 0x02XX = MD15MOD-RZ	R
100	Serial number 1	0-65535	R
101	Serial number 2	0-65535	R
102	Serial number 3	0-65535	R
103	Firmware version	0-65535	R
104	Operating state / fault	0x0000: Normal operation, no message 0x0001: Fault internal memory 0x0002: Fault internal AD conversion 0x0004: Fault valve adaptation 0x0008: Fault internal motor function 0x0010: P1 Overrange 0x0020: P2 Overrange 0x0100: Command execution test run/adaptation active	R
147	RS-485 baud rate	0: Default (38400, 8, N, 2) 1: 9,600 2: 19,200 3: 38,400 4: 57,600 5: 115,200	R/W
148	RS-485 stop bits	1; 2	R/W
149	RS-485 parity	0: = None; 1: = Even; 2: = Odd	R/W
407	Leakage warning	0: = None; 1: = leakage detected, (> 8 K differential temperature of flow/return over 6 hours)	R
135	Purging timer	Value in minutes (0; 60 ... 32767 minutes) 0 = Inactive (default) 60 = Smallest interval 32767 = Largest interval	R/W
319	Purging timer, reset time until next purging procedure	Value in minutes (0 ... 32767 minutes)	R
136	VBS time (valve blocking protection function)	Value in hours (0; 24 ... 4320) 0 = inactive 24 = Smallest interval 4320 = Largest interval	R/W
320	VBS reset time until next purging procedure	Value in hours (0; 1 ... 4320)	R
123	Sensor type P1	0 = Off 1 = Binary input 2 = 0 – 10 V 3 = KP10 4 = Ni1000 5 = Ni1000LG 6 = Pt1000 (default)	R/W

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Register	Who	Description	R/W
425	Sensor type P2	0 = Off 1 = Binary input 2 = 0 – 10 V 3 = KP10 4 = Ni1000 5 = Ni1000LG 6 = Pt1000 (default) 8 = Y-output 0 - 10 V (register 426 = 0 - 1000) 9 = Y-feedback 0 – 10 V	R/W
426	Y at output P2	Voltage value (0 – 1000) for 0 – 10 V Output signal at terminals P2 (for configuration in register 425 = 8; P2 = Output 0 – 10 V)	R/W
1) Data point only available with X-VALVE-MOD-KP-MD15-Q-J6 R = Read only register W = Write register			