



Electronic actuator with Modbus RTU

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

Modbus communication interface



X-AIRCONTROL - Modbus zone module



Small valve - perfect accessory for the actuator



For the secondary treatment of air, downstream of heating and cooling coils in water-side applications, in defined zones, offices and meeting rooms

Electronic actuator for the room air and extract air temperature control by means of pressure-independent valves in various water-based applications and automatic, pressure-independent flow control (hydraulic balancing)

- Electronic actuator with Modbus interface
- LED for indicating the operating status
- DIP switches for setting the communication parameters
- Display of actual values, setpoint values and status via Modbus
- Automatic closing point detection and valve calibration
- Modulating control of the control signal and hence of the valve position (0 - 100%), feedback via Modbus
- Automatic valve anti block function prevents the spindle from blocking if the valve remains idle for a prolonged period of time
- Automatic flushing
- Flow characteristics of pressure-independent valves can be set via Modbus
- Volume flow rates can be set via Modbus (hydraulic balancing)
- Analogue inputs (can be configured) for two temperature sensors
- Automatic leak detection based on the flow and return temperatures
- Space-saving casing optimised for installation on an underfloor heating manifold

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General information

Application

- For the secondary treatment of air, downstream of heating and cooling coils in water-side applications of HVAC systems, in defined zones, offices and meeting rooms
- Electronic actuator for RBQ/QTZ valves, used for the modulating control of room temperature and extract air temperature in various water-based applications
- Small actuator for modulating control procedures in heating, ventilation and air conditioning systems

Special features

- Communication and signalling via Modbus RTU
- RJ12 connection for easy plug and play
- Ideal for the TROX X-AIRCONTROL system
- LED for indicating operating status and faults
- DIP switches for setting bus parameters
- Automatic detection of the closing point
- Leak detection by means of flow and return temperature measurement
- Choice of flow characteristics
- Configuration of hydraulic balancing values
- Automatic flushing
- Valve anti block function
- Maintenance-free

Interface

Digital communication interface (bus)

- Modbus RTU for communication and signalling

Analogue interface

- 2 analogue inputs (e.g. for temperature sensors)

Variants

- Electronic actuator suitable for 2-way and 3-way valves

Parts and characteristics

- Electronic actuator for encased valves
- Valve calibration for DN 10 – 32
- Electrical connection with terminals or plug-in cables
- Factory fitted cable with RJ12 socket for the connection to X-AIRCONTROL

Construction features

- Valve connection with M30 × 1.5 thread
- Electrical connection points with removable cover
- 2 casing cover variants (with 1 or 2 cable entry points)
- Simple connection to the X-AIRCONTROL Modbus zone module with plug and play

Materials and surfaces

- Casing top made of plastic, PC, UL 94 V-0, RAL 9003
- Casing bottom made of plastic, PTB, UL 94 V-0, RAL 7035

Useful additions

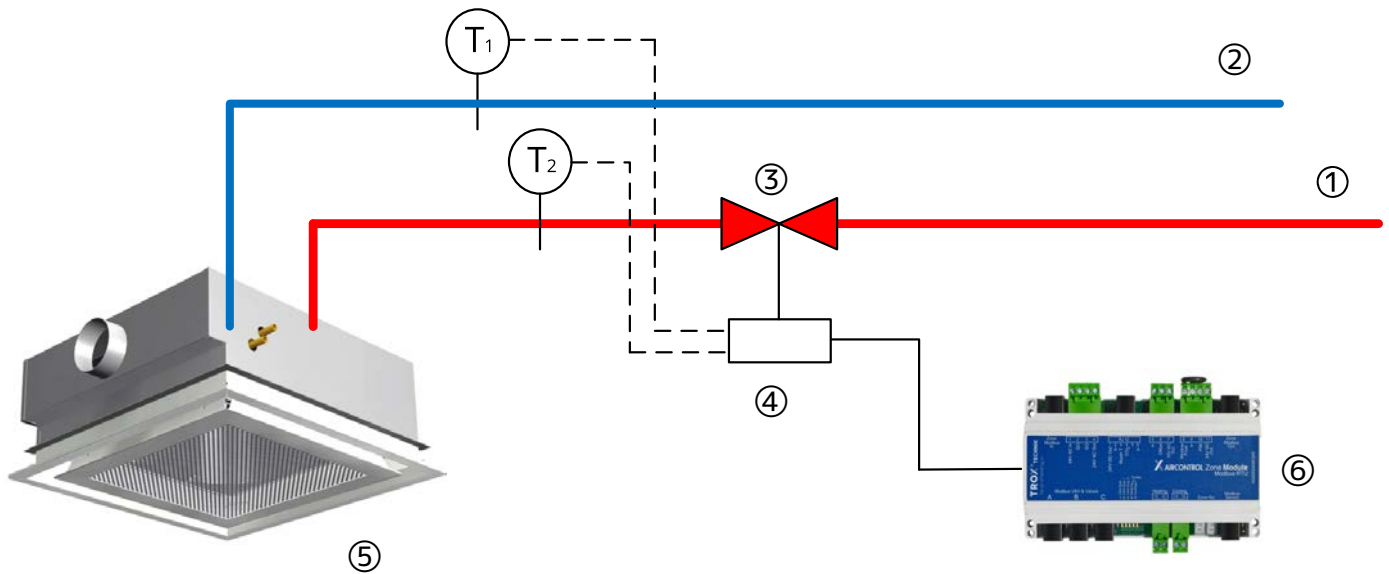
- X-AIR-ZMO-MOD Modbus zone module for room control

Function

For the secondary treatment of air, downstream of heating and cooling coils in water-side applications of HVAC systems, in defined zones, offices and meeting rooms. Electronic actuator for

RBQ/QTZ valves, used for the modulating control of room temperature and extract air temperature in various water-based applications.

Installation example: TROX X-VALVE Modbus (RTU) used with TROX DID and zone module X-AIR-ZMOMOD



- ① Water flow
 - ② Water return
 - ③ Small valve
 - ④ Modbus (RTU) actuator for small valve
 - ⑤ TROX DID604 active chilled beam
 - ⑥ TROX Modbus (RTU) zone module X-AIR-ZMO-MOD for single room control
- T_1 = optional analogue temperature sensor in the water return
 T_2 = optional analogue temperature sensor in the water flow

Specification text

This specification text describes the general properties of the product. Texts for variants can be generated with our Easy Product Finder design program.

Specification text

Small actuator with Modbus RTU interface (RS485) for the modulating control of zone-based secondary treatment devices in HVAC systems.

Special features

- Communication and signalling via Modbus RTU
- RJ12 connection for easy plug and play
- Ideal for the TROX X-AIRCONTROL system
- LED for indicating operating status and faults
- DIP switches for setting bus parameters
- Automatic detection of the closing point
- Leak detection by means of flow and return temperature measurement
- Choice of flow characteristics
- Configuration of hydraulic balancing values
- Automatic flushing
- Valve anti block function
- Maintenance-free

Interface/signalling

- Modbus RTU interface (RS 485)

Electrical connection

- RJ12 socket as standard, alternatively screw terminals

- Can be connected to X-AIRCONTROL and an X-AIR-ZMO-MOD zone module simply by plug and play
- 2 universal inputs, e.g. for temperature measurement (flow and return temperatures)

Supply voltage

- 24 V AC/DC $\pm 10\%$ with RJ12 connection
- When used with X-AIRCONTROL, the power is supplied via the zone module

Water-side connection

- Positive lock connection M30 \times 1.5; DIN 13
- For type RBQ/QTZ control valves

Factory condition

- Electronic actuator
- Factory fitted RJ12 connector for simple plug and play
- Special cover with a second cable entry point
- Factory fitted connecting cable for sensors
- Product description

Dimensions

Height: 75 mm

Width: 48.5 mm

Depth: 86.5 mm



Order code

X-VALVE – MOD – KP-MD15-Q-J6
| | |
1 2 3

1 Type
X-VALVE

MOD Modbus RTU

2 Interface
ANA analogue
MP MP bus

3 Type of actuator
For example
KP-MD15-Q-J6 for pressure-independent valves
KP-MD15-RZ-J6 for standard valves

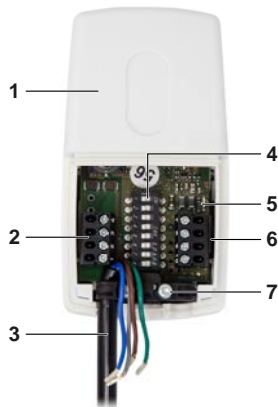
Order example: X-VALVE-MOD-KP-MD15-Q-J6

Type
Interface
Type of actuator

X-VALVE
MOD
KP-MD15-Q-J6

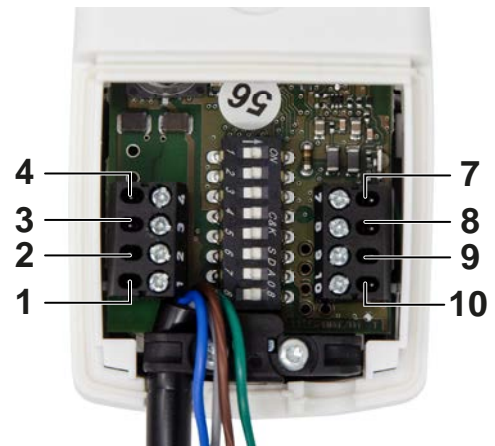
Variants

X-VALVE-MOD-KP-MD15 with open cover



- 1: X-VALVE-MOD casing
- 2: Terminal strip
- 3: 4-wire cable at RJ12 socket
- 4: DIP switches
- 5: Status LED, green / yellow / red
- 6: Terminal strip
- 7: Strain relief

X-VALVE-MOD-KP-MD15 with open cover, detail



- 1: 24 V AC/DC (blue)
- 2: GND 0 V (brown)
- 3: Modbus RTU D+ (green)
- 4: Modbus RTU D- (grey)
- 7: Universal input 1 (white)
- 8: GND for universal input 1 (purple)
- 9: Universal input 2 (grey)
- 10: GND for universal input2 (pink)

Two covers (part of the supply package)



- 1: Cover with 2 cable entry points
- 2: Cover with 1 cable entry point

4-wire sensor cable (part of the supply package)



Small valve, a perfect accessory for the actuator



Technical data

Order code	Part number	Type
X-VALVE-MOD-KP-MD15-Q-J6	A00000073472	KP-MD15-Q-J6

X-VALVE-MOD-KP-MD15-Q-J6, electronic actuator for small valves

X-VALVE-MOD-KP-MD15-Q-J6, electronic actuator for small valves

Supply voltage (AC)	24 V AC $\pm 10\%$, 50/60 Hz
Supply voltage (DC)	24 V DC $\pm 10\%$
Power rating (AC)	3.8 VA
Power rating (DC)	1.9 W
Interface	RS485 Modbus RTU slave
Control input signal	Modbus RTU
Inputs/outputs	2 universal inputs or outputs (P1, P2) via Modbus, can be configured individually as: - binary input, volt-free, 500 Ω , 1 mA max.; 13 V DC - analogue input - output 0 – 10 V only P2
Voltage and communication connection	Factory fitted cable with RJ12 socket / terminals
Connection of inputs/outputs	Terminals up to 1.5 mm ²
Display	LED for indicating operating status and faults; scale for valve stroke on the outside
Actuator noise	< 31 dB(A)
Actuator stroke	9 mm max.
Actuator force	150 N, nominal
Acceptable water temperature	0 °C – 120 °C
Ambient temperature	0 °C – 50 °C
Humidity	No condensation
Protection level	IP 54
IEC protection class	III according to EN 60730
Installation orientation	360°
Maintenance	Maintenance-free
Weight	Approx. 350 g

Installation and commissioning

- Installation only in heating, ventilation and air conditioning systems indoors
- Do not switch on the power supply until the actuator has been installed on the valve
- Setting Modbus addresses with DIP switches 1 - 6
- LED for indicating the operating status
- Maintenance-free actuator

Removing the actuator

- Let valve and actuator cool down
- Set DIP switches 1 – 6 to OFF
- LED blinking rapidly, green
- Interrupt the supply voltage
- Disconnect all electrical connections
- Loosen the union nut
- Remove the actuator from the valve

Setting Modbus addresses 1 - 63 with the DIP switches

Address	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
etc.						
...						
63	1	1	1	1	1	1

Note: After the addressing has been adjusted, an initialisation run is always carried out.

Communication interface Modbus RTU

Register	Who	Description	R/W
0	Setpoint value	0 – 10000 (0.0 – 100.0 %)	R/W
1	Override control	0 = none 1 = open 2 = close 3 = minimum position 5 = maximum position	
2	Command	0 = normal control operation 1 = initialisation 2 = test 3 = sync 4 = ErrReset 5 = BaudrateChange	R/W
5	Absolute position (mm)	in mm (* 10)	R
8	Flow temperature	in °C (* 10), actual flow temperature	R
107	Return temperature	in °C (* 10), actual return temperature	R
141	Temperature difference P1/P2	in K (*10), temperature difference between 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 temperatures: 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
105	Minimum stroke	0 – 10000 (0 – 100) (minimum stroke) (0 = default)	R/W
106	Maximum stroke	0 – 10000 (0 – 100) (maximum stroke) (10000 = default)	R/W
140	Hardware	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	0x0000: Normal, fault-free operation 0x0001 = fault, internal memory 0x0002 = fault, internal A/D conversion 0x0004 = valve calibration error 0x0008 = fault, internal motor 0x0010 = P1 limit exceeded 0x0020 = P2 limit exceeded 0x0100 = communication, test run/calibration in process	R
147	RS-485 baud rate	0 = default (38400, 8, N, 2) 1 = 9600 2 = 19200 3 = 38400 4 = 57600 5 = 115200	R/W
148	RS-485 stop bits	1; 2	R/W
149	RS-485 parity	0 = none 1 = even 2 = odd	R/W



Register	Who	Description	R/W
407	Leakage warning	0 = none 1 = leak detected, (> 8 K temperature difference between flow and return over 6 hours)	R
3	Actuator type	201	R
6	Relative volume flow rate	0 – 10000 (0.0 – 100.0 %)	R
7	Actual volume flow rate	l/h	R
146	Selection of the current valve characteristic	0: linear 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	Volume flow rate V_{nom}	l/h	R
144	Volume flow rate setting	l/h (hydraulic volume flow rate balancing)	R/W
135	Flushing timer	Value in minutes (0; 60 – 32767 minutes) 0 = inactive (default) 60 = smallest interval 32767 = largest interval	R/W
319	Flushing timer – time remaining until next flushing procedure	Value in minutes (0 – 32767 minutes)	R
136	VBS time (valve anti block function)	Value in hours (0; 24 – 4320) 0 = inactive 24 = smallest interval 4320 = largest interval	R/W
320	VBS time until next flushing procedure	Value in hours (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
425	Sensor type P2	0 = off 1 = binary 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 a 0 – 10 V output signal at terminal P2 (if register 425 = 8; P2 = output 0 – 10 V)	R

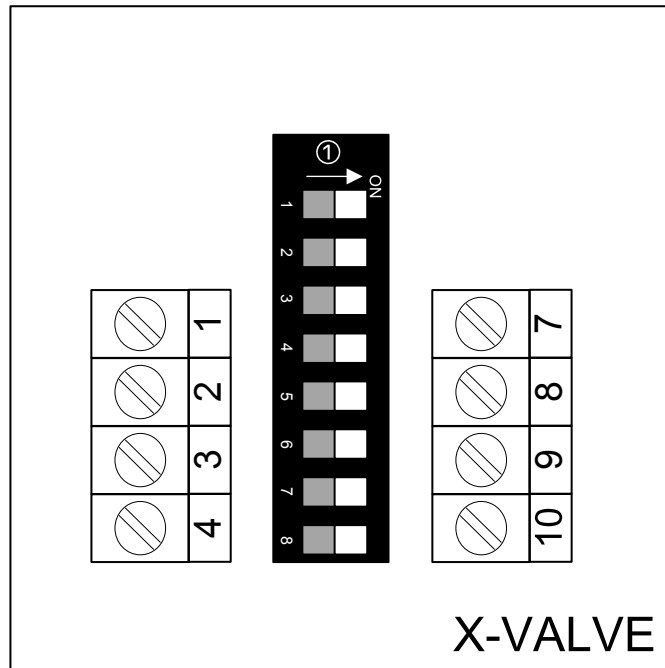
R = Read-only access to register

R/W = Read/write access to register

Note:

Supported Modbus functions 0x03 Read Holding Register
0x06 Write Holding Register
0x03 Read Holding Multiple
0x10 Write Holding Multiple

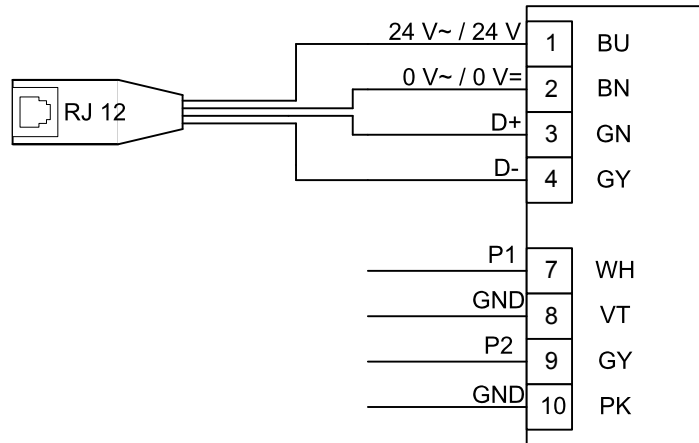
Terminal strips and DIP switches



- 1: ~, +, supply voltage 24 V AC/DC
- 2: ⊥, -, ground, neutral
- 3: D+ Modbus RTU
- 4: D- Modbus RTU

- 7: Universal input 1
- 8: Ground, GND
- 9: Universal input 2
- 10: Ground, GND
- Ⓛ: DIP switches 1 – 8

Plug-in cables, connection

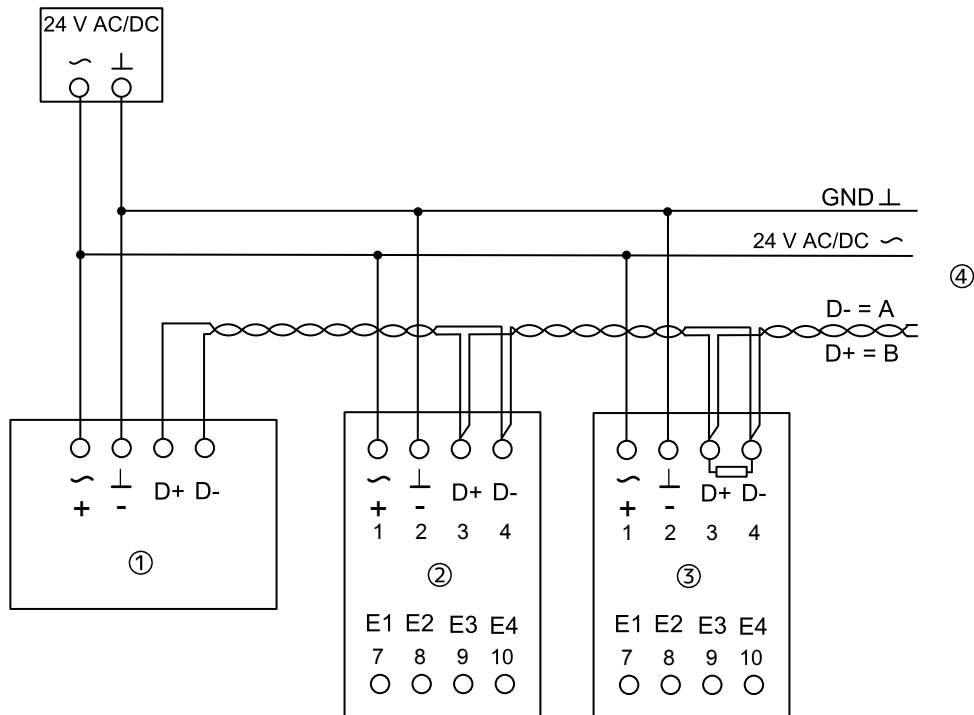


- 1: BU, supply voltage, 24 V
- 2: BN, ground, neutral, 0 V
- 3: GN, Modbus RTU, D+
- 4: GY, Modbus RTU, D-

- 7: WH, universal input 1
- 8: VT, ground, GND
- 9: GY, universal input 2
- 10: PK, ground, GND

Note: Plug-in cables are part of the supply package.

Modbus RTU connections, one voltage source

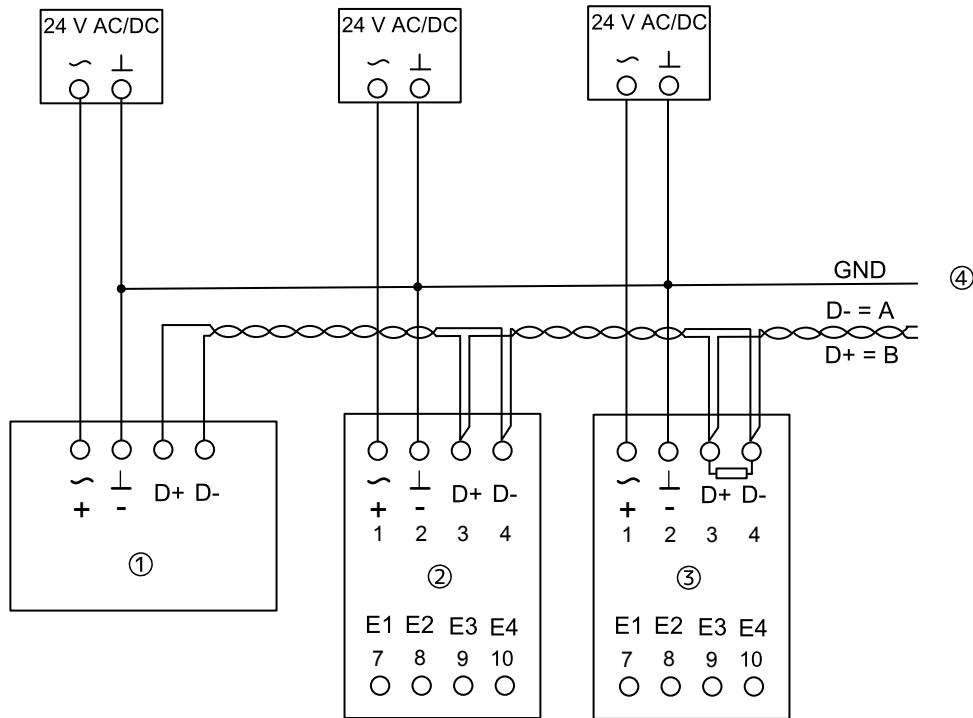


- ① Modbus RTU master
- ② Modbus RTU slave, e.g. X-VALVE
- ③ Modbus RTU slave 2, e.g. X-VALVE with terminal resistor, DIP switch 8
- ④ Other network devices

- 1: ~, + = supply voltage 24 V AC/DC
- 2: ⊥, - = Ground, neutral
- 3: D+ = Modbus RTU
- 4: D- = Modbus RTU

- Note:**
- Electrical connection only with safety transformer
 - Modbus wiring only according to the relevant RS485 guidelines
 - Supply voltage and communication must not be galvanically isolated. All electric devices have to be connected to the same GND signal.

Modbus RTU connections, several voltage sources



- ① Modbus RTU master
- ② Modbus RTU slave, e.g. X-VALVE
- ③ Modbus RTU slave 2, e.g. X-VALVE with terminal resistor, DIP switch 8
- ④ Other network devices

- 1: ~, + = supply voltage 24 V AC/DC
- 2: ⊥, - = Ground, neutral
- 3: D+ = Modbus RTU
- 4: D- = Modbus RTU

- Note:**
- Electrical connection only with safety transformer
 - Modbus wiring only according to the relevant RS485 guidelines
 - Supply voltage and communication must not be galvanically isolated. All electric devices have to be connected to the same GND signal.
 - If several voltage sources are being used, the GND of all the sources have to be connected.

Product details

Automatic detection of the closing point

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

Positioning

The actuator is a modulating actuator. The control signal (0 – 100%) is transmitted via Modbus communication. The current position (0 – 100 %/mm) can be queried via Modbus.

Valve anti block function

The actuator has a valve anti block function that can be switched on. The cycle time can be set or changed as part of Modbus parameter setting. If the value is 0, this function is deactivated. The automatic valve anti block function prevents the spindle from blocking if the valve remains idle for a prolonged period of time

Temperature measurement

The flow and return temperatures can be captured with two temperature sensors and queried via Modbus.

Flushing

The actuator has a function for automatic flushing. The valve opens fully for the flushing procedure. The cycle time can be set or changed as part of Modbus parameter setting. If the value is 0, this function is deactivated.

Leak detection

Automatic leak detection based on the flow and return temperatures and with the valve being closed. A temperature difference greater than 8 K for at least 6 hours with the valve closed indicates a leak.

Indication of operating status and faults

Operating status and fault signals are captured by the actuator and can be queried via Modbus. This data helps to assess the condition of the hydraulic system and detect faults at an early stage.

Creating flow characteristics

Various valve types and the corresponding flow characteristics can be selected as part of Modbus parameter setting. These flow characteristics are used to determine a minimum and a maximum volume flow rate (only with valve QTZ or RBQ).

Configuration of hydraulic balancing values

A maximum volume flow rate (hydraulic balancing) for heating and one for cooling can be set as part of Modbus parameter setting (only with QTZ or RBQ).

Volume flow rate calculation

If a pressure-independent valve (QTZ or RBQ) is used, the volume flow rate actual value can be determined based on the selected flow characteristic and the actual actuator position, and it can be queried via Modbus.