oventrop

Aktor M Modbus

Motorised Modbus RTU Actuators

Modbus actuator for small valves for modulating control in heating, ventilation and air-conditioning systems. Control is carried out via Modbus RTU communication. In addition to communication on the Modbus, 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 to the building automation (Modbus leader).

Function

- Configuration of the hydronic balancing values
- Automatic closing point detection
- Calculation functions (volume flow, thermal energy)
- Limitation functions (return temperature etc.)
- Control functions (room temperature, thermal energy etc.)

- Valve blocking protection function
- Temperature sensing
- Flushing function
- Control of a six-way ball valve via the actuator
- Operating and error messages
- Leakage detection

Features

- + Modbus RTU
- + Alternative control strategies can be implemented
- + Optimally suitable for Cocon Q control valves

Product Details

Technical Data

Item no.	1012745	1158014
	Actuator for small valves, with characteristic lines for Oventrop Cocon QTZ DN 10…32	Actuator for small valves, with valve adapter and characteristic lines for Oventrop Cocon QTR and QFC DN 40…50
Control	Modbus RTU follower, modulating. For technical data, see chapter "Bus communication" below	
Electrical connection		
Actuator	Screw terminals with two pre-assembled cables Cable 1: Control and power supply (terminal 1 to 4) Cable 2: Further inputs and outputs (terminal 7 to 10)	
Cables	Cable 1: 2 x 2 x 0.5 mm², shielded Cable 2: 4 x 0.5 mm²	
Cable length	1.5 m each	
Operating voltage	24 V AC ±10 %, 50/60 Hz; 3,8 VA 24 V DC ±10 %; 1.9 W	24 V AC ±10 %, 50/60 Hz; 4.8 VA 24 V DC ±10 %; 2.5 W
Power consumption	4.2 VA (24 V AC)	9.0 VA (24 V AC)
Dimensioning	2.2 W (24 V DC) 3.8 VA (24 V AC)	4.7 W (24 V DC) 4.8 VA (24 V AC)
Nominal	1.9 W (24 V DC)	2.5 W (24 V DC)
Switch-on current	7.2 A; 0.052 A²s (24 V AC) 24 V DC; 5.0 A; 0.025 A²s (24 V DC)	7.2 A; 0.052 A²s (24 V AC) 5.0 A; 0.025 A²s (24 V DC) -
Mechanical connection		
Valve connection	M 30 x 1.5	M 30 x 1.5
Medium temperature	0…120 °C	0…120 °C
Positioning noise	<31 dB (A)	<31 dB (A)
Positioning stroke	Max. 9 mm	Max. 14 mm
Positioning time	22 s/mm	22 s/mm
Positioning force	150 N	500 N
Installation	Position-independent	Position-independent
Protection type	IP54	IP54
Protection class	III according to EN 60730	III according to EN 60730

Transport and storage

Temperature range	0…50 °C
Relative air humidity	Max. 85 %
Particles	Store in a dry and dust-protected place
Mechanical influences	Protect from mechanical shock
Weather influences	Do not store outdoors and protect from sunlight
Chemical influences	Do not store together with aggressive media

Functions

Detailed description of the individual functions with the associated data points can be found here:

For 1012745

For 1158014

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 modulating control. The control signal (0-100%) is transmitted via Modbus communication. The current position (0-100%) can be queried via Modbus.

VALVE BLOCKING PROTECTION FUNCTION

The valve blocking protection prevents the spindle from jamming if the valve is not operated for a longer period. The actuator has a configurable valve blocking protection function. The cycle time can be configured via the Modbus parameterisation. If the value is 0, the function is deactivated.

SETTING OF VALVE CHARACTERISTIC LINES

Various valve types with their characteristic lines can be selected via mode parameterisation. A minimum and maximum volume flow is determined on the basis of these characteristic lines. The following Oventrop valves are stored:

Characteristic lines 1012745

Value	Data point 110	Oventrop item no.
0	Linear	—
1	Cocon QTZ PN 25 DN 10/15, control range 30…210 l/h	1143104, 1143163, 1143164, 1143504, 1143563,1143564, 1144864, 1147204, 1149204
2	Cocon QTZ PN 25 DN 10/15, control range 150…700 l/h	1143204, 1143263, 1143264, 1143604, 1143663, 1143664, 1144964, 1147304, 1149304
3	Cocon QTZ PN 25 DN 15, control range 200…1,300 l/h	1143304, 1143364, 1143704, 1143764, 1145064, 1147404, 1149404
4	Cocon QTZ PN 25 DN 20, control range 250…1,800 l/h	1143206, 1143266, 1143606, 1143666, 1144966, 1147306, 1149306
5	Cocon QTZ PN 25 DN 25, control range 400…2,500 l/h	1143208, 1143268, 1143608, 1143668, 1147308, 1149308
6	Cocon QTZ PN 25 DN 32, control range 600…4,800 l/h	1143210, 1143270, 1143610, 1143670, 1147310, 1149310
7	Cocon QTZ PN 16 DN 10/15, control range 30…210 l/h	1144564, 1145504, 1145563, 1145564, 1146004, 1146063, 1146064, 1147504, 1148504
8	Cocon QTZ PN 16 DN 10/15, control range 90…450 l/h	1144664, 1145604, 1145663, 1145664, 1146104, 1146163, 1146164, 1147604, 1148604
9	Cocon QTZ PN 16 DN 15/20, control range 150…1,050 l/h	1144566, 1144764, 1145506, 1145566, 1145704, 1145764, 1146006, 1146066, 1146204, 1146264, 1147506, 1147704, 1148506, 1148704
10	Cocon QTZ PN 16 DN 20, control range 180…1,300 l/h	1144666, 1145606, 1145666, 1146106, 1146166, 1147606, 1148606

Value	Data point 110	Oventrop item no.
11	Cocon QTZ PN 16 DN 25, control range 300…2,000 l/h	1145608, 1145668, 1146108, 1146168, 1147608, 1148608
12	Cocon QTZ PN 16 DN 32, control range 600…3,600 l/h	1145610, 1145670, 1146110, 1146170, 1147610, 1148610

Characteristic lines 1158014

Value	Data point 110	Oventrop item no.
0	Linear	—
1	Cocon QFC PN 25 DN 40, control range 1.5…7.5 m³/h	1146112
2	Cocon QFC PN 25 DN 50, control range 3.5…14 m³/h	1143116
3	Cocon QFC PN 16 DN 40, control range 1.5…7.5 m³/h	1146172
4	Cocon QFC PN 16 DN 50, control range 2.5…10 m³/h	1146174
5	Cocon QFC PN 16 / PN 25 DN 40, control range 1.5…7.5 m³/h Cocon QFC ANSI Class 150, 2", control range 6.6…33 US gpm	1146149, 1146649 1676149
6	Cocon QFC PN 16 / PN 25 DN 50, control range 2…8 m³/h Cocon QFC ANSI Class 150, 2", control range 8.8…35 US gpm	1146150, 1146650 1676150

CONFIGURATION OF THE HYDRONIC BALANCING VALUES

Via Modbus parameterisation, a maximum volume flow (hydronic balancing) can be set for heating and for cooling.

TEMPERATURE SENSING

The temperatures of the supply and return pipe can be measured via two connected temperature sensors and queried via Modbus.

FLUSHING FUNCTION

The actuator features an automatic flushing function. This temporarily opens the valve completely. The cycle time can be configured via the Modbus parameterisation.

If the value is 0, the function is deactivated.

Calculation function

CALCULATION OF THE VOLUME FLOW

In combination with the Cocon QTZ pressure independent control valve, the current volume flow is calculated on the basis of the set valve characteristic line and the current actuator position and can be queried via Modbus.

CALCULATION OF THE THERMAL ENERGY

Based on the calculated volume flow and the temperature difference between supply and return, the current thermal energy is calculated and can be queried via Modbus.

Limitation functions

RETURN TEMPERATURE LIMITATION

The return temperature is limited on the basis of the limit value configured via Modbus and the currently measured return temperature. If the temperature exceeds (heating mode) or falls below(cooling mode) the limit value, the volume flow is reduced until the limit value is reached again.

LIMITATION OF THE THERMAL ENERGY

The thermal energy is limited on the basis of the limit value configured via Modbus and the currently calculated instantaneous energy. If the limit value is exceeded, the volume flow is reduced until the limit value is reached again.

LIMITATION OF THE SPREAD

The spread is determined from the difference between the flow and return temperatures. The return temperature is controlled to limit the setpoint of the spread.

CONTROL FUNCTIONS

ENERGY CONTROL

The calculated thermal instantaneous energy can be used for control to a predefined energy value.

ROOM TEMPERATURE CONTROL (2-WIRE)

The room temperature is controlled on the basis of the setpoint temperature configured via Modbus and the transmitted current room temperature.

ROOM TEMPERATURE CONTROL (SIX-WAY BALL VALVE)

For example, with Oventrop Optibal W6 six-way ball valve and Aktor R rotary actuator.

The Optibal W6 switches between heating and cooling with the help of the Aktor R. The Aktor R is connected to the Aktor M Modbus and receives the switching commands from it. Switching takes place depending on the room temperature. The Aktor M Modbus receives the current room temperature from the building automation system via Modbus RTU.

The Aktor M Modbus is mounted on a Cocon QTZ pressure independent control valve and regulates the volume flow for heating or cooling mode individually, as higher volume flows are usually required for cooling mode.

An optional dew point monitor protects against condensation on the cooling surfaces.

RETURN TEMPERATURE CONTROL

The return temperature is controlled on the basis of the setpoint temperature configured via Modbus and the currently measured return temperature.

TEMPERATURE CONTROL ACCORDING TO DIFFERENTIAL TEMPERATURE

The differential temperature is determined from the difference between the flow and return temperatures. The return temperature is controlled to keep the differential temperature setpoint constant.

System monitoring

LEAKAGE DETECTION

Based on the measured flow and return temperatures, 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.
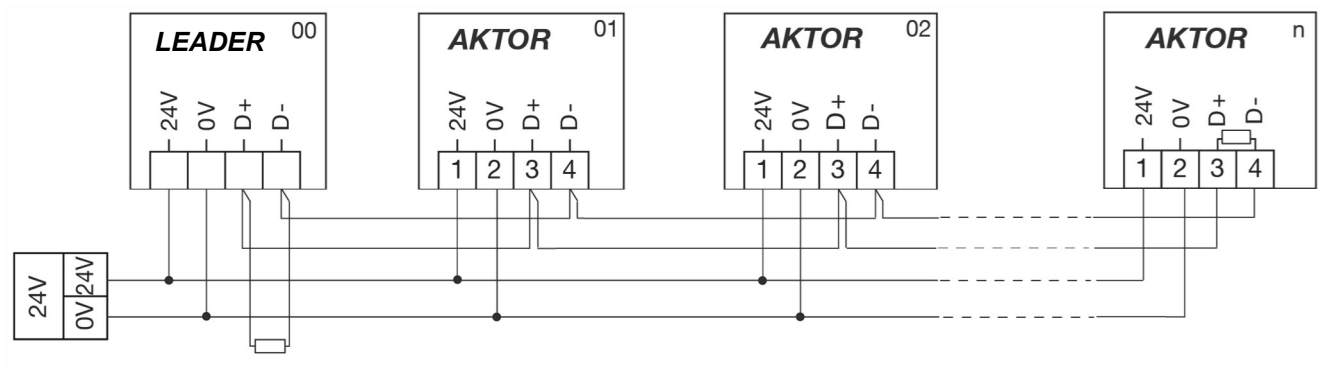
OPERATING AND ERROR MESSAGES

All data recorded by the actuator can be queried via Modbus. The data can be used to assess the status of the hydraulics and to detect possible errors and failures at an early stage.

BUS MONITORING

The bus failure detection can be parameterised via Modbus.

Bus communication

| Interface	EIA-485 / RS-485
Transmission type	Modbus RTU follower
Baud rate	9,600, 19,200, 38,400 (factory setting), 57,600, 115,200 bps
Start/stop bits	8N1, 8N2 (factory setting)
Number of bus participants	Up to 32 recommended, max. up to 64
Bus load	1/8 unit load
Termination	Switchable in the unit, 120 Ohm
Bias network	To be set in the leader
Recommended line	Twisted pair line with shield (characteristic impedance approx. 120 Ohm)
Line length	With bus topology with 115,200 baud: max. 500 m With bus topology with 38,400 / 57,600 baud: max. 750 m With bus topology with 9,600 / 19,200 baud: max. 1,000 m Stub line: max. 2 m
Supported Modbus function codes	0x03 Read Holding Register 0x06 Write Holding Register 0x03 Read Holding Multiple 0x10 Write Holding Multiple

Sensor types

- 0...10 V, 0...100 %
- KP 10: -50...150 °C
- Ni1000 (DIN): -50...150 °C
- Ni1000 (L&G): -50...150 °C
- PT1000: -50...150 °C

Electrical Connection
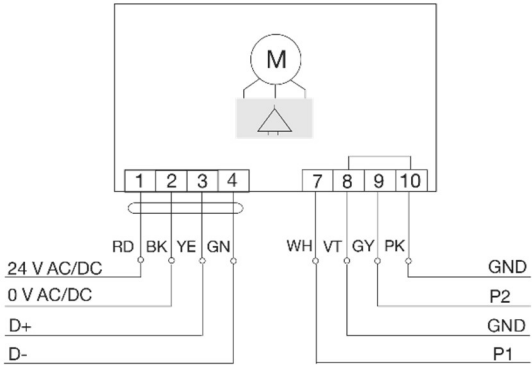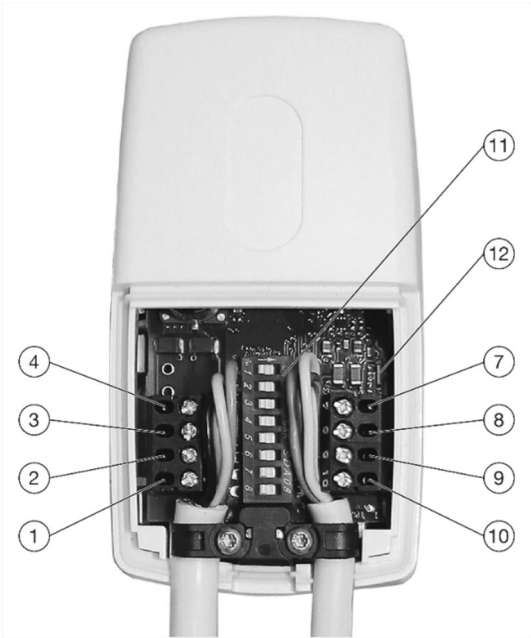
1	RD (red)	24 V AC/DC	
2	BK (black)	0 V AC/DC	
3	YE (yellow)	D+	Data line
4	GN (green)	D-	Data line
7	WH (white)	P1	Universal input 1
8	VT (violet)	GND	Universal input 1 ground
9	GY (grey)	P2	Universal input 2
10	PK (pink)	GND	Universal input 2 ground
11	DIP switch panel		
12	Status LED		

Dimensions and item numbers

86,5
51
60
75
M30x1,5 DIN 13

96
62
71
95
M30x1,5 DIN 13

48.5

56

(1)
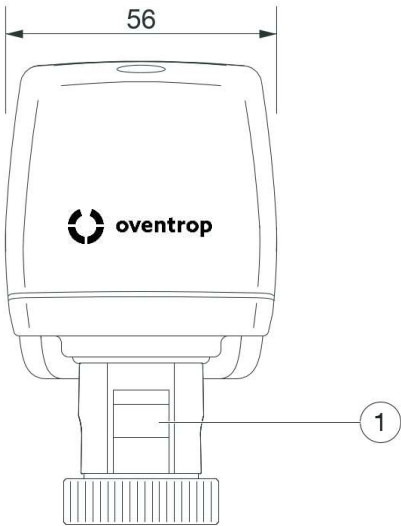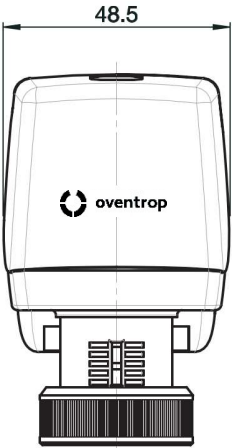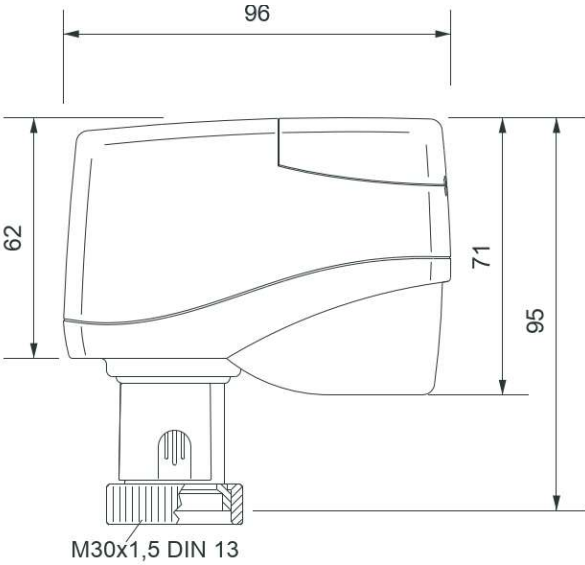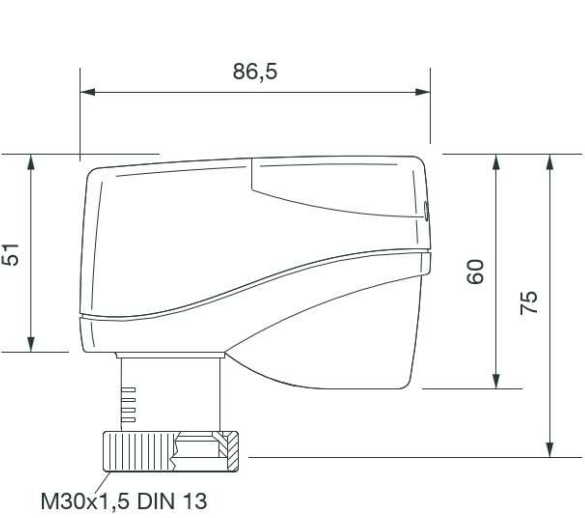
(1) Push button for releasing the engaged valve spindle