



Kieback&Peter

OPERATING INSTRUCTIONS

MD50-BUS and MD50-BUS-N

**Actuator for valves from the
RBK15..50 and RBQ40..50 series, Rev. 1.10 and later**

This document replaces all versions with an older release date. This version is not updated automatically. Subject to change.

The figures in this document were created with the utmost care. Nevertheless, we cannot guarantee that the delivered product will not differ from these figures.

The original operating instructions were composed in German.

Documentation in other languages has been translated from German.

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IMPORTANT

READ CAREFULLY BEFORE USE

RETAIN FOR LATER REFERENCE

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1 Notes on these operating instructions



NOTE

If you have any questions that cannot be clarified with these operating instructions, you can obtain further information from your Kieback&Peter contact person.

1.1 Validity of the operating instructions

These operating instructions constitute an integral part of the MD50-BUS and MD50-BUS-N actuators with RBQ40..50 (COCON QTR40..50) combo valves or RBK15..50 two-way/three-way valves in addition to actuating and sensor components, and are not valid for any other products.

To make the text easier to read, the MD50-BUS and MD50-BUS-N actuators are referred to in the text below as the "actuator." The above-mentioned valves are referred to in the text as "valves" and the actuator and sensor components as "components."

1.2 Display elements



NOTE

Notes provide you with important information.

You can find the following display elements in these instructions:

- List point
- ▶ Step or measure for avoiding danger

2 Safety

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2.1 Explanation of safety instructions and warnings

The basic safety notices warn of residual dangers that the approved specialist personnel are generally aware of thanks to their qualification.

Action-related warning notices warn of other residual risks and are indicated prior to dangerous steps of action.

Presentation and structure of warnings

The warnings are action-related and are structured as follows.



CAUTION

Type and source of danger!

Potential consequences when the danger occurs or the warning is not observed.

- ▶ Measures to avoid the danger.

Warnings are classified according to the severity of the hazard. The hazard levels and their corresponding signal words and warning symbols are described below:



WARNING

Indicates a hazard of medium risk which can result in **death or serious bodily injury** if not avoided.



CAUTION

Indicates a hazard of low risk which can result in **minor or medium bodily injury** if not avoided.



CAUTION

Indicates a hazard which can result in **material damage or malfunctions** if not avoided.

2.2 Basic safety instructions

Safety in the workplace depends on the attention, care and rationality of all the persons involved. To prevent damage and injury, read and follow the safety instructions below, the safety instructions in the documentation on using the components and the applicable local regulations.

Sharp edges and corners

There is a risk of skin abrasions and cutting injuries due to sharp edges and corners, such as those on cast iron bodies and the outer threads of the valves and individual parts of the actuators.

- ▶ Proceed with care.
- ▶ Wear protective gloves.

Toppling, falling and ejected parts

Severe injury and substantial damage to property due to:

- Toppling or falling valve or actuator parts
- Ejected parts in the event of impermissible pressure increases (bursting components)
- Impermissible drop in pressure (e.g. when using tensioning devices)
- ▶ Secure the protected area against access by unauthorized persons.
- ▶ Secure parts to prevent toppling and falling.
- ▶ Do not exceed the maximum valve operating pressure.

Pressurized liquids

There is a risk of severe burns and injuries caused by liquid jets due to incorrect connections.

- ▶ Do not exceed the maximum valve operating pressure.
- ▶ Check all connections before filling the system.
- ▶ Secure the protected area against access by unauthorized persons.

Hot and cold surfaces

There is a risk of severe burns or hypothermia from contact with hot or cold surfaces on the valves and pipelines.

- ▶ Before starting work, wait until the temperature of the pipelines and valves is between roughly 10 to 40 °C.

Musculoskeletal disorders

There is a risk of severe musculoskeletal disorders (e.g. back injuries) due to incorrect posture or excessive exertion (e.g. due to weight loads).

- ▶ Proceed with care.

2.3 Responsibilities of the Operator

The actuator, valve and components must be operated only when in a technically sound and safe working order. The operator must observe the following points:

- Ensure that the operating instructions are available to all persons who carry out work on the actuator, valve and components.
- Ensure that all persons have read and understood the operating instructions and the relevant documentation on using the components before working on the actuator, valve and components.
- Ensure the required ambient conditions and clearances at the mounting location.
- Ensure that mounting, installation and commissioning are carried out only by a fitter, an electrical specialist or a commissioning technician, according to the tasks. Siehe Absatz "Qualification of personnel", Seite 7.
- Inform your Kieback&Peter contact person in the event of damage to the actuator and/or valve.
- Ensure that personnel receive the personal protective equipment (PPE) stipulated in the specific country and use this equipment at all times.

2.4 Qualification of personnel

Fitter

The fitter is familiar with heating, ventilation and air conditioning systems. Based on his or her technical training and appropriate knowledge and experience, he or she is familiar with the described actuator and valve. The fitter knows the applicable regulations, can assess his or her assigned tasks and identify potential dangers.

Electrical specialist

The electrical specialist is a person who is familiar with the described actuator. Based on his or her professional training, knowledge and experience, he or she has a very good understanding of the fields of cable, wire and laying systems and a good knowledge of the areas of electrical engineering and electrical machines and actuators. The electrical specialist knows the applicable regulations, can assess work assigned to him or her and identify possible dangers.

Who is permitted to perform which tasks?

Task	Fitter	Electrical specialist
Mounting		
Assembling the valve	x	
Assembling the actuator	x	
Commissioning		
Electrical connection		x
Adapting actuator functions		x
Faults and remedial measures		
Searching for and correcting faults	x	x
Decommissioning, disassembly and disposal		
Taking the actuator out of operation		x
Disassembling the actuator	x	
Disassembling the valve	x	
Disposal	x	

2.5 Intended use

- The actuator with valve is designed to control the flow or precise mixture of liquids for heating, ventilation and air conditioning systems.
- Operate the actuator only with one of the specified valves and the original valve accessories.
- The actuator with valve is intended only for industrial and commercial use; never operate the actuator with valve in the private sphere or in households.
- Only operate the actuator with valve indoors.
- Maintain the specified ambient conditions during operation, transport and storage.
- Use a suitable operating medium.
- Only operate the actuator with valve in its original condition. Modifications to the actuator and/or valve may result in unforeseeable dangers and are thus prohibited.

2.6 Transport and storage

Unpacking

- ▶ Do not use damaged deliveries and get in touch with your contact at Kieback&Peter.
- ▶ Dispose of packaging material according to local regulations.

Transportation

- ▶ Maintain the specified ambient temperature of -20..+60 °C and ambient humidity of 0..85% r. F., non-condensing.
- ▶ Avoid slipping.

Storage

- ▶ Maintain the specified ambient temperature of -20..+50 °C and ambient humidity of 0..85% r. F., non-condensing.

3 Technical features and functions

3.1 Device variants

MD50-BUS	Actuator BACnet/Modbus selectable for valves RBK15..50 and RBQ40..50 (COCON QTR40..50) with two universal binary and analog inputs one of which can be used as analog output
MD50-BUS-N	Actuator BACnet/Modbus selectable for valves RBK15..50 and RBQ40..50 (COCON QTR40..50) Without inputs and outputs

3.2 Technical data

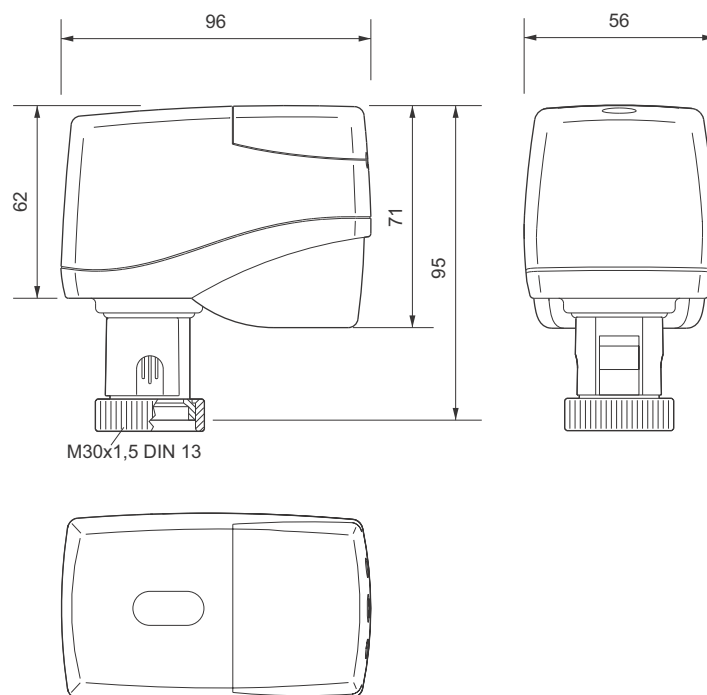
Nominal voltage	24 V AC $\pm 10\%$; 50/60 Hz; 24 V DC $\pm 10\%$
Dimensioning	9.0 VA (24 V AC); 4.7 W (24 V DC)
Power consumption	Nominal: 4.8 VA (24 V AC); 2.5 W (24 V DC) Sleep mode: 2.2 VA (AC); 1.1 W (DC)
Switch-on current	- 24 V DC; 5.0 A; 0.025 A ² s - 24 V AC; 7.2 A; 0.052 A ² s
Interface	BACnet MS/TP master or RS485 Modbus RTU slave; max. 1000 m dependent on baud rate
Control	Directly via BACnet MS/TP or Modbus through automation station or gateway
Inputs and outputs	for MD50-BUS only 1 universal input (P1) 1 universal input and output (P2) can be programmed independently via Bus as: - binary input, potential-free, max. 500 Ohm, 1 mA; 13 V DC - analog input, - analog output 0..10 V DC, 1 mA only P2
Connection	Two built-in cables 1.5 m; 2 x 0.5 mm ² / 2 x 2 x 0.34 mm ² insulated and 1.5 m; 4 x 0.5 mm ² for MD50-BUS only - two built-in cables 1.5 m; 2 x 0.5 mm ² / 2 x 2 x 0.34 mm ² insulated and 1.5 m; 4 x 0.5 mm ² - one built-in cable 1.5 m; 2 x 0.5 mm ² / 2 x 2 x 0.34 mm ² insulated
Sound power	<28 dB (A)
Positioning stroke	14 mm max.
Positioning time	Configurable 16s/mm, 22 s/mm, 28 s/mm
Positioning force	500 N
Permitted medium temperature in the valve	RBK15..50: 0..+120 °C RBQ40..50: -10..+120 °C
Ambient temperature	0..50 °C
Ambient humidity	0..85 % r.h., non-condensing

Overvoltage category	III
Level of contamination	2
Degree of protection	IP54 only if installed in the appropriate position (see p.)
Protection class	III in accordance with EN 60730
Installation position	360°
Maintenance	Maintenance-free
Weight	MD50-BUS: 396 g, MD50-BUS-N: 380 g

Sensor Types

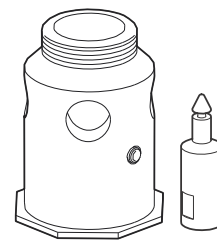
Sensor type	Measuring range
0..10 V	0..100 %
KP10	-50..+150 °C
Ni1000 (DIN)	-50..+150 °C
Ni1000 (L&G)	-50..+150 °C
PT1000	-50..+150 °C
Potentiometer 10k	0..100 %
Potentiometer 10k	-3..+3 K
Potentiometer 10k	-5..+5 K

3.3 Dimensions



3.4 Accessories (not included in the delivery)

- Z223** Adapter for RBQ40 (QTR DN40) and RBQ50 (QTR DN50) with actuator MD50-BUS, MD50(-E)(-R), MD50/230 or MF50-R.
Further information can be found in the mounting instructions for Z223 and in the operating instructions for the actuators.



3.5 Scope of delivery

- MD50-BUS actuator
- Operating instructions for the MD50-BUS actuator for valves from the RBK15..50 and RBQ40..50 series
- Mounting instructions for MD50-BUS

3.6 Identification

The type plate is attached to the underside of the actuator housing. Two barcode stickers are included with the device.



- 1 CE marking
- 2 Protection class
- 3 BACnet device ID
- 4 Month, year of construction
- 5 Serial number/revision number
- 6 Nominal voltage and power consumption
- 7 Item number



- 8 Barcode (BACnet Device ID)



NOTE

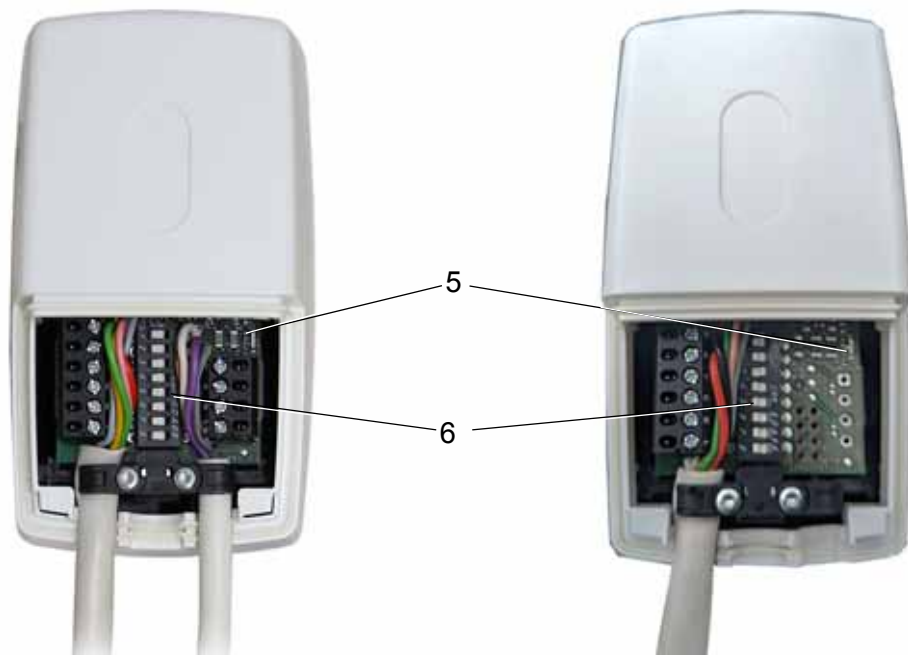
Information on the type of valve can be found on the cast body of the valve.

3.7 Structure



3-1: Actuator layout

- 1 Inspection cover
- 2 Housing
- 3 Safety button
- 4 Union nut



3-2: Indicators and controls on the MD50-BUS and MD50-BUS-N actuators

- 5 Status LED
- 6 Switches 1 to 8

3.8 Operating mode

The actuator MD50-BUS, MD50-BUS-N with a positioning force of 500 N is used for fine stroke adjustment of two-way and three-way valves of the types:

- RBK15..50(-BK)
- RBQ40..50

It is controlled via BACnet MS/TP or Modbus RTU communication.

Two universal binary and analog inputs, one of which can be used as an analog output, are available for further processing via BACnet MS/TP or Modbus in an automation station or for internal functions.

In combination with differential pressure-independent control valves from the RBQ40..50 (COCON QTR40..50 series, the specified volume flow can be controlled directly.

3.9 Bus communication

Overview

Interface	EIA-485/RS-485
Transmission type	BACnet MS/TP master or Modbus RTU slave
Supported baud rates	9,600, 19,200, 38,400 *, 57,600, 76,800, 115,200 bps
Start/stop bits	8N1, 8N2 *
Bus load	1/8 unit load
Termination	switchable in the unit, 120 ohms
Bias network	to be set in the master
Recommended cable	twisted pair cable with shield (characteristic impedance approx. 120 ohms)
for bus topology with 115,200 bauds	recommended cable length max. 500 m
for bus topology with 38,400 / 57,600 bauds	recommended cable length max. 750 m
for bus topology with 9,600/19,200 bauds	recommended cable length max. 1000 m
Stub lines	Cable length max. 2 m

* Default setting

Modbus properties

Supported Modbus function codes	Code	Function
	0x03	Read Holding Register
	0x06	Write Holding Register
	0x03	Read Holding Multiple
	0x10	Write Holding Multiple



NOTE

Via Modbus, 32-bit values (uint32, int32) are represented in two consecutive registers. The higher-order part is represented in the first register and the lower-order part in the following register (big-endian).

BACnet properties

Device profile	B-ASC	BACnet Application Specific Controller
BACnet Interoperability Building Blocks (BIBBs)	DS-RP-B	Data Sharing-ReadProperty-B
	DS-RPM-B	Data Sharing-ReadPropertyMultiple-B
	DS-WP-B	Data Sharing-WriteProperty-B
	DS-WPM-B	Data Sharing-WritePropertyMultiple-B
	DS-COV-B	Data Sharing-COV-B
	DM-DDB-B	Device Management-Dynamic Device Binding-B
	DM-DOB-B	Device Management-Dynamic Object Binding-B
	DM-DCC-B	Device Management-DeviceCommunicationControl-B
	DM-TS-B	Device Management-TimeSynchronization-B
	DM-UTC-B	Device Management-UTCTimeSynchronization-B
	DM-RD-B	Device Management-ReinitializeDevice-B
	DM-R-B	Device Management-Restart-B
	DM-BR-B	Device Management-Backup and Restore-B
Object types	AI	Analog Input Object
	AO	Analog Output Object
	AV	Analog Value Object
	BI	Binary Input Object
	BV	Binary Value Object
	DEV	Device Object
	FIL	File Object
	MI	Multi-state Input Object
	MV	Multi-state Value Object
	NP	Network Port Object

3.10 Actuator functions

The following integrated functions are available and can be configured via bus:

Base function	■ Automatic closing point detection ■ Positioning ■ Inversion of the actuating direction ■ Valve exercise function ■ Adjustment of valve characteristics ■ Configuration of hydraulic adjustment values ■ Temperature recording ■ Flushing function ■ Status LED configuration ■ Setting speed configuration ■ End position range
Calculation function	■ Calculation of volume flow rate *1) ■ Calculation of thermal output *1) ■ Calculation of thermal energy *1)
Limitation function	■ Limitation of the return temperature ■ Thermal output limitation *1) ■ Limitation of differential temperature ■ Limitation of actuating signal min/max
Control functions	■ Room or supply temperature control ■ Control of the return temperature ■ Control according to thermal output *1) ■ Differential temperature control
System monitoring	■ Leak detection ■ Operating and malfunction messages ■ Bus monitoring ■ Frost protection and dew point monitor

*1) RBQ40..50 series combination valves required



NOTE

For **configuration information, application examples** and the data point list, refer to manual 3.09-20.370-01 "Configuration and Application Examples MD50-BUS-XX and MD15-BUS-XX".



CAUTION

Some functions are available only once commissioning and bus parameterization are carried out.



NOTE

When using an automation station from the DDC4000 automation system and the BACnet protocol, it should be noted that the counting mode of multistate values in the DDC system (numbering starting with 0) differs from the counting mode of the BACnet values (numbering starting with 1).

For better readability, the term "bus" has been chosen for BACnet and Modbus communication.

3.10.1 Base function

Automatic Valve Stroke Detection

During initialization, the actuator automatically detects the valve stroke.

Positioning

The actuator is operated with continuous control. The control signal (0..100%) can come directly from the bus value. Alternatively, it can result from the control and limiting functions. Further, the control signal can be delivered via the 0..10 V input. The usage of the integrated functions is thus possible even without bus communication.

Alternatively, the actuating signal can be preset via a 0..10V input. The usage of the integrated functions is thus possible even without bus communication.

Inversion of the actuating direction

The actuating direction of the valve can be inverted via the bus. 100 % = open (factory setting) or 100 % = close.

Valve exercise function

The actuator has a valve exercise function that can be switched on and off. The cycle time can be configured via the bus parameterization.

If the value = 0, the function is disabled (factory setting).

The valve exercise feature prevents the cone from jamming when the valve is inactive for a long time.

Adjustment of valve characteristics in combination with RBQ40..50 (COCON QTR40..50) valves

Various valve types with their characteristic curves can be selected via bus parameterization.

With the selection of the valve characteristic curves, the appropriate volume flow limit values for the setting range in l/h are also selected automatically.

Independently of this, it is possible to switch over between a linear, a constant-percentage and an inverted constant-percentage characteristic.

Configuration of hydraulic balancing values

A maximum volume flow rate (hydraulic balancing) can be set for both heating and cooling mode via bus parameterization.

With changeover operation, the bus master specifies the heating or cooling mode for the actuator.

This automatically activates the volume flow rate limit value set for the selected changeover mode as the maximum volume flow rate.

The actuator limits the opening of the valve so that the set maximum volume flow rate (hydraulic balancing) is reached at 100% of the control signal. For this purpose, the maximum stroke position is limited taking into account the selected valve characteristic.

If it is possible to mechanically adjust the volume flow rate at the valve (e.g. RBQxx combo valves), this must be set to the maximum value.

Temperature detection (MD50-BUS only)

The temperatures of the flow and return lines can be detected via two connected temperature sensors and queried via the bus.

Flushing function

The drive has an automatic flushing function. With this function, the valve is fully opened temporarily independently of the hydraulic balancing. The cycle time can be configured using bus parameterization.

When the value is 0, this function is deactivated.

Status LED configuration

The LED status display can be configured as follows:

- Off
- Operating status without bus
- Operating status with bus (factory setting)

Actuating speed configuration

The actuating speed can be configured in 3 steps:

- Fast: 16 s/mm
- Normal: 22 s/mm
- Slow: 28 s/mm

End position range

The end position range can be configured using the bus. In this range of the actuating signal, the actuator always travels to the respective upper or lower end position.

3.10.2 Calculation function

Calculation of the volume flow rate in combination with RBQ40..50 (COCON QTR40..50) valves

In combination with a pressure-independent RBQ40..50 (COCON QTR40..50) valve, 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 the bus.



NOTE

The minimum differential pressure at the valve must be observed. Further information can be found in the product description "RBQ15..32, RBQ40..50 (Cocon QTR DN40..50) and RBQ65..200 (Cocon QFC DN65..200) combo valve" data sheet 3.10-20.000-01.

Calculation of thermal output in combination with RBQ40..50 (COCON QTR40..50) valves (MD50-BUS only)

Based on the calculated volume flow rate and the temperature difference between the flow and return, the current thermal output is calculated and can be queried via the bus.



NOTE

The power is specified without a sign; therefore, a cooling medium (return is warmer than supply) is also displayed as a positive power value.

Energy calculation (MD50-BUS only)

The energy output since the start of operation is calculated on the basis of the thermal output. If the time is set, the energy output since 12:00 a.m. and in the previous 24 hours is also calculated.

3.10.3 Limitation function

Limitation of the return temperature (MD50-BUS only)

The return temperature is limited based on the currently measured return temperature and the limiting value configured via the bus.

In the "heating" change-over mode, if the configured return temperature is exceeded, the limiting value of the volume flow rate is reduced until the limiting value is reached again.

In the "cooling" change-over mode, if the configured return temperature is not reached, the limiting value of the volume flow rate is reduced until the limiting value is reached again.

The sensitivity of the boundary is adjustable.

Limitation of thermal output in combination with RBQ40..50 (COCON QTR40..50) valves (MD50-BUS only)

The thermal output is limited on the basis of the limiting value configured via the bus and the currently calculated instantaneous output.

If the configured maximum thermal output is exceeded, the volume flow rate is reduced until the limiting value is reached again.

The sensitivity of the boundary is adjustable.

Limitation of the differential temperature

The differential temperature is limited on the basis of the limiting value configured via the bus and the currently calculated differential temperature.

If the configured maximum differential temperature is exceeded, the volume flow rate is reduced until the limiting value is reached again.

The sensitivity of the boundary is adjustable.

3.10.4 Control functions

Output control in combination with RBQ40..50 (COCON QTR40..50) valves (MD50-BUS only)

On the basis of the calculated instantaneous thermal output, the system can be regulated to a specified output value.

Room or supply temperature control

The control of the room or supply temperature is based on the setpoint temperature configured via the bus and the transmitted or measured room temperature.

Return temperature control (MD50-BUS only)

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

Differential temperature control (MD50-BUS only)

The differential temperature is controlled on the basis of the differential temperature setpoint configured via the bus and the difference between the two connected temperature sensors.



NOTE

The integrated control functions are limited to the actuator with valve. The bus master receives the control result only as status information.



NOTE

The control parameters must be adapted to each specific plant.

3.10.5 System monitoring

Leak detection (MD50-BUS only)

With the valve closed, a possible internal leak is detected on the basis of the measured values of the flow and return temperatures.

A leak is detected if the temperature difference measured is more than 8 K for at least 6 h when the valve is closed.

Operating and malfunction messages

All the data recorded by the drive can be queried via bus. The condition of the hydraulics can be assessed based on this data and potential faults and failures can be detected early.

If a bus failure is detected, the valve moves to the open position, the closed position or the defined emergency position.

Bus monitoring

Bus failure detection can be parameterized via bus.

If a bus failure is detected, the valve moves to the open position, the closed position or the defined emergency position.

Frost protection and dew point monitor

The actuator offers various options for connecting a frost protection or dew point monitor. When the monitor responds, the actuator moves into a configurable emergency position.

3.11 Sensor and actuator components

3.11.1 Sensors

The analog inputs can be operated with sensors for temperature measurements; see page , sensor types table.

Temperature sensor active

Measuring element	active measuring element KP10; 2.73 V at 0 °C; TC=10 mV/K
Product examples: Contact temperature sensor	■ TAVD
Product examples: Immersion temperature sensor	■ TDE, TDE-10M, TDE-15M, TDE-S3, TDE-S4 and accessories: Z5/TDxx, Z6/TDxx ■ TVDB1..TVDB4, TVDB1-S6..TVDB4-S6 ■ TVD1..TVD4, TVD1-S6..TVD4-S6 ■ TDN1..TDN4, TDN1-S6..TDN4-S6
Product examples: Room temperature sensor	■ TD11..13, TDF12 and TDF13

Temperature sensor, passive

Measuring element	PT1000, NI1000-DIN, NI1000-LG
Product examples: Contact temperature sensor	■ TAV/BW
Product examples: Immersion temperature sensor	■ TV1/BW..TV4/BW, TV1/BW-S6..TV4/BW-S6

3.11.2 Remote actuator with valves

Control signal	DC 0..10 V
Current load	max. 1 mA
Product examples	■ MD15xx, MD50, MD100xx, MD250xx, MD300xx, MF100xx-SR(-Z)(-L), MF100 and MF250 for various valves

4 Actuator/valve combinations

4.1 RBK15..50 three-way/two-way valves with actuator

Application

The red cast iron three-way valves and two-way valves with actuator are used for mixing liquids precisely.

The valves can be used as two-way valves using the BK blank cover on gate B.



4.1.1 Types

Compact red brass three-way valve RBK15..50 can be used for actuator MD50-BUS or MD50BUS-N, for water up to 120 °C, 16 bar

Types	DN	PN	kvs	Δp (bar)	Connec- tion	Weight (kg)
RBK15/0,63	15	16	0.63	12.1	G 1 1/8	1.06
RBK15/1,0	15	16	1.0	12.1	G 1 1/8	1.06
RBK15/1,6	15	16	1.6	12.1	G 1 1/8	1.06
RBK15/2,5	15	16	2.5	12.1	G 1 1/8	1.06
RBK20/4,0	20	16	4.0	9.2	G 1 1/4	1.16
RBK20/6,3	20	16	6.3	9.2	G 1 1/4	1.16
RBK25/6,3	25	16	6.3	5.0	G 1 1/2	1.38
RBK25/8,0	25	16	8.0	5.0	G 1 1/2	1.38
RBK25/10,0	25	16	10.0	5.0	G 1 1/2	1.38
RBK32/10,0	32	16	10.0	3.5	G 2	1.92
RBK32/16,0	32	16	16.0	3.5	G 2	1.92
RBK40	40	16	25.0	1.5	G 2 1/4	2.34
RBK50	50	16	35.0	0.7	G 2 3/4	3.50

Compact gunmetal two-way valve RBK15..50-BK usable for actuator MD50-BUS or MD50-BUS-N, for water up to 120°C, 16 bar

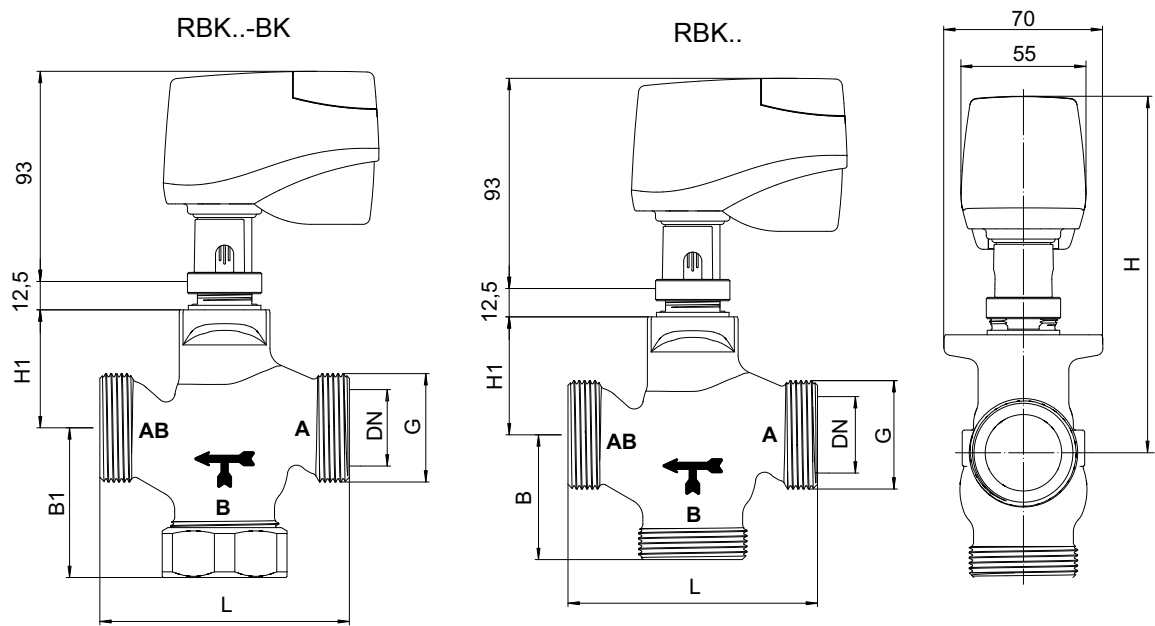
Types	DN	PN	kvs	Δp (bar)	Connec- tion	Weight (kg)
RBK15/0,63-BK	15	16	0.63	12.1	G 1 1/8	1.17
RBK15/1,0-BK	15	16	1.0	12.1	G 1 1/8	1.17
RBK15/1,6-BK	15	16	1.6	12.1	G 1 1/8	1.17
RBK15/2,5-BK	15	16	2.5	12.1	G 1 1/8	1.17
RBK20/4,0-BK	20	16	4.0	9.2	G 1 1/4	1.29
RBK20/6,3-BK	20	16	6.3	9.2	G 1 1/4	1.29
RBK25/6,3-BK	25	16	6.3	5.0	G 1 1/2	1.54

Types	DN	PN	kvs	Δp (bar)	Connec- tion	Weight (kg)
RBK25/8,0-BK	25	16	8.0	5.0	G 1 1/2	1.54
RBK25/10,0-BK	25	16	10.0	5.0	G 1 1/2	1.54
RBK32/10,0-BK	32	16	10.0	3.5	G 2	2.20
RBK32/16,0-BK	32	16	16.0	3.5	G 2	2.20
RBK40-BK	40	16	25.0	1.5	G 2 1/4	2.69
RBK50-BK	50	16	35.0	0.7	G 2 3/4	4.00

4.1.2 Technical Data: RBK..(BK) Valves

Nominal width	DN15..50 (G 1 1/8.. G 2 3/4)	
Pressure rating	PN 16	
Connection	Male thread ISO 228/1	
Characteristic curve	RBK..	Gates A → AB = modified, same percentage up to DN32 Gates A → AB = linear as of DN40 Gates B → AB = linear
	RBK..-BK	Gates A → AB = modified, same percentage up to DN32 Gates A → AB = linear as of DN40
Positioning stroke	10 mm	
Leak rate	in accordance with EN 1349; leakage class I; 0.05% from Kvs value	
Medium temperature	0..+120 °C	
Housing	Gunmetal, CC491K	
Cone	Brass CW614N	
Valve spindle	CrMo steel 1.4021	
Stem seal	EPDM O-rings, maintenance-free	
Pipe connections	Female thread fittings and	
	GTW union nuts (malleable iron, yellow chromated)	
Blank cover	GTW union nut (malleable iron, yellow chromated)	
	Steel gasket, yellow chromated	

4.1.3 Dimensions



RBK.. -BK design (two-way valve) with blank cover on gate B

DN	H1	B	B1	L	H	G
15	46	55	65	80	152	G 1 1/8
20	46	55	65	90	152	G 1 1/4
25	52	55	66	110	158	G 1 1/2
32	56	55	67	120	162	G 2
40	65	60	72	130	171	G 2 1/4
50	65	65	77	150	171	G 2 3/4
Dimensions H1 to H in mm, connection threads G in inches						

4.1.4 Accessories (not included in delivery)

RBK15..50-BK two-way valves require 2 fittings and RBK15..50 three-way valves require 3 fittings.

- Z210 Female thread fitting DN15
- Z211 Female thread fitting DN20
- Z212 Female thread fitting DN25
- Z213 Female thread fitting DN32
- Z214 Female thread fitting DN40
- Z215 Female thread fitting DN50

4.2 RBQ40..50 (Cocon QTR40..50) combo valves with actuator

Application

The two-way combo valves with actuator are used to adjust the volume flow rate and automatically regulate the flow rate regardless of the differential pressure (hydraulic balancing).

The combo valve is used in air conditioning, cooling and heating systems, e.g. central heating systems, floor heating systems, fan coil systems, cooling ceilings and fan convectors.



4.2.1 Types

Red cast iron RBQ40..50 combo valves (Cocon QTR40..50) can be used for MD50-BUS or MD50-BUS-N actuator, for water up to 120 °C, 16 bar

Type	DN	PN	Volume flow rate range [l/h] min*..max	kvs	Control range [kPa]	Connection	Weight [kg]
RBQ40 (QTR DN40 1146172)	40	16	1500..7500	11.5	20..400	Size 1 3/4	10.0
RBQ50 (QTR DN50 1146174)	50	16	2500..10000	15.0	20..400	Size 2 3/8	13.0

* Recommended lowest setting value; using the actuator, the flow rate can be reduced from the setting value to shut-off.



NOTE

Z223 mounting kit required (see accessories on page 11).



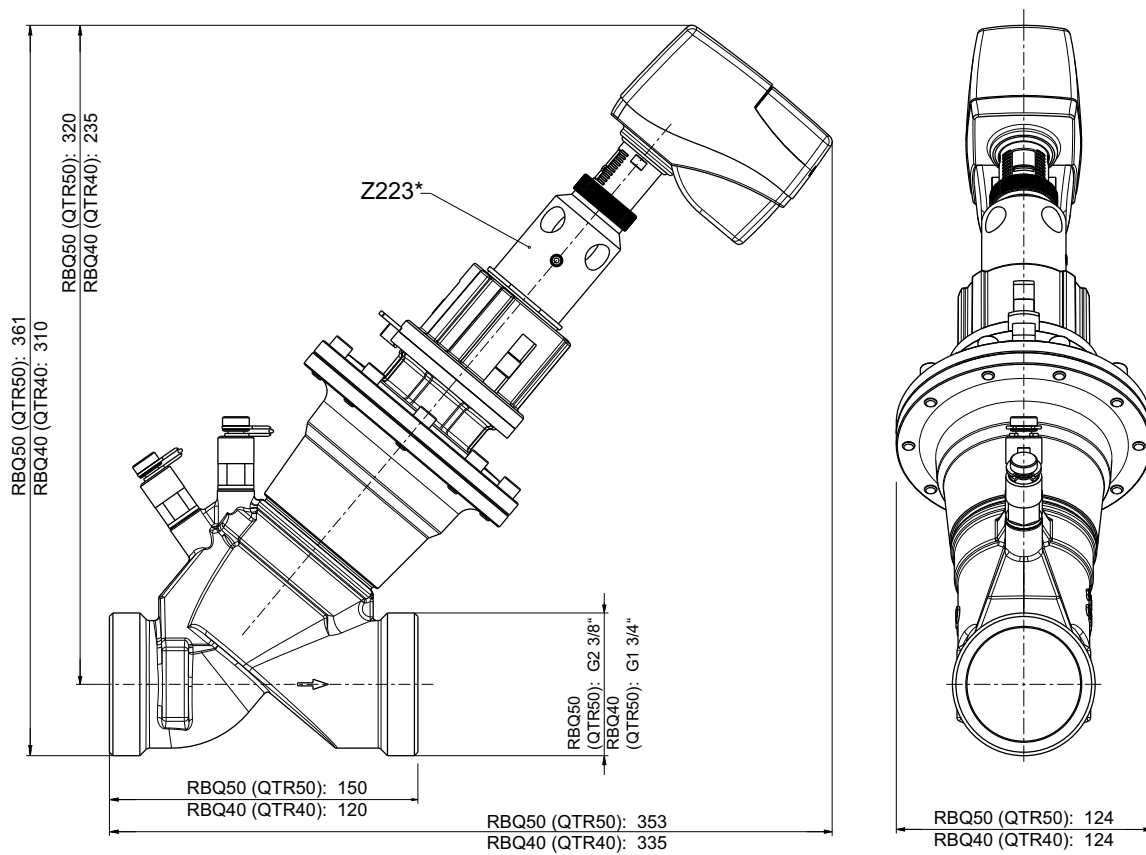
NOTE

Detailed descriptions of the technical data, function, volume flow setting and dimensions for the RBQ combo valves can be found in the RBQ15..200 product description, doc. no. 3.10-20.000-01.

4.2.2 Technical data for RBQ40..50

Medium temperature	-10..+120 °C
Max. operating pressure	16 bar (1600 kPa)
Max. differential pressure	4 bar (400 kPa)
Leak rate	0.01% of kvs
Positioning stroke	10 mm
Medium	Water or ethylene/propylene glycol-water mixtures (max. 50%, pH value 6.5..10)
Housing	Gunmetal, male thread on both sides
Seals	Made of EPDM or PTFE

4.2.3 Dimensions



Z223* adapter accessory for RBQ40..50

5 Mounting

5.1 Valve mounting



CAUTION

The valve may only be installed by qualified technicians. In addition to the generally valid installation guidelines, the following points are to be observed:

- Any protective caps on the valve gates should be removed before assembling the valves.
- No grease or oil may be used during assembly because these could destroy the valve seals.
- The pipeline system and the interior of the fitting must be free of foreign objects, particles of dirt, and grease and oil residues. Rinse them out if necessary.
- There must be no tension between the fixture and the pipeline connection.
- To avoid eddy formations in the valve body, the valve should be installed in a straight section of the pipe. A distance of 10 times the nominal diameter is recommended between the valve flange and manifold or other similar parts.
- The installation location is to be selected so that the ambient temperature at the actuator is kept between 0 °C and +50 °C.
- If the operating medium is contaminated, a strainer must be installed in the supply pipe. For maintenance purposes, we recommend to install shut-off valves both upstream and downstream of the valve or plant section.
- During installation, observe the maximum permitted differential pressure Δp .
- Note that a free space of 150 mm above the valve is required for mounting the actuator and removing the connection cover.
- Observe the direction of flow arrow on the valve body. Inverting the direction of flow impairs control behavior.
- Differential pressure must not occur on the valve body. Close the gate valve and turn off pumps.
- Screw the valve connections onto the pipelines.

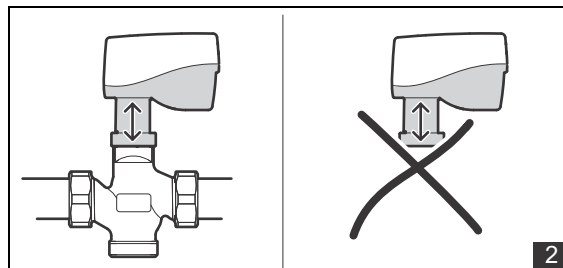
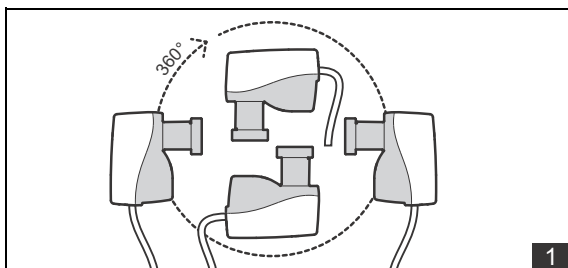
5.2 Mounting the actuator on the valve

Preparatory tasks

Perform the following preparatory tasks to mount the actuator on a valve in a plant that is in operation:

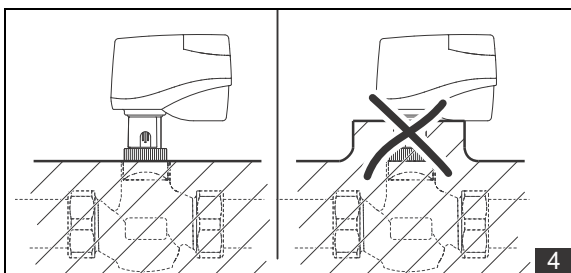
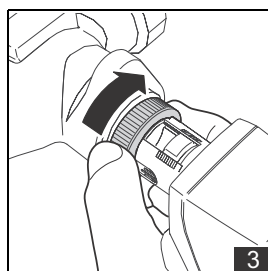
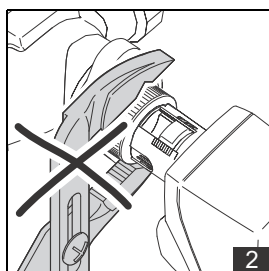
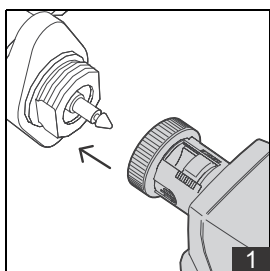
- ▶ Before starting the tasks, ensure that there is no buildup of differential pressure in the valve body.
 - ▶ Close the gate valve and turn off pumps.
- ▶ Allow the valve and pipelines to cool down.

Installation instructions



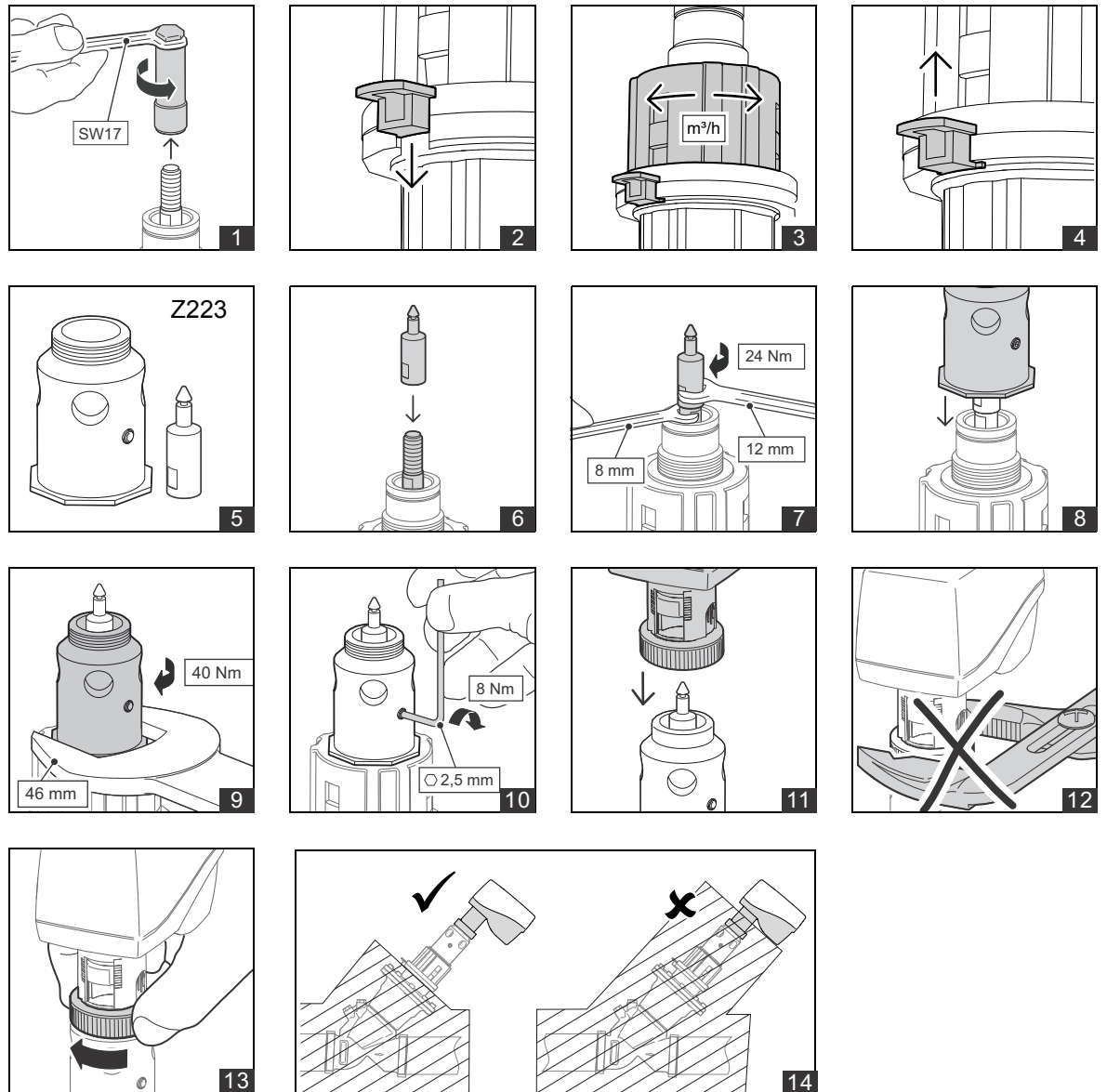
- ▶ **1** Any actuator installation positions in which the cabling runs downward are permitted.
- ▶ **2** CAUTION! Do not operate the actuator without a valve.

5.2.1 Mounting the actuator on an RBK15..50 valve



- ▶ **1** Place the actuator onto the valve.
- ▶ **2** CAUTION! Do not use a pipe wrench. This may damage the actuator and valve.
- ▶ **3** Tighten the union nut by hand.
- ▶ **4** In the case of system-side insulation, ensure that the flange of the actuator remains clear and is not covered.

5.2.2 Mounting the actuator with Z223 onto a RBQ40..50 (Cocon QTR40..50) valve



- ▶ **1** Remove the adjustment sleeve of the valve using a 17 mm open-end wrench.
- ▶ **2** Push the locking clip down.
- ▶ **3** Adjust the setpoint of the maximum volume flow rate to the desired value by turning the hand-wheel.
- ▶ **4** Push the locking clip up. This locks the setting.
- ▶ **5** Z223 adapter
- ▶ **6** Install the spindle adapter (part of Z223).
- ▶ **7** Tighten the spindle adapter with a tightening torque of 24 Nm using a 12 mm open-end wrench. While doing so, hold the spindle in place with an 8 mm open-end wrench.
- ▶ **8** Install the valve adapter (part of Z223).
- ▶ **9** Tighten the valve adapter with a tightening torque of 40 Nm using a 46 mm open-end wrench.

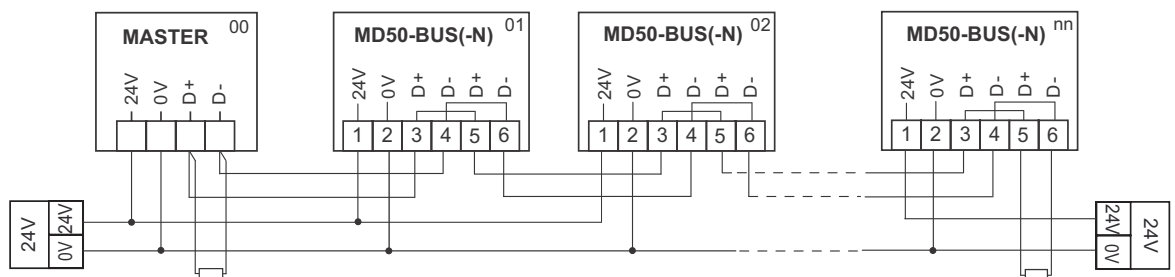
- ▶ **10** Secure the valve adapter: Tighten the grub screw with a tightening torque of 8 Nm using a 2.5 mm hexagon socket.
- ▶ **11** Set the actuator onto the threaded connection on the adapter.
- ▶ **12** CAUTION! Do not use a pipe wrench. This may damage the actuator and valve.
- ▶ **13** Tighten the union nut by hand.
- ▶ **14** In the case of system-side insulation, ensure that the flange of the actuator remains clear and is not covered.

6 Connecting the actuator and putting it into operation

6.1 Notes on wiring

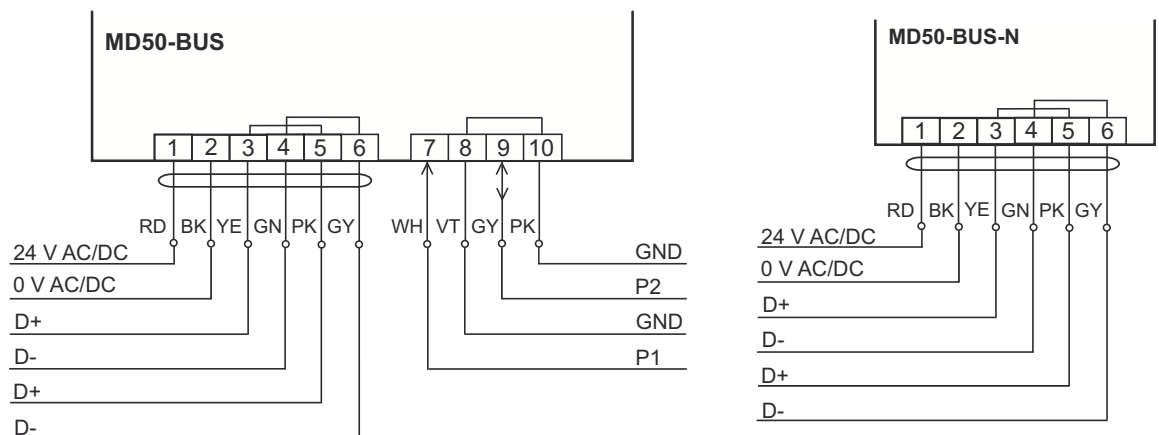
- Use twisted pair shielded connection cables.
- The network must have a linear topology (not a star topology). Avoid stub lines to ensure optimal signal quality. If you cannot avoid stub lines from a wiring standpoint, stub lines with a line length of up to 2 m are permissible.
- A 120 ohm terminating resistor must be installed between the two data lines (D+ and D-) at the beginning and end of the communication line.
- To improve the signal quality, activate a bias network on the bus master.
- When wiring the bus line, ensure that the polarity of the D+ and D- signals is not accidentally switched between the participants within the bus topology. Reverse polarity leads to a communication failure in the entire bus.
- The MD50-BUS(-N) actuator represents a bus load of 1/8 unit load in the network.

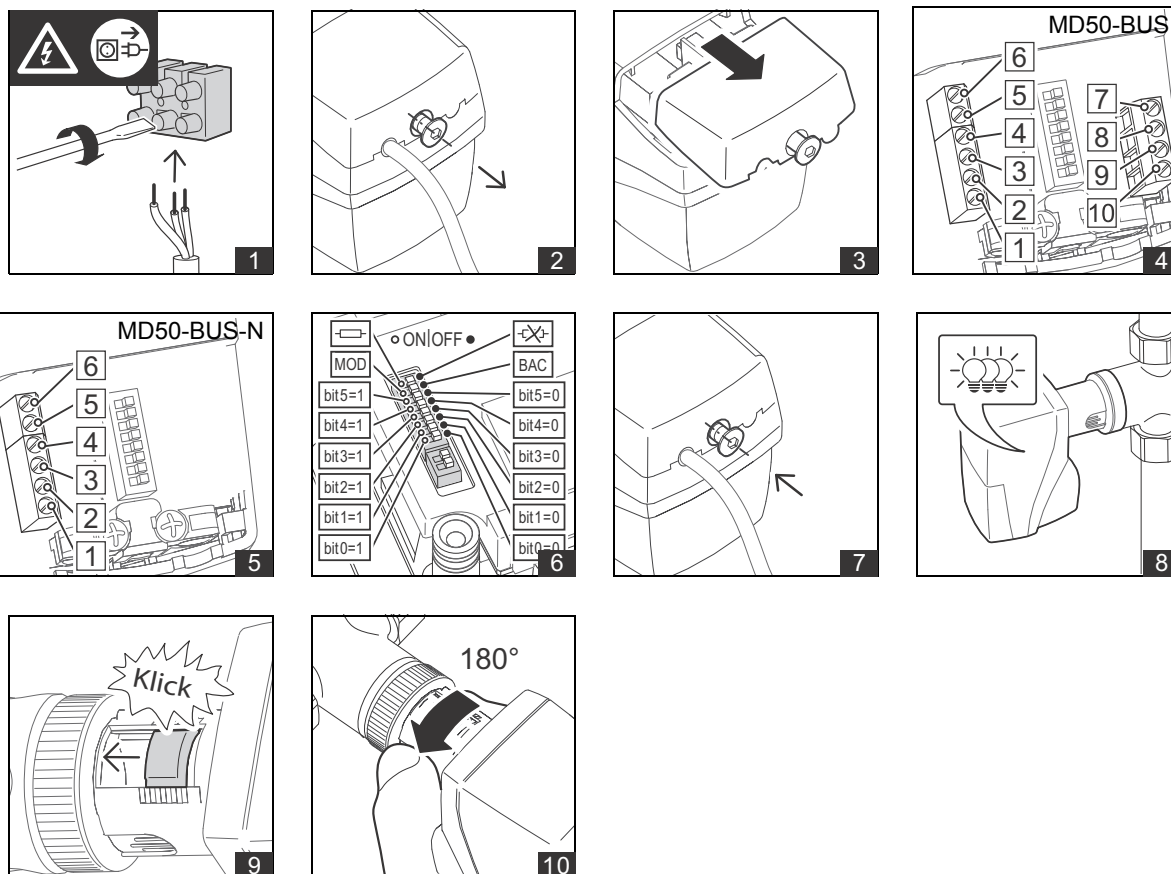
Bus topology



6.2 Electrical installation

Wiring diagram





- ▶ **1** Carry out the electrical connection of the actuator as a fixed installation.
- ▶ **2 3** Remove the inspection cover.
- ▶ **4 5** Refer to the circuit diagram.
- ▶ **6** Set the bus address with switches 1 to 6 and set the bus protocol with switch 7 (see p. 33).
- ▶ **7** After the mounting and commissioning work is complete, fit the inspection cover.
- ▶ **8** Switch on the operating voltage. The LED flashes green.
- ▶ **9** An automatic initialization run and valve adaptation is performed. The actuator will not respond to the control signal until the initialization run is complete and the bus interface has been commissioned.
- ▶ **10** Once the assembly and commissioning work is complete, protect the automatic coupling system with the dust protection cap.

6.3 Setting the address



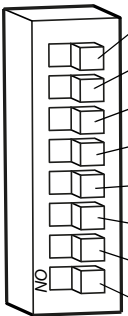
CAUTION

Do not use any conductive tools to press the switches.

You adapt the actuator configuration with switches 1 to 8.

The switches are located under the inspection cover in the center.

During initial commissioning, the actuator performs an initialization run even if the address is 0.

Function switch position ON	Switches (2)	Function switch position OFF (factory setting)
Terminating resistor active		Terminating resistor inactive
Modbus protocol		BACnet MS/TP protocol
Bit 5 = 1		Bit 5 = 0
Bit 4 = 1		Bit 4 = 0
Bit 3 = 1		Bit 3 = 0
Bit 2 = 1		Bit 2 = 0
Bit 1 = 1		Bit 1 = 0
BIT 0 = 1		BIT 0 = 0

Switches 1 to 6: bus address setting

The six switches are used to set the address in binary form. The valid address range is 1 to 63. A valid address must be set even if the actuator will be operated without bus communication.

BIT 5 [32]	BIT 4 [16]	BIT 3 [8]	BIT 2 [4]	BIT 1 [2]	BIT 0 [1]	Address
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
0	0	0	1	0	0	4
0	0	0	1	0	1	5
0	0	0	1	1	0	6
0	0	0	1	1	1	7
0	0	1	0	0	0	8
0	0	1	0	0	1	9
0	0	1	0	1	0	10
0	0	1	0	1	1	11
0	0	1	1	0	0	12
:	:	:	:	:	:	:
1	1	1	1	1	1	63



CAUTION

Each address may be assigned only once.

In a Modbus network, the Modbus master always occupies the address 00.

All devices on a network must use the same Bus protocol. The common use of BACnet and Modbus devices in a common network is not permitted.

If the address 63 is set, an address in the range 63..127 (BACnet) or 63..247 (Modbus) can be configured via the BUS interface.



CAUTION

For address entries >127 (BACnet) or >247 (Modbus), the value is rejected and the previously set address remains in effect.

If invalid address inputs < 63, the address is set to DIP switch position 63.



NOTE

Until revision 1.09

When the address switches or the bus switch are changed over, a new initialization drive is triggered and the configuration of the actuator is reset. The baud rate is reset to the default value of 38400/8-N-2 (Modbus) or 38400/8-N-1 (BACnet).

To change the bus address or bus protocol without resetting the configuration of the actuator, the switches must be switched over with the power supply switched off.



NOTE

From revision 1.10

The reset occurs only when the actuator is switched on with the address 0 set.

Switch 7: selects the Bus protocol. OFF = BACnet, ON = MODBUS

Switch 8: set 120 ohm terminating resistor to active or inactive

A 120 ohm terminating resistor must be activated/installed between the two data lines (D+ and D-) at the beginning and end of the bus.

After the bus address has been set, an automatic initialization run takes place.

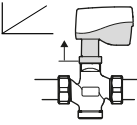
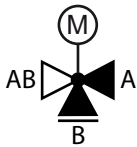
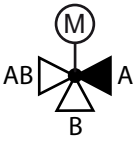
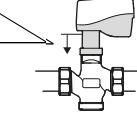
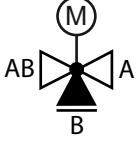
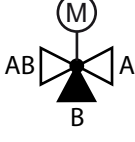
The actuator will not respond to the control signal until the initialization run is complete and the bus interface has been commissioned.



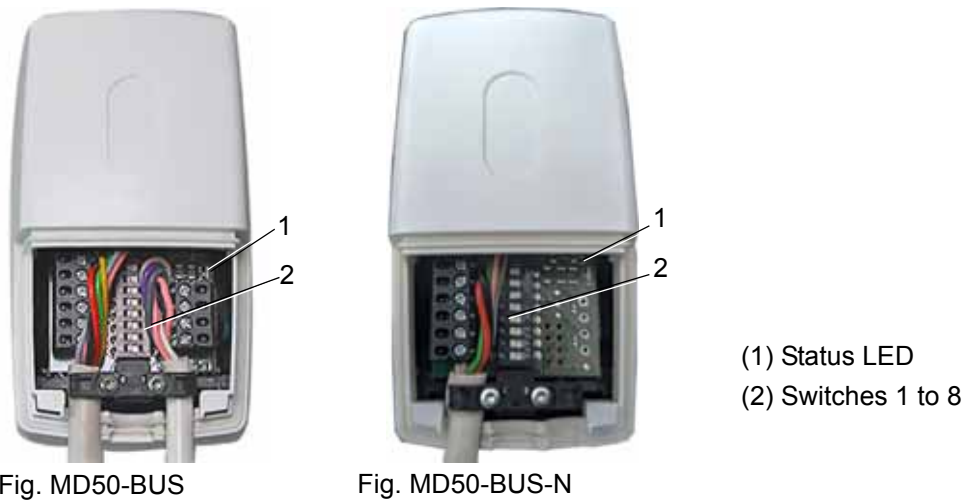
NOTE

The unique BACnet device ID is already defined and is listed on the type plate of every device. However, the device ID can be changed via the bus.

Flow directions:

Actuating direction	Two-way valve		Three-way valve
	RBQ..	RBK-BK..	RBK..
Bus control valve spindle retracting 			
Bus control valve spindle extending 			
 = open  = closed  = sealed at the flange			

6.4 Status LED



The status LED is located under the inspection cover above the right side of the terminal and indicates the operating status of the actuator.
The status LED is still visible when the inspection cover is closed.



NOTE
Status LED can be configured via Bus:

- Off
- Operating status without Bus
- Operating status with Bus

Meaning	Configuring the status LED		
	Off	Operating status without bus	Operating status with bus
Normal operation	Off	constant green	constant green
Assembly position	Off	Fast flashing green	Fast flashing green
Initialization run	Off	Flashing green	Flashing green
Bus communication	Off	--	Flickering green
Spindle manual adjustment extended	Off	Flashing yellow	Flashing yellow
Valve adaptation error	constant red	constant red/ Flashing yellow	constant red/ Flashing yellow
Valve block failure	constant red	constant yellow	constant yellow
Operating voltage interrupted	Off	Off	Off

6.5 Manual mode



WARNING

Hot and cold surfaces!

If a hardware or software error occurs, there may be unexpected movements and the valve may open. There is a risk of severe burns or hypothermia from contact with hot or cold surfaces on the valves and pipelines.

- ▶ Wear protective gloves

When the voltage supply is switched on and the mounting position is set (switch setting 0, switches 1 to 6 are all set to OFF), the spindle is fully retracted.

In this state, the valve can be closed and opened manually using a magnet.

BIT 5 [32]	BIT 4 [16]	BIT 3 [8]	BIT 2 [4]	BIT 1 [2]	BIT 0 [1]
0	0	0	0	0	0



Spindle extended:

- ▶ Bus address 0 (default setting) must be set on the actuator.
The actuator moves to the mounting position.
Status LED: rapidly flashing green
- ▶ Briefly run the magnet (1) along the right side of the actuator.
The actuator fully extends the spindle.
Status LED: flashing yellow

Spindle retracted:

- ▶ Briefly run the magnet (1) along the right side of the actuator again.
The actuator fully retracts the spindle (mounting position).
Status LED: rapidly flashing green

Opening and closing the valve can be repeated as often as necessary.



NOTE

The function for closing or opening the valve can be triggered again only once the valve has reached the respective end position. The time span depends on the valve.



NOTE

The actuator moves to the end positions without power in manual mode. There may be a leak on the valve.



NOTE

To ensure that the actuator functions correctly, we recommend rewriting the relevant parameters cyclically (e.g. AV1/reg. 400 External actuating signal). When using the DDC4000 automation system, you can use the H033 object "Heartbeat" function to do so.

6.6 Revision history

Minor optimizations - New from revision 1.10

Topic	Description
Resolution AI18 changed	The value is now provided with a decimal point.
Resetting Xp and Tn with controllers	When switching modes, the Xp and Tn values of each controller are not lost. A short-term switch into the operating mode "off" is thereby possible. Internally, Xp/Tn are stored individually for each controller. When switching, the internal values are restored.
Backup&Restore	Download and upload settings via BACnet Backup&Restore process. The settings are device-independent and do not include: - Device ID - MAC address - Valve initialization data - BACnet object texts Among other things, Yabe supports the Backup&Restore function.
Storage of temperature values	A cyclic buffer storage of the temperature values: Supply temperature, return temperature and space temperature are stored together with the log data regularly every 60 minutes. When the device is turned on, this snapshot is then restored once.
Temperature offset	The offset of the sensor value for P1 (125/AV6) and P2 (128/AV7) can now be set in the range between -10 and +10 K (previously 5 to +5 K)
Flushing timer	After the start of the flushing cycle, the timer is restarted directly until the next start - a drift is thus eliminated.
Communication failure	In the event of a communication failure, you can now additionally switch to YIN at P1 or P2 - setting via parameter 133/MV6.

6.7 BACnet-specific configuration

Setting the device ID

The new device ID is active immediately.

The device ID of the actuator can be configured. The object identifier in the device object can be described for this purpose.

Configuration of the MAX master address

The MAX master value specifies the highest MAC address that the actuator uses to search for additional bus participants in the local BACnet MS/TP network. Reducing the MAX master can reduce unnecessary bus communication. Note that the MAC address of all bus participants must be less than or equal to the configured MAX master address.

The MAX master address can be configured both in the device object (DEV1) and in the network port object (NP1). The default value of the MAX master address is 127.

Example: Participants with the MAC addresses 1, 5, and 10 exist in the BACnet MS/TP network. The MAX master address can be reduced to the value 10.

Configurable object identifier

The descriptions of the following objects can be configured:

Object		Property
DEV1	Device	Identifier
DEV1	Device	Name
DEV1	Device	Location
NP1	Network Port	Description
BI1	Binary Input	Description
BI2	Binary Input	Description
AI2	Analog Input	Description
AI3	Analog Input	Description

7 Faults and remedial measures



WARNING

Hot and cold surfaces!

If a hardware or software error occurs, there may be unexpected movements and the valve may open. There is a risk of severe burns or hypothermia from contact with hot or cold surfaces on the valves and pipelines.

- ▶ Wear protective gloves

Error	Cause	Remedy
No actuator control in automatic mode	Power failure	▶ Identify and correct the cause.
	Actuator is incorrectly connected	▶ Check and correct the connection.
	Operating voltage too high or too low	▶ Measure the operating voltage. Compare with type plate and technical data.
	Bus communication interrupted	▶ Check and correct the connection.
Actuator runs unstably	Voltage drop because the electrical connection line is too long and/or the cross section is too small	▶ Measure the operating voltage. Recalculate and replace the connection lines.
	Mains fluctuations greater than the permitted tolerance	▶ Improve the mains conditions.
Actuator stops intermittently	Bus communication has a loose connection	▶ Check and tighten the connections on the terminal strip.
	Supply line has a loose connection	▶ Check and tighten the connections on the terminal strip.
Sensor values are incorrect	Supply line interrupted	▶ Check and correct the connection.
Volume flow calculation is incorrect	Differential pressure on the valve is too low	▶ Ensure the minimum differential pressure
Actuator does not move to the end position; valve does not close or open	Valve jams	▶ Ensure that the valve moves freely or replace the valve.
	Differential pressure is too high	▶ Set the differential pressure correctly.

8 Maintenance

Maintenance

The actuator does not require maintenance.

Cleaning

The actuator does not require cleaning.



NOTE

Regular inspection of the plant, including functional testing of the actuator, is recommended.

9 Repair

At the installation location, the valve/actuator combination can only be repaired by replacing the valve or actuator. Get in touch with your contact at Kieback&Peter.

10 Decommissioning, disassembly and disposal

10.1 Shut down the actuator and dismount

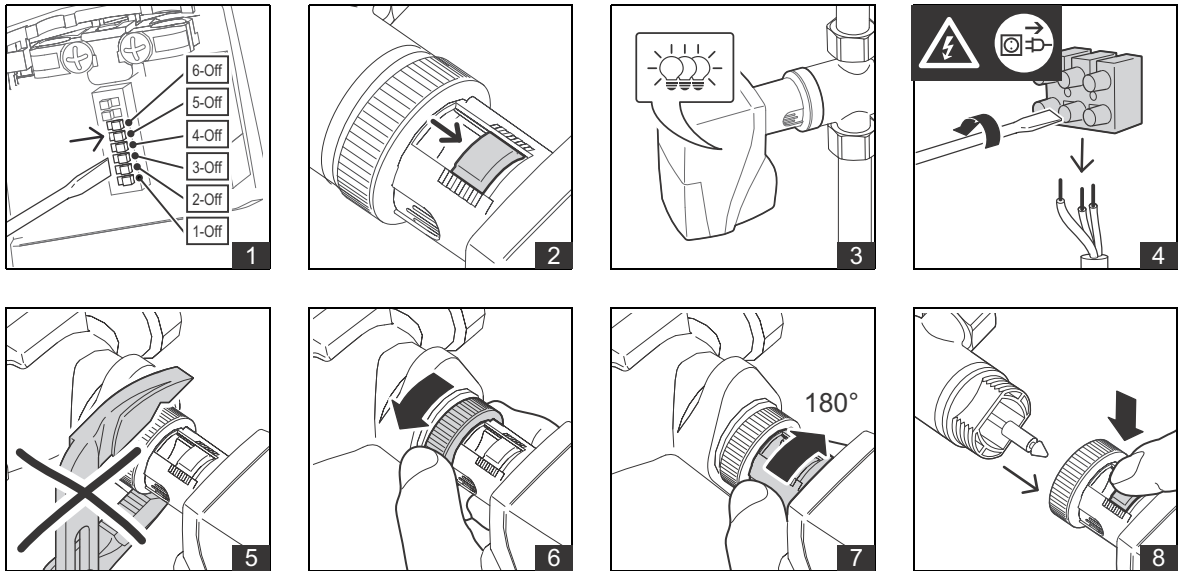


WARNING

Hot and cold surfaces!

If a hardware or software error occurs, there may be unexpected movements and the valve may open. There is a risk of severe burns or hypothermia from contact with hot or cold surfaces on the valves and pipelines.

- ▶ Wear protective gloves



- ▶ **1** Set addressing to 0 (switches 1 to 6 to OFF).
- ▶ **2** It may take up to 3 minutes for the drive spindle to move to the upper end position. The runtime depends on the valve. The actuator is now in the assembly position.
- ▶ **3** The LED is blinking green quickly.
- ▶ **4** Disconnect the actuator from the power supply and remove all electrical cables.
- ▶ **5** CAUTION! Do not use a pipe wrench. This may damage the actuator and valve.
- ▶ **6** Loosen the union nut.
- ▶ **7** Turn the dust cover far enough so that you can press the safety button.
- ▶ **8** Press the safety button on the automatic coupling all the way in and hold it. Remove the actuator from the valve.

10.2 Removing the valve

- ▶ No differential pressure must occur on the valve body. Close the gate valve and turn off pumps.
- ▶ Loosen the screw fittings between the pipeline and the valve connections.
- ▶ Remove the valve from the pipeline.

10.3 Notes on disposal

In accordance with the applicable laws and directives of the European Union countries, the product should not be disposed of with household waste. This ensures environmental protection and sustainable recycling of raw materials. Commercial users should contact their supplier and observe the conditions of the purchase agreement. This device may not be disposed of together with other commercial waste.

11 Contact persons

Orders and questions

If you want to submit an order, have questions or require technical information, please contact your Kieback&Peter contact person.

Repair service

If your device has a defect, contact your Kieback&Peter contact person to clarify how to proceed.

12 Declaration of conformity

EN



EU-DECLARATION OF CONFORMITY

Kieback&Peter GmbH & Co. KG
Tempelhofer Weg 50
12347 Berlin / Germany

Authorized Representative for Documentation:
Lydia Bruchno / Eva Franke

declares in sole responsibility that the designated product

Actuator

MD50-BUS

in combination with the valves of the series

RBK15..50, RBQ40..50

to which this declaration refers, corresponds to the requirements which are stipulated in the following European directives:

- 2006/42/EG Directive Machinery
- 2014/35/EU Low Voltage Directive
- 2014/30/EU electromagnetic compatibility
- 2011/65/EU Restriction of certain Hazardous Substances

Harmonised standards applied:

DIN EN 60730-2-14: 2019-10
DIN EN ISO 12100: 2011-03

Signed for and on behalf of:

(ppa. Philipp Menzel)
Managing Director
Product & Solutionmanagement

(ppa. Rainer Mahling)
Managing Director
Solution & Support Center

Berlin,
01/06/26



EU-DECLARATION OF CONFORMITY

Kieback&Peter GmbH & Co. KG
 Tempelhofer Weg 50
 12347 Berlin / Germany

Authorized Representative for Documentation:
 Lydia Bruchno / Eva Franke

declares in sole responsibility that the designated product

Actuator

MD50-BUS-N

in combination with the **valves** of the series

RBK15..50, RBQ40..50

to which this declaration refers, corresponds to the requirements which are stipulated in the following European directives:

- **2006/42/EG** Directive Machinery
- **2014/35/EU** Low Voltage Directive
- **2014/30/EU** electromagnetic compatibility
- **2011/65/EU** Restriction of certain Hazardous Substances

Harmonised standards applied:

DIN EN 60730-2-14: 2023-03
 DIN EN ISO 12100: 2011-03

Signed for and on behalf of:

Berlin,
 01/06/26

(ppa. Philipp Menzel)

Managing Director
 Product & Solutionmanagement

(ppa. Rainer Mahling)

Managing Director
 Solution & Support Center

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