



TROXNETCOM

Functional module MB-BAC-WA1/2

For the control of up to two fire damper actuators

For use with module WA1/B3-AD230 or WA1/B3-AD

For use in EIA-485 networks (Modbus RTU und BACnet MS/TP)



TROX[®] TECHNIK

The art of handling air

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Translation of the original

A00000057215, 1, GB/en

08/2018

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1 General

About this manual

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

Functional module MB-BAC-WA1/2

This manual is intended for use by fitting and installation companies, in-house technicians, technical staff, instructed persons, and qualified electricians or air conditioning technicians.

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.

This manual must be given to the system owner when handing over the system. The system owner must include the manual with the system documentation. The manual must be kept in a place that is accessible at all times.

Illustrations in this manual are mainly for information and may differ from the actual design.

Symbols used in this manual

Safety notes

Symbols are used in this manual to alert readers to areas of potential hazard. Signal words express the degree of the hazard.

Comply with all safety instructions and proceed carefully to avoid accidents, injuries and damage to property.

DANGER!

Imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

Potentially hazardous situation which, if not avoided, may result in death or serious injury.

CAUTION!

Potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE!

Potentially hazardous situation which, if not avoided, may result in property damage.

ENVIRONMENT!

Environmental pollution hazard.



Tips and recommendations



Useful tips and recommendations as well as information for efficient and fault-free operation.





Specific safety notes

The following symbols are used in safety notes to alert you to specific hazards:

Warning signs	Type of danger
	Warning – high-voltage.
	Warning – danger zone.

Additional markers

In order to highlight instructions, results, lists, references and other elements, the following markers are used in this manual:

Marker	Explanation
 1., 2., 3. ...	Step-by-step instructions
	Results of actions
	References to sections in this manual and to other applicable documents
	Lists without a defined sequence
[Switch]	Operating elements (e.g. push buttons, switches), display elements (e.g. LEDs)
'Display'	Screen elements (e.g. buttons or menus)

Limitation of liability

The information in this manual has been compiled with reference to the applicable standards and guidelines, the state of the art, and our expertise and experience of many years.

The manufacturer does not accept any liability for damages resulting from:

- Non-compliance with this manual
- Incorrect use
- Operation or handling by untrained individuals
- Unauthorised modifications

The actual scope of delivery may differ from the information in this manual for special constructions, additional order options or as a result of recent technical changes.


Copyright

This document, including all illustrations, photos, etc., is protected by copyright.

Any use of this document without the written consent of the manufacturer is an infringement of copyright; this applies in particular to disclosing this document to third parties, to publishing, copying, microcopying, or translating content, and to saving content on electronic systems or modifying it.

Violators will be held liable for any damage. We reserve the right to make further claims.

Replacement parts

 **WARNING!**

Safety risk due to incorrect replacement parts

Incorrect or faulty replacement parts may affect the safety of people and cause damage to property or even total failure of the system.

If you intend to use a replacement part that has not been approved by TROX, make sure beforehand that it is safe to use.

Buy replacement parts from TROX or from an authorised supplier. See the address on page 2.

Defects liability

For details regarding defects liability please refer to Section VI, Warranty Claims, of the Delivery and Payment Terms of TROX GmbH. The Delivery and Payment Terms of TROX GmbH are available at www.troxtechnik.com.

Customer service

TROX Technical Service

To ensure that your request is processed as quickly as possible, please keep the following information ready:

- Product name
- TROX order number
- Delivery date
- Brief description of the fault

Online	www.troxtechnik.com
Phone	+49 2845 202-400

2 Safety

Dangers and risks

! NOTICE!

Risk of damage to the module due to incorrect installation of the EIA-485 network cable!

If several modules are connected to one EIA-485 cable, overvoltage transients that result from phase shifts may damage the modules beyond repair. Be sure to follow the instructions in *Chapter 7.3 'Installing the EIA-485 network' on page 11.*

! NOTICE!

Risk of damage to property due to large temperature differences

If any electronic components have been kept in an unheated area, condensation may form and damage the electronic components beyond repair.

- Before you start commissioning, make sure that all devices have warmed up to ambient temperature. Only after about 2 hours will the system have reached room temperature.

! NOTICE!

Risk of damage to property due to electrostatic charge

Electrostatic charge can damage the electronics.

- Avoid skin contact with any components or printed circuits.
- Touch an equipotentially bonded metal surface before you touch any printed circuit boards.
- Wear conductive footwear and antistatic clothing.

! NOTICE!

Risk of damage to property due to foreign matter and liquids!

Foreign matter and liquids that get into the unit may damage the electronic parts.

- Do not use any liquids for cleaning.
- Remove foreign matter, if any.
- If the device emits a smell or smoke, have it checked by the manufacturer.
- If liquid gets into the module, let the module completely dry before commissioning.

! NOTICE!

Risk of damage to property!

Over tightening the fixing screws may damage the casing.

- Tighten the screws only hand-tight.

Correct use

Functional module MB-BAC-WA1/2 is used to monitor and control motorised fire dampers in EIA-485 networks. MB-BAC-WA1/2 can be used for one or two fire dampers. Connecting a second fire damper requires connection module WA1/B3-AD or WA1/B3-AD230. The dampers then have to be fitted with a suitable 24 V AC/DC actuator (TROX or Belimo).

Incorrect use

Do not use the functional module for areas of application that are not described in this manual.

Do not use the functional module:

- outdoors
- in wet areas
- in areas with potentially explosive atmospheres

Qualified staff



WARNING!

Danger of injury due to insufficiently qualified individuals!

Incorrect use may cause considerable injury or damage to property.

- Only skilled qualified personnel must carry out work.

The following degrees of qualification are required for the work described in the operating manual:

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.

3 Transport and installation

Supply package

Check delivered items immediately after arrival for transport damage and completeness.

Properly dispose of packaging material.

Supply package

MB-BAC-WA1/2

Installation and commissioning manual

Transport

- If possible, take the functional module in its transport packaging up to the installation location.
- Do not remove the protective wrapping until just before installation.

Storage

For temporary storage please note:

- Leave the product in its packaging and do not expose it to the effects of weather.
- Store the product in a dry place and away from direct sunlight.
- Temperature -10 °C to $+70\text{ °C}$, humidity 90% max. (no condensation)

4 Structure and functional description

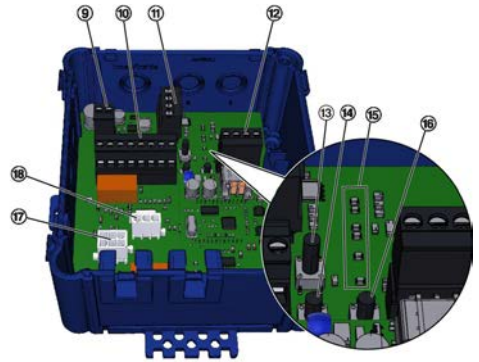


Fig. 1: Functional module MB-BAC-WA1/2

- ① Cover
- ② Rating plate
- ③ LED description (LEDs ⑮)
- ④ Casing
- ⑤ Removable side parts
- ⑥ Fixing lugs
- ⑦ Cable entry points (actuator)
- ⑧ Cover fixing
- ⑨ Terminal block for the FireChain relay

- ⑩ Terminal block for wiring a second fire damper using connection module WA1/B3-AD or WA1/B3-AD230
- ⑪ Terminal block for supply voltage, input/output
- ⑫ Terminal block for connection to the EIA-485 network
- ⑬ 'Test' push button
- ⑭ 'Service' push button
- ⑮ LEDs
- ⑯ 'Reset' push button
- ⑰ Plug base for the limit switches on the fire damper actuator
- ⑱ Plug base for the supply voltage to the fire damper actuator

Push buttons on the main PCB

Push button	Function
Test	Starts a functional test for the damper: The damper is moved from the 'Normal' position to the 'Fire' position and back to the 'Normal' position.
Service	Sends the neuron ID for system integration
Reset	Reboot

LEDs on the main PCB

Display	Description	LED	State
Damper 1	Relay with change-over contact for fire damper 1	Green	Relay open
		Red	Relay closed
Damper 2	Relay with NO contact for fire damper 2 (with connection module WA1/B3-AD or WA1/B3-AD230)	Green	Relay open
		Red	Relay closed
FireChain	FireChain relay (NO contact)	Yellow	Relay closed

Display	Description	LED	State
Service	Operating status	Yellow	Status
Operation	LEDs	Green	Ready

Functional description

Functional module MB-BAC-WA1/2 is used to monitor and control motorised fire dampers in EIA-485 networks. MB-BAC-WA1/2 can be used for one or two fire dampers. A second fire damper has to be connected with connection module WA1/B3-AD or WA1/B3-AD230. The suitability for use with smoke control dampers has not been demonstrated.

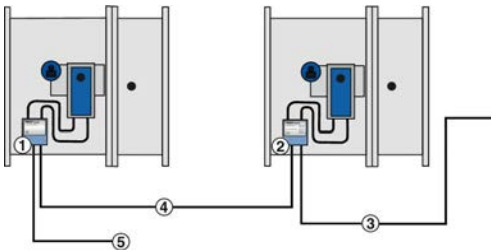


Fig. 2: Supply voltage 230 V AC

- ① WA1/B3-AD230, ready for connection to 24 V AC actuators
- ② MB-BAC-WA1/2, ready for connection to 24 V AC actuators
- ③ EIA-485 FTT twisted pair
- ④ 8-wire cable
- ⑤ Supply voltage 230 V AC

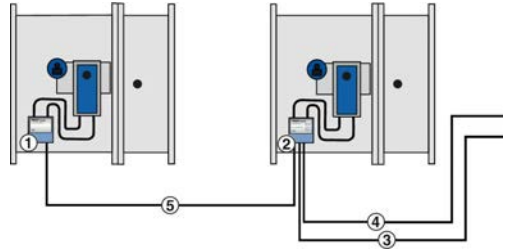


Fig. 3: Supply voltage 24 V AC

- ① WA1/B3-AD
- ② MB-BAC-WA1/2
- ③ 24 V AC supply voltage connection
- ④ EIA-485 FTT twisted pair
- ⑤ 6-wire cable

Safe positions

In case of an error, the following safe positions apply, based on VDMA sheet 24200-1 (Automated fire protection and smoke extract systems):

- Fire damper - Closed
- Smoke control damper - Last position is maintained

5 Technical data

Supply voltage	20 – 28 V AC/DC, 50/60 Hz
Power consumption without actuators	3.12 VA or 1.32 W
Max. switch rating for Damper 1 relay (24 V AC)	120 VA (5 A resistive load)
Max. switch rating for Damper 2 relay (24 V AC)	144 VA (6 A resistive load)
Max. switch rating for Fire-Chain relay	AC: 1500 VA (250 V AC; 6 A resistive load)
EIA-485 interface	4 terminals, LON; FTT free topology
Operating temperature	+10 to +60 °C
Relative humidity (no condensation)	< 95%
IEC protection class (safety-low voltage)	III
Protection level	IP 54
Dimensions (B × L × H)	135 × 135 × 65 mm
Weight	0.130 kg
Software application	xif/apb-files under www.trox.de

Terminals

Supply voltage	Rising clamp terminals, for 0.08 – 2.5 mm ²
Connection module WA1/B3-AD or WA1/B3-AD230	Max. switch rating 5 A with 24 V AC/DC
EIA-485 network	Rising clamp terminals, for 0.08 – 2.5 mm ²
FireChain signal	Rising clamp terminals, for 0.08 – 1.5 mm ²
Actuator end positions	AMP-Mate-N-Lok socket, 6-pole
Supply voltage for actuator	AMP-Mate-N-Lok socket, 3-pole

6 Installing the functional module

Depending on the order, the functional module is shipped as follows:

- Mounted onto the fire damper (mounting bracket)
- As a separate device for retrofitting

Retrofitting

If you retrofit a functional module for a fire damper, you can choose any installation location; in the event of a fire, the damper blade will be moved to its safe position (closed) even if the module fails. We recommend you to use the TROX universal mounting bracket for fixing the module to a wall, for example.

Installation

Fix the functional module on at least two fixing lugs, e.g. with screws.

7 Wiring

Safety notes

Personnel:

- Skilled qualified electrician



DANGER!

Danger of death due to electric current!

Danger of electric shock! Do not touch any live components!

- Switch off the supply voltage and secure it against being switched on accidentally before working on the unit.
- Ensure that no voltage is present.
- Work on the electrical system must only be carried out by skilled qualified electricians.



CAUTION!

Malfunction due to incorrect wiring

For wiring please note:

- Do not connect the 24 V supply voltage if the WA1/B3-AD230 supply voltage has already been connected.
- Do not connect 24 V AC and 24 V DC supply voltage at the same time.

Notes on wiring

Use only cables that are designed for the supply voltage for which they will be used. The length and cross section as well as any contact resistance may increase voltage losses. The power rating of each unit must also be considered. A skilled qualified electrician has to select the correct cable types and sizes. This job must only be carried out by specialist electrical companies.

- For the electrical connection comply with any applicable regulations and follow the code of good practice. Be sure to comply with the applicable guidelines for working on electrical and electronic equipment as well as with any applicable local regulations.
- For electrical connection data refer to the 'Technical data' chapter.
- Protect any connections from physical damage.
- Feed cables through the cable entry points into the casing. Feeding the cable may be easier if you pull out the side parts of the casing.

Installing the EIA-485 network

If several modules are connected to one EIA-485 cable, the modules could become damaged beyond repair. This may happen if the secondary winding of the transformers that supply voltage to the modules have been connected to the earth; the EIA-485 cable to which the modules are connected is fairly long, and the transformers are supplied with voltage by different phases. The EIA-485 bus cables are usually used for 0 V to 5 V. The communication modules can even be used with -13 V to +13 V without becoming damaged. If, however, several phases are used, possible phase shifts between these phases may lead to voltages of up to 67 V (!) on the bus cable, which will eventually destroy the modules.

For the correct installation of an EIA-485 network please note:

- When you connect a module to a 2-wire bus (EIA-485), use an additional wire for equipotential bonding to divert currents caused by different potentials and prevent them from affecting the two data wires.
- Do not connect the secondary winding to the earth, if at all possible.
- If you use only one phase to supply voltage to the entire system, the additional wire for equipotential bonding is not required.

- If you use several phases to supply voltage to the system, take precautions to avoid the over-voltage transients described above. For example, you could use power supply units with so called "floating potentials". For systems in which each power supply unit has to be connected to the earth for some reason, you can use a commercially available repeater in the bus cable for galvanic isolation.
- If there are any sources of disturbance in the system that could affect the bus communication, use shielded cables.
- Designing and making earth connections have to be performed by others.

Voltage supply for a limited number of modules

If the supply voltage is 24 V AC/DC, you must not connect more than two MB-BAC-WA1/2 modules with the double stack terminals as otherwise the load current on the PCB and the terminals will become too high.

Polarity of the power supply

Be sure to maintain the correct polarity when you wire up modules to a 24 V DC supply.

Strain relief

Use a wire clamping bracket or other type of strain relief (by others) for all cables.

Terminal connections

MB-BAC-WA1/2

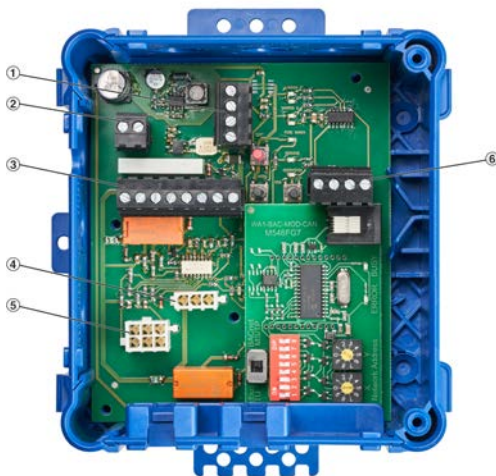


Fig. 4: MB-BAC-WA1/2

- 1 Connection for the supply voltage
- 2 FireChain relay
- 3 Actuator for 2nd fire damper
- 4 Plug base for fire damper actuator supply voltage
- 5 Plug base for the fire damper actuator limit switch
- 6 EIA-485 network

Connection of the supply voltage (Fig. 4/1)

Terminal	Used for	Description
+	+ 24 V AC	Do not connect the supply voltage for MB-BAC-WA1/2 if the supply voltage is provided by connection module WA1/B3-AD230.
-	- 24 V AC	
+	+ 24 V AC	
-	- 24 V AC	

Connection of the FireChain relay (Fig. 4/2)

Terminal	Description
13	The relay can be used to switch off a ventilation system, for example.
14	

Connection of the actuator for the 2nd fire damper (Fig. 4/3)

Terminal	Used for	Description
1	24 V	Control input signal for fire damper 2
2	0 V	Output, control signal for fire damper 2
3	24 V	Input, limit switch for fire damper 2
4	0 V	CLOSED position of fire damper 2
5	24 V	Input, limit switch for fire damper 2
6	0 V	OPEN position of fire damper 2
7	+ 24 V AC	Supply voltage for MB-BAC-WA1/2 when connection module WA1/B3-AD230 is being used
8	- 24 V AC	

Connection of the EIA-485 network (Fig. 4/6)

Terminal	BAC-net	Modbus
NA	BUS +	DI
NB	BUS -	DO
NA	BUS +	DI
NB	BUS -	DO

Connection of data cables

MB-BAC-WA1/2 has terminals for two EIA-485 data bus cables.

- Strip the insulation from the bus cable (at least two wires), insert the bare wires into the terminals and tighten the screws by hand.
- Make sure that the polarity of the conductor pairs is correct. Incorrect polarity will result in inverted data signals and hence communication errors.

- Support the bus cables with a wire clamping bracket or other strain relief (by others).
- A maximum of 32 units can be operated on one network segment.
- To avoid cable reflections, network segments must be terminated at both ends with 120 Ω bus terminal resistors.

WA1/B3-AD230



Fig. 5: WA1/B3-AD230

- ① Plug base for limit switches on the actuator for fire damper 2
- ② Plug base for the supply voltage to the actuator of fire damper 2
- ③ Connection of MB-BAC-WA1/2
- ④ Connection of 230 V AC supply voltage; double terminals for looping through

Connection of MB-BAC-WA1/2 (Fig. 5/③)

Terminal WA1/B3-AD230	Terminal MB-BAC-WA1/2	Used for
1	1	Input, control input signal for fire damper 2
2	2	

Terminal WA1/B3-AD230	Terminal MB-BAC-WA1/2	Used for
3	3	Signal output for damper blade position CLOSED
4	4	
5	5	Signal output for damper blade position OPEN
6	6	
7	7	24 V AC supply voltage for MB-BAC-WA1/2
8	8	

Connection of MB-BAC-WA1/2 with 8-wire cable.

Connection of supply voltage (Fig. 5/④)

Terminal	Used for	Description
1	L	Supply voltage 230 V AC
2	N	
3	PE	

WA1/B3-AD

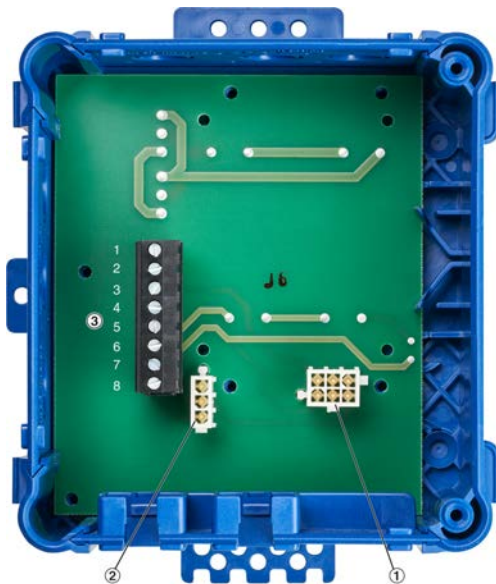


Fig. 6: WA1/B3-AD

- ① Plug base for limit switches on the actuator for fire damper 2
- ② Plug base for the supply voltage to the actuator of fire damper 2
- ③ Connection of MB-BAC-WA1/2

Connection of MB-BAC-WA1/2 (Fig. 5/③)

Terminal WA1/B3-AD230	Terminal MB-BAC-WA1/2	Used for
1	1	Input, control input signal for fire damper 2
2	2	
3	3	Signal output for damper blade position CLOSED
4	4	
5	5	Signal output for damper blade position OPEN
6	6	
7	–	Not used
8	–	

Connection to MB-BAC-WA1/2 with 6-wire cable.

8 Commissioning the functional module

Configuration

Before you use MB-BAC-WA1/2 as a BACnet or Modbus interface module, you have to configure it to the actual application. To do so, use the switches on the interface module.



Fig. 7: MB-BAC-WA1/2

- 1 Switches to set the network addresses, 01-99
- 2 DIP switch to set communication parameters
- 3 Switch to select BACnet MS/TP or Modbus RTU protocol

Setting the protocol type

Use the slide switch to select either BACnet MS/TP or Modbus RTU. When you change the protocol, an initialisation procedure starts after about 1 s.

Setting the network address

Use the two switches X and Y to set a network address between 01 and 99. Address 00 is reserved for broadcast mode. A maximum of 32 devices (network addresses) can be operated on one network segment. Each device requires a unique network address. When you change the protocol, an initialisation procedure starts after about 1 s.

Settings for BACnet

Transmission speed

BACnet	S2	S3
9600 Bd	Off	Off
19200 Bd	On	Off
38400 Bd	Off	On
76800 Bd	On	ON

Settings for Modbus

Transmission speed

Modbus	S2	S3
9600 Bd	Off	Off
19200 Bd	On	Off
38400 Bd	Off	On
57600 Bd	On	ON

Setting parity

Parity	S5	S6
None	Off	Off
None	On	Off
Odd	Off	On
Even	On	ON

9 Removal and disposal

Removal

If the device is no longer used, it has to be removed and disposed of in an environmentally friendly manner.

1. ▶ Remove the mains cable.
2. ▶ Remove any other cables.

Disposal

If no return or disposal agreement is in place, any disassembled components should be recycled:

- ▶ Have electronic waste and electronic components disposed of by an approved specialist disposal company.

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Appendix

A BACnet interface

A.1 BACnet objects

BACnet-Objekte

Test

Mit diesem Objekt wird ein Testlauf gestartet, gestoppt und gemeldet.
Dabei werden alle Klappen erst in die sichere und danach in die normale Position gebracht.
Der Testlauf endet für die Klappen sofort, bei denen ActuDrive1...2 in sicherer Position ist.
Werte: No_Test_Active (0), Test_Active (1), Grundeinstellung 0.

FireChain

Mit diesem Objekt wird die Stellung des Fire-Chain-Relais gemeldet.
Werte: Relay_Off (0), Relay_On (1).

Damper1...2

Mit diesem Objekt wird die Betriebsart des jeweiligen Kanals eingestellt.
Je nach Betriebsart sind die dafür verwendeten BACnet-Objekte sichtbar oder unsichtbar.
Werte:

Inactive (1)	keine Klappe angeschlossen, Werkseinstellung
Motorized_Damper (2)	motorbetriebene Klappe
Limit_Switches_Open_and_Closed (3)	mechanische Klappe mit Auf- und Zu-Endschalter
Only_Limit_Switch_Open (4)	2 mechanische Klappen nur mit Auf-Endschalter
Only_Limit_Switch_Closed (5)	2 mechanische Klappen nur mit Zu-Endschalter

SafetyPos1...2

Nur bei Betriebsart Motorized_Damper.
Mit diesem Objekt wird die sichere Klappenstellung im Fehlerfall vorgegeben. Damit wird zwischen Brandschutzklappe (close) und Entrauchungsklappe (open) unterschieden.
Werte: open (1), close (2), Werkseinstellung 2.

ActuDrive1...2

Nur bei Betriebsart Motorized_Damper.
Mit diesem Objekt wird die Klappenstellung gesteuert.
Werte: open (1), close (2), Grundeinstellung nach Reset ist Gegenteil von SafetyPos1...2.

ActuPos1...2

Betriebsarten Motorized_Damper und Limit_Switches_Open_and_Closed:
Mit diesem Objekt wird die Klappenstellung rückgemeldet.
Die Rückmeldung kommt von Endschaltern AUF1, ZU1, AUF2, ZU2 (Schließer).
Bei Änderung des Zustands sind COV-Meldungen möglich.
Werte: open (1), close (2), running (3).

Betriebsarten Only_Limit_Switch_Open und Only_Limit_Switch_Closed:
Mit diesem Objekt wird die Klappenstellung rückgemeldet.
Die Rückmeldung kommt von Endschaltern an den Eingängen AUF1, AUF2 (Schließer-Kontakt bei Only_Limit_Switch_Open, Öffner-Kontakt bei Only_Limit_Switch_Closed).
Bei Änderung des Zustands sind COV-Meldungen möglich.
Werte: open (1), close (2).

ActuPos1a...2a

Betriebsarten `Only_Limit_Switch_Open` und `Only_Limit_Switch_Closed`:

Mit diesem Objekt wird die Klappenstellung rückgemeldet.

Die Rückmeldung kommt von Endschaltern an den Eingängen `ZU1`, `ZU2`

(Schließer-Kontakt bei `Only_Limit_Switch_Open`, Öffner-Kontakt bei `Only_Limit_Switch_Closed`).

Bei Änderung des Zustands sind COV-Meldungen möglich.

Werte: `open` (1), `close` (2).

Alarm1...2

Mit diesem Objekt werden Fehlerzustände gemeldet. Der erste Fehlercode (2...7) bleibt gespeichert, bis er beseitigt ist, erst danach ist eine andere Fehlermeldung möglich.

Die Werte und das Rücksetzen von Fehlern werden unten beschrieben.

Bei Änderung des Zustands sind COV-Meldungen möglich.

Werte bei Betriebsart `Motorized_Damper`:

`OK` (1), `System_Error` (2), `Runtime_Error` (3), `Manipulation` (4), `Update_Error` (5), `Alarm` (6).

Werte bei Betriebsart `Limit_Switches_Open_and_Closed`:

`OK` (1), `Manipulation` (4), `Alarm` (6).

Werte bei Betriebsarten `Limit_Switches_Open` und `Limit_Switches_Closed`:

`OK` (1), `Alarm` (6) bei Eingängen `AUF1`, `AUF2`, `Alarm_a` (7) bei Eingängen `ZU1`, `ZU2`.

`Alarm` (6) hat Priorität vor `Alarm_a` (7), falls beide Klappen in Alarm-Position sind.

DriveTime1...2

Nur bei Betriebsart `Motorized_Damper`.

Mit diesem Objekt wird die Maximaldauer des Öffnens der Klappe eingestellt.

Bei Zeitüberschreitung wird der Alarm `Runtime_Error` gemeldet.

Beim Wert 0 ist die Zeitmessung abgeschaltet.

Werte: 0...6553,4 Sekunden, Auflösung 0,1 Sekunden, Werkseinstellung 240 Sekunden.

TurnOffTime1...2

Nur bei Betriebsart `Motorized_Damper`.

Mit diesem Objekt wird die Maximaldauer des Schließens der Klappe eingestellt.

Bei Zeitüberschreitung wird der Alarm `Runtime_Error` gemeldet.

Beim Wert 0 ist die Zeitmessung abgeschaltet.

Werte: 0...6553,4 Sekunden, Auflösung 0,1 Sekunden, Werkseinstellung 35 Sekunden.

RcvHrtBtl...2

Nur bei Betriebsart `Motorized_Damper`.

Mit diesem Objekt wird die Maximaldauer zwischen Schreibzugriffen auf `ActuDrive1...2`

eingestellt. Bei längeren Pausen wird der Alarm `Update_Error` gemeldet.

Beim Wert 0 ist die Zeitmessung abgeschaltet.

Werte: 0...6553,4 Sekunden, Auflösung 0,1 Sekunden, Werkseinstellung 0 Sekunden.

COV-Meldungen bei BACnet

Die Änderung des Werts von von Multistate-Value-Objekten kann mit Change-Of-Value-Meldungen (COV) gemeldet werden.

COV wird für die Objekte ActuPos1...2, ActuPos1a...2a und Alarm1...2 eingesetzt. Das Erzeugen der Meldungen muss mit dem Dienst Subscribe-COV beauftragt werden. Es sind bestätigte und unbestätigte Meldungen möglich. Für den Parameter Lifetime sind die Werte 0...65535 Sekunden möglich.

Adressen der Modbus-Register

Die Bezeichnungen und Zwecke der Register sind gleich wie bei BACnet, siehe oben. Die Register werden innerhalb von 100ms ausgelesen und aktualisiert.

Adresse	Bezeichnung	Werte * Auflösung Einheit
0...1	Damper1...2	1...5
2...3	SafetyPos1...2	1...2
4...5	ActuDrive1...2	1...2
6...7	ActuPos1...2	1...3
8...9	ActuPos1a...2a	1...2
10...11	DriveTime1...2	0...65534 * 0,1 s
12...13	TurnOffTime1...2	0...65534 * 0,1 s
14...15	RcvHrtBt1...2	0...65534 * 0,1 s
16...17	Alarm1...2	1...7
18	Test	0...1 (bei Write gilt Bit 0)
19	FireChain	0...1

Erkennung von Fehlern

Es gibt 4 Fehlerquellen, die als Alarmcode in den Alarm-Objekten gemeldet werden und teilweise zu einer automatischen Steuerung der Brandschutzklappe führen.

System_Error (Betriebsart Motorized_Damper)

Die Relaiskontakte sind mit Polyswitch-Sicherungen 0,5A geschützt. Diese werden bei Überlast hochohmig und stellen sich automatisch zurück, wenn die Überlast beseitigt und der Haltestrom unterschritten wird.

Wenn die Sicherung hochohmig wird, wird dieser Fehler gemeldet. Außer der Fehlermeldung gibt es keine weiter gehende Fehlerbehandlung, der Schaltzustand des Relais wird nicht beeinflusst.

Mögliche Ursachen: Motor defekt, Leitung zum Motor kurzgeschlossen.

Runtime_Error (Betriebsart Motorized_Damper)

Die Zeit, während der die Klappe sich öffnet oder schließt, kann gemessen werden. Wenn die erlaubte Dauer überschritten wird, wird dieser Fehler gemeldet.

Die Zeitmessung mit DriveTime1...2 beginnt, wenn das Relais eingeschaltet wird (Klappe öffnen), und endet, wenn die Endschalter die Position AUF melden.

Die Zeitmessung mit TurnOffTime1...2 beginnt, wenn das Relais ausgeschaltet wird (Klappe schließen), und endet, wenn die Endschalter die Position ZU melden.

Die 2 Zeitmessungen sind mit dem Wert 0 einzeln abschaltbar.
Ein Fehler bleibt gespeichert, das Relais schaltet dann in die sichere Stellung.

Mögliche Ursachen: Klappe klemmt, Endschalter defekt, Eingang für Endschalter defekt, Kabel zum Endschalter unterbrochen, Kabel zum Motor unterbrochen, Motor defekt.

Manipulation (Betriebsart Motorized_Damper und Limit_Switches_Open_and_Closed)

Wenn beide Endschalter gleichzeitig eingeschaltet sind, wird dieser Fehler gemeldet.
In ActuPos1...2 wird gleichzeitig der Wert running gemeldet.
Ein Fehler bleibt gespeichert, das Relais wird dann ausgeschaltet.

Mögliche Ursachen: Endschalter defekt, Eingang für Endschalter defekt, Kabel zum Endschalter kurzgeschlossen.

Update_Error (Betriebsart Motorized_Damper)

Das Zeitintervall von Schreibzugriffen auf ActuDrive1...2 kann überwacht werden. Wenn die erlaubte Dauer (RcvHrtBt1...2) überschritten wird, wird dieser Fehler gemeldet.
Die Überwachung startet auch, wenn der Fehler rückgesetzt wird oder RcvHrtBt ungleich 0 wird.
Die Zeitmessung ist mit dem Wert 0 abschaltbar.
Ein Fehler bleibt gespeichert, das Relais schaltet dann in die sichere Stellung.

Mögliche Ursachen: Gegenstelle am Bus außer Betrieb, Busverbindung unterbrochen (z.B. Kabel, Repeater, Switch).

Mehrere gleichzeitige Fehler

Auch wenn bei einem Kanal mehrere Fehler gleichzeitig vorliegen, erfolgt ausschließlich die Fehlerbehandlung für den zuerst erkannten Fehler. Erst wenn dieser bestätigt und rückgesetzt worden ist, kann wieder ein anderer Fehler erkannt werden.

Fehlermeldungen

Der Multistate-Value Alarm1...2 dient zum Melden von Fehlern (Wert 2...5) oder der Fire-Position (Wert 6...7, hat Priorität). Damit wird der Alarm angezeigt, der als erster aufgetreten ist. Der Alarm kann rückgesetzt werden, indem OK (Wert 1) in das Objekt geschrieben wird. Innerhalb 100ms nach dem Schreiben endet die Fehlerbehandlung. Ab jetzt können wieder andere Fehler angezeigt werden.

Fehler	OK	System_Error	Runtime_Error	Manipulation	Update_Error	Alarm	Alarm_a
Wert	1	2	3	4	5	6	7

Endschalter

An den Klemmen werden die Endschalter folgendermaßen angeschlossen:

Klemme	Betriebsarten Motorized_Damper, Limit_Switches_Open_and_Closed (jeweils Schließer-Kontakt)	Betriebsarten Only_Limit_Switch_Open (Schließer-Kontakt), Only_Limit_Switch_Closed (Öffner-Kontakt)
AUF1	Klappe 1 auf	Klappe 1
ZU1	Klappe 1 zu	Klappe 1a
AUF2	Klappe 2 auf	Klappe 2
ZU2	Klappe 2 zu	Klappe 2a

Die Betriebsarten Only_Limit_Switch_Open und Only_Limit_Switch_Closed unterscheiden sich nur im Namen und sind sonst völlig identisch. Bei offener Klappe ist der Kontakt geschlossen.

Fire-Position

Die Fire-Position wird je nach Betriebsart von den Endschaltern abgeleitet.

Betriebsart	Fire-Position wenn
Motorized_Damper, SafetyPos = close	Klappe nicht AUF
Motorized_Damper, SafetyPos = open	Klappe nicht ZU
Limit_Switches_Open_and_Closed	Klappe nicht AUF
Only_Limit_Switch_Open	min. 1 Klappe nicht AUF
Only_Limit_Switch_Closed	min. 1 Klappe ZU

Fire-Chain-Relais

Das Fire-Chain-Relais, das Fire-Chain-Objekt und die Fire-Chain-LED werden miteinander angesteuert:

- Wenn weder ein Alarm noch eine Fire-Position besteht, dann ist das Fire-Chain-Relais eingeschaltet und die LED leuchtet.
- Wenn ein Alarm oder eine Fire-Position besteht, dann sind das Fire-Chain-Relais und die LED ausgeschaltet.

Brandschutzklappe (Motorized_Damper, SafetyPos1...2 = close)

Abhängig von Test-Zustand, Alarm-Reset, Fire-Position, ActuDrive1...2 und dem Fehlerzustand ist das Relais folgendermaßen geschaltet (Auswertung von oben nach unten):

sonstiges	ActuDrive1...2	Alarm1...2	Relais1...2
Alarm-Reset	open (1)	OK (1)	Ein
Test sicher	open (1)	beliebig	Aus
Test normal	open (1)	beliebig	Ein
Fire-Position	beliebig	beliebig	Aus
-	beliebig	Runtime Error (3)	Aus
	beliebig	Update Error (5)	Aus
	beliebig	Manipulation (4)	Aus
	open (1)	System Error (2)	Ein
	close (2)	System Error (2)	Aus
	open (1)	OK (1)	Ein
	close (2)	OK (1)	Aus

Initialisierung nach dem Einschalten / Zurücksetzen:

ActuDrive wird auf open gesetzt. Alarm wird auf OK gesetzt. Der Alarm-Reset startet, um die Selbsthaltung über Fire-Position im sicheren Zustand zu unterbrechen.

Entrauchungsklappe (Motorized_Damper, SafetyPos1...2 = open)

Abhängig von Test-Zustand, Alarm-Reset, Fire-Position, ActuDrive1...2 und dem Fehlerzustand ist das Relais folgendermaßen geschaltet (Auswertung von oben nach unten):

sonstiges	ActuDrive1...2	Alarm1...2	Relais1...2
Alarm-Reset	close (2)	OK (1)	Aus
Test sicher	close (2)	beliebig	Ein
Test normal	close (2)	beliebig	Aus
Fire-Position	beliebig	beliebig	Ein
-	beliebig	Runtime Error (3)	Ein
	beliebig	Update Error (5)	Ein
	beliebig	Manipulation (4)	Aus
	open (1)	System Error (2)	Ein
	close (2)	System Error (2)	Aus
	open (1)	OK (1)	Ein
	close (2)	OK (1)	Aus

Initialisierung nach dem Einschalten / Zurücksetzen:

ActuDrive wird auf close gesetzt. Alarm wird auf OK gesetzt. Der Alarm-Reset startet, um die Selbsthaltung über Fire-Position im sicheren Zustand zu unterbrechen.

Betriebsarten ohne Relais

In Betriebsart Inactive ist das Relais eingeschaltet.

In Betriebsart Limit_Switches_Open_and_Closed, Only_Limit_Switch_Open und Only_Limit_Switch_Closed ist das Relais ausgeschaltet.

A.2 BACnet protocol

BACnet Protocol Implementation Conformance Statement

Date: 11.04.2014
Vendor Name: TROX GmbH
Product Name: MB-BAC-WA1B3
Product Model Number:
Application Software Version: 1.0
Firmware Revision: 1.0
BACnet Protocol Revision: 12

Product Description:

Controller with Fire Smoke Damper Application providing a BACnet MS/TP Interface.

BACnet Standardized Device Profile (Annex L):

- BACnet Operator Workstation (B-OWS)
- BACnet Advanced Operator Workstation (B-AWS)
- BACnet Operator Display (B-OD)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K):

Data Sharing-ReadProperty-B (DS-RP-B)
 Data Sharing-WriteProperty-B (DS-WP-B)
 Data Sharing-COV-B (DS-COV-B)
 Device Management-Dynamic Device Binding-B (DM-DDB-B)
 Device Management-Dynamic Object Binding-B (DM-DOB-B)
 Device Management-DeviceCommunicationControl-B (DM-DCC-B)
 Device Management-ReinitializeDevice-B (DM-RD-B)

Segmentation Capability:

- Able to transmit segmented messages Window Size _____
- Able to receive segmented messages Window Size _____

Standard Object Types Supported:

An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: No
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: No
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning
- 7) List of any property range restrictions

Data Link Layer Options:

- BACnet IP, (Annex J)
- BACnet IP, (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) _____
- MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
- MS/TP slave (Clause 9), baud rate(s): _____
- Point-To-Point, EIA 232 (Clause 10), baud rate(s): _____
- Point-To-Point, modem, (Clause 10), baud rate(s): _____
- LonTalk, (Clause 11), medium: _____
- BACnet/ZigBee (ANNEX O)
- Other: _____

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) Yes No

Networking Options:

- Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
- Annex H, BACnet Tunneling Router over IP
- BACnet/IP Broadcast Management Device (BBMD)
 - Does the BBMD support registrations by Foreign Devices? Yes No
 - Does the BBMD support network address translation? Yes No

Network Security Options:

- Non-secure Device - is capable of operating without BACnet Network Security
- Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
 - Multiple Application-Specific Keys:
 - Supports encryption (NS-ED BIBB)
 - Key Server (NS-KS BIBB)

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ISO 10646 (UTF-8) IBM™/Microsoft™ DBCS ISO 8859-1
- ISO 10646 (UCS-2) ISO 10646 (UCS-4) JIS X 0208

Default strings implemented in the objects use UTF-8.
 Default strings can be restored by writing an empty string.

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

Configuration Switches

Hexadecimal Switches X, Y	Network-Address
---------------------------	-----------------

DIP Switch 2	OFF	ON	OFF	ON
DIP Switch 3	OFF	OFF	ON	ON
Baudrate	9600	19200	38400	76800

Device Object

Property	Remark / Value	RW
Object_Identifier	device, default instance: 32900 + Address Switch	RW-E
Object_Name	max. 63 Bytes, default "MB-BAC-WA1B3"	RW-E
Object_Type	DEVICE (8)	R
System_Status	OPERATIONAL (0)	R
Vendor_Name	"TROX GmbH"	R
Vendor_Identifier	329	R
Model_Name	"MB-BAC-WA1B3"	R
Location	max. 63 Bytes, default ""	RW-E
Description	max. 127 Bytes, default ""	RW-E
Firmware_Revision	"1.0"	R
Application_Software_Version	"1.0"	R
Protocol_Version	1	R
Protocol_Revision	12	R
Protocol_Services_Supported	read-property, write-property, subscribe-cov, who-has, who-is, device-communication-control, reinitialize-value	R
Protocol_Object_Types_Supported	DEVICE, ANALOG_VALUE, BINARY_VALUE, MULTISTATE_VALUE	R
Object_List	device, analog-value 1...6, binary-value 1...2, multistate-value 1...12 (Analog-value 1...6 and multistate-value 3...12 by default are disabled and not accessible. They are selectively enabled depending on operating mode with multistate-value 1...2.)	R
Max_APDU_Length_Accepted	480	R
Segmentation_Supported	NO_SEGMENTATION (3)	R
APDU_Timeout	10000	R
Number_Of_APDU_Retries	3	R
Device_Address_Binding	-	R
Database_Revision	0	R
Max_Master	default 127	RW-E
Max_Info_Frames	default 1	RW-E
Active_COV_Subscriptions	max. 10 Subscriptions, for multistate-value 13...24, Confirmed / Unconfirmed, Lifetime = 0...65535 sec.	R

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

Binary Value Objects

Property	Remark / Value	RW
Object_Identifier	binary-value, instance 1 ... 2	R
Object_Type	BINARY_VALUE (5)	R
Object_Name	max. 42 Bytes	RW-E
Description	max. 84 Bytes, default ""	RW-E
Present_Value	INACTIVE (0) / ACTIVE (1)	
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0	R
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0)	R
Inactive_Text	max. 31 Bytes	RW-E
Active_Text	max. 31 Bytes	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Instance	Object_Name default	Inactive_Text default	Active_Text default	Present_Value default	Present_Value RW
1	"Test"	"No_Test_Active"	"Test_Active"	0	RW
2	"FireChain"	"Relay_Off"	"Relay_On"	0	R

Analog Value Objects

Property	Remark / Value	RW
Object_Identifier	analog-value, instance 1 ... 6	R
Object_Type	ANALOG_VALUE (2)	R
Object_Name	max. 42 Bytes	RW-E
Description	max. 84 Bytes, default ""	RW-E
Present_Value	0...6553,4	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0	R
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0)	R
Units	seconds (73)	R

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

Instance	Object_Name default	Present_Value default
1	"DriveTime1"	240.0
2	"DriveTime2"	240.0
3	"TurnOffTime1"	35.0
4	"TurnOffTime2"	35.0
5	"RcvHrtBt1"	0.0
6	"RcvHrtBt2"	0.0

Analog-value 1...6 by default are disabled and not accessible.
They are enabled in operating mode Motorized_Damper with multistate-value 1...2.

Multistate Value Objects

Property	Remark / Value	RW
Object_Identifier	multistate-value, instance 1 ... 12	R
Object_Type	MULTISTATE_VALUE (19)	R
Object_Name	max. 42 Bytes	RW-E
Description	max. 84 Bytes, default ""	RW-E
Present_Value	State	
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0	R
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0)	R
Number_Of_States		R
State_Text	max. 31 Bytes	RW-E

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

Instan- ce	Object_Name default	Present_Value	Damper State Enabled	Number Of_ States	State	State_Text default
1 2	"Damper1" "Damper2"	RW-E operating mode	1...5	5	1 (default) 2 3 4 5	"Inactive" "Motorized_Damper" "Limit_Switches_Open_and_Closed" "Only_Limit_Switch_Open" "Only_Limit_Switch_Closed"
3 4	"SafetyPos1" "SafetyPos2"	RW-E	2	2	1 2 (default)	"open" "close"
5 6	"ActuDrive1" "ActuDrive2"	RW	2	2	1 2 (at reset: opposite of SafetyPos)	"open" "close"
7 8	"ActuPos1" "ActuPos2"	R	2, 3, 4, 5	3, 2	1 2 3	"open" "close" "running"
9 10	"ActuPos1a" "ActuPos2a"	R	4, 5	2	1 2	"open" "close"
11 12	"Alarm1" "Alarm2"	RW	2, 3, 4, 5	7	1 (default) 2 3 4 5 6 7	"OK" "System_Error" "Runtime_Error" "Manipulation" "Update_Error" "Alarm" "Alarm a"

Multistate-value 3...12 by default are disabled and not accessible.
They are selectively enabled depending on operating mode with multistate-value 1...2.

B Modbus interface

Frame-Timing bei Modbus-RTU

Die Einteilung in Frames wird bei Modbus mit Pausenzeiten bestimmt. Folgende Zeiten gelten bei bis zu 19200 Baud, bei höheren Baudraten in Klammern:

- Beim Senden ist höchstens 1,5 Zeichen (750µs) als Pause zwischen 2 Zeichen eines Frames erlaubt.
- Mindestens 3,5 Zeichen (1750µs) muss beim Senden die Pause zwischen 2 Frames dauern.
- Der Bereich dazwischen dient als Toleranzbereich für den Empfänger. Wenn beim Empfang diese Pause überschritten wird, endet der Frame.

Dieses Gerät macht beim Senden zwischen den Zeichen keine Pausen.
Vor dem Senden macht es $\geq 3,6$ Zeichen (1800µs) Pause.
Der Empfang endet bei etwa 2,5 Zeichen (1250µs) Pause.

Modbus-Funktionen

Die Codierung der Modbus-RTU-Frames ist unten dargestellt (Darstellung ohne CRC).
Bei Daten mit 2 Byte kommt das High-Byte zuerst.

Bedeutung der Exception Codes:

- | | | |
|---|-----------------------|--|
| 1 | Illegal Function Code | Unbekannter Code in Funktion oder Subfunktion. |
| 2 | Illegal Data Address | Eine Register-Adresse ist ungültig. |
| 3 | Illegal Data Value | Inkonsistente Codierung bei Register-Anzahl, Byte-Anzahl, Datenwert. |

Modbus-Funktion 3 (0x03) Read Holding Registers

Modbus-Funktion 4 (0x04) Read Input Registers

Diese Funktionen werden verwendet, um mehrere aufeinanderfolgende Register zu lesen. Die beiden Funktionen machen das gleiche.

Request:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x03 / 0x04
Byte 2-3	Register Address	Erstes Register
Byte 4-5	Register Quantity	Anzahl der Register

Response:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x03 / 0x04
Byte 2	Byte Count	2 Bytes je Register
Byte 3-4	Register Value	0x0000-0xFFFF
Byte ...	Register Value	0x0000-0xFFFF

Error:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Error Code	0x83 / 0x84
Byte 2	Exception Code	0x02,0x03

Modbus-Funktion 06 (0x06) Write Single Register

Diese Funktion wird verwendet, um in ein einzelnes Register zu schreiben.

Request:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x06
Byte 2-3	Register Address	Adresse des Registers
Byte 4-5	Register Value	0x0000-0xFFFF

Response:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x06
Byte 2-3	Register Address	Adresse des Registers
Byte 4-5	Register Value	0x0000-0xFFFF

Error:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Error Code	0x86
Byte 2	Exception Code	0x02,0x03

Modbus-Funktion 16 (0x10) Write Multiple Registers

Diese Funktion wird verwendet, um in mehrere aufeinanderfolgende Register zu schreiben.

Request:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x10
Byte 2-3	Register Address	Erstes Register
Byte 4-5	Register Quantity	Anzahl der Register
Byte 6	Byte Count	2 Bytes je Register
Byte 7-8	Register Value	0x0000-0xFFFF
Byte ...	Register Value	0x0000-0xFFFF

Response:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x10
Byte 2-3	Register Address	Erstes Register
Byte 4-5	Register Quantity	Anzahl der Register

Error:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Error Code	0x90
Byte 2	Exception Code	0x02,0x03

Modbus-Funktion 8 (0x08) Diagnostics

Diese Funktion dient zum Prüfen der Modbus-Kommunikation.

Request:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x08
Byte 2-3	Subfunction	s.u.
Byte 4-5	Data	s.u.

Response:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x08
Byte 2-3	Subfunction	s.u.
Byte 4-5	Data	s.u.

Error:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Error Code	0x88
Byte 2	Exception Code	0x01,0x03

Sub- func.	Data Req.	Data Resp.	Name Bedeutung
0	*	*	Return Query Data Der ganze Frame (max. 100 Bytes) wird zurückgesendet.
1	x	x	Restart Communications Option Die Modbus-Kommunikation wird nach der Antwort neu gestartet (Warmstart), der Listen-Only-Mode beendet.
4	0	-	Force Listen Only Mode Keine Antwort wird gesendet. Der Listen-Only-Mode beginnt sofort. Das Gerät reagiert dann nur noch auf die Funktion Diagnostics, Subfunktion Restart Communications Option.
10	0	0	Clear Counters Alle 5 Diagnose-Zähler werden gelöscht.
11	0	Count	Return Bus Message Count Die Anzahl der fehlerfrei empfangene Meldungen abfragen.
12	0	Count	Return Bus Communication Error Count Die Anzahl der Meldungen mit CRC-Fehler, Länge < 3, Paritäts-Fehler oder Framing-Fehler abfragen.
13	0	Count	Return Slave Exception Error Count Die Anzahl der Fehlermeldungen (Error) abfragen.
14	0	Count	Return Slave Message Count Die Anzahl der Meldungen für dieses Gerät abfragen.
15	0	Count	Return Slave No Response Count Die Anzahl der Broadcast-Meldungen abfragen.

Modbus-Funktion 43/14 (0x02B/0x0E) Read Device Identification

Mit dieser Funktion werden Daten zur Identifikation des Geräts gelesen.

Request:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x2B
Byte 2	MEI-Type	0x0E
Byte 3	Read Device ID Code	0x01
Byte 4	Object ID	0x00

Response:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Function Code	0x2B
Byte 2	MEI-Type	0x0E
Byte 3	Read Device ID Code	0x01
Byte 4	Conformity Level	0x01
Byte 5	More Follows	0x00
Byte 6	Next Object ID	0x00
Byte 7	Number of Objects	0x03
Byte 8	ID: VendorName	0x00
Byte 9	Obj-Length	9
Byte 10-18	Obj-Value	"TROX GmbH"
Byte 19	ID: ProductCode	0x01
Byte 20	Obj-Length	12
Byte 21-32	Obj-Value	"MB-BAC-WA1B3"
Byte 33	ID: MajMinRevision	0x02
Byte 34	Obj-Length	4
Byte 35-38	Obj-Value	"V1.0"

Error:

Byte 0	Slave Address	Drehschalter 1-99
Byte 1	Error Code	0xAB
Byte 2	Exception Code	0x01-0x03

