



Multi-turn actuators

TIGRON

TR-M30X – TR-M1000X

Profibus DP



**Read operation instructions first.**

- Observe safety instructions.

**Purpose of the document:**

This document contains information for the commissioning staff of the distributed control system and DCS software engineers. This document is intended to support the actuator integration into the DCS via fieldbus interface.

**Reference documents:**

- Operation instructions (Assembly and commissioning) for the actuator

Reference documents can be downloaded from the Internet ([www.auma.com](http://www.auma.com)) or ordered directly from AUMA (refer to <Addresses>).

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## 1. Safety instructions

### 1.1. Prerequisites for the safe handling of the product

- Standards/directives** The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation. They include among others:
- Standards and directives such as IEC 60079 “Explosive atmospheres”:
    - Part 14: Electrical installations design, selection and erection.
    - Part 17: Electrical installations inspection and maintenance.
  - Applicable configuration guidelines for fieldbus applications.
- Safety instructions/warnings** All personnel working with this device must be familiar with the safety and warning instructions in this manual and observe the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.
- Qualification of staff** Assembly, electrical connection, commissioning, operation, and maintenance must be carried out by suitably qualified personnel authorised by the end user or contractor of the plant only.
- Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.
- Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant is responsible for respect and control of these regulations, standards, and laws.
- Electrostatic charging** Highly efficient charge generating processes (processes more efficient than manual friction) on the device surface must be excluded at any time, since they will lead to propagating brush discharges and therefore to ignition of a potentially explosive atmosphere.
- This also applies to fireproof coatings or covers available as an option.
- Ignition dangers** Gearboxes were subjected to an ignition hazard assessment in compliance with the currently applicable standard according to ISO 80079-36/ -37. Hot surfaces, mechanically generated sparks as well as static electricity and stray electric currents were identified and assessed as major potential ignition sources. Protective measures to prevent the likelihood that ignition sources arise were applied to the gearboxes. This includes in particular lubrication of the gearbox, the IP protection codes and the warnings and notes contained in these operation instructions.
- Commissioning** Prior to commissioning, imperatively check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.
- Operation** Prerequisites for safe and smooth operation:
- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
  - Only operate the device if it is in perfect condition while observing these instructions.
  - Immediately report any faults and damage and allow for corrective measures.
  - Observe recognised rules for occupational health and safety.
  - Observe national regulations.
  - During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature prior to working on the device using an appropriate thermometer and wearing protective gloves.

**Protective measures** The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.

**Maintenance** To ensure safe device operation, the maintenance instructions included in this manual must be observed.  
Any device modification requires prior written consent of the manufacturer.

**1.2. Range of application**

AUMA multi-turn actuators are designed for the operation of industrial valves, e.g. globe valves, gate valves, butterfly valves, and ball valves.  
Other applications require explicit (written) confirmation by the manufacturer.  
No liability can be assumed for inappropriate or unintended use.  
Observance of these instructions and the operation instructions is considered as part of the device's designated use.

**1.3. Warnings and notes**

The following warnings draw special attention to safety-relevant procedures in these operation instructions, each marked by the appropriate signal word (DANGER, WARNING, CAUTION, NOTICE).



**Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning results in death or serious injury.**




**Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.**



**Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning could result in minor or moderate injury. May also be used with property damage.**



**Potentially hazardous situation. Failure to observe this warning could result in property damage. Is not used for personal injury.**

Safety alert symbol  warns of a potential personal injury hazard.  
The signal word (here: DANGER) indicates the level of hazard.


**1.4. References and symbols**

The following references and symbols are used in these instructions:

**Information** The term **Information** preceding the text indicates important notes and information.

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

 **Result of a process step**  
Describes the result of a preceding process step.

## 2. General information about Profibus DP

For exchange of information among automation systems and between automation systems and the connected distributed field devices, the use of serial fieldbus systems for communication is state-of-the-art. Thousands of applications have proved impressively that, in comparison with conventional technology, cost savings of up to 40 % in wiring, commissioning, and maintenance are achieved by using fieldbus technology. While in the past the fieldbus systems used were often manufacturer specific and incompatible with other bus systems, the systems employed today are almost exclusively open and standardized. This means that the user does not depend on individual suppliers and can choose within a large product range the most suitable product at the most competitive price.

Profibus DP is the leading open fieldbus system in Europe and is also used successfully throughout the world. The application range includes automation in the areas of manufacturing, processing, and building. Profibus DP is an international, open fieldbus protocol which has been standardized in the fieldbus standards IEC 61158 and IEC 61784. This standardization ensures that the investments by manufacturers and users are protected to the best possible degree and the independence of the manufacturer is guaranteed.

### 2.1. Basic characteristics

Profibus DP defines the technical and functional features of a serial fieldbus system allowing interconnection of distributed, digital automation devices. Profibus DP distinguishes between master and slave devices.

Profibus DP is designed for fast data transmission on the field level. Here, central control devices, such as a PLC or PC, communicate via a fast serial connection with peripheral field devices such as input/output devices, valves, and actuators.

Data exchange among these field devices is based on cyclic communication. The respectively necessary communication functions are defined by the Profibus DP basic functions according to IEC 61158 and IEC 61784.

**Master devices** Master devices control data traffic on the bus. A master is allowed to send messages without an external request. Within the Profibus protocol, masters are also called 'active devices'.

**Slave device** Slave devices such as AUMA Profibus DP actuators are peripheral devices. Typical slave devices are input/output devices, valves, actuators, and measuring transducers. They do not have bus access rights, i.e. they may only acknowledge received messages or, at the request of a master, transmit messages to that master. Slaves are also called 'passive devices'.

### 2.2. Basic functions of Profibus DP

On a cyclic basis, the master reads the input information from the slaves and writes the output information to the slaves. In addition to this cyclic data transfer of the process representation, Profibus DP also provides powerful functions for diagnostics and commissioning. Data traffic is monitored through the monitoring functions on the master and slave side.

### 2.3. Transfer mode

- RS-485 twisted pair cable or fibre optic cable
- AUMA actuators support baud rates up to 1.5 Mbits/s.

### 2.4. Bus access

- Token-passing between the masters and polling between master and slave
- Mono-master or multi-master systems are possible.
- Master and slave devices: max. 126 devices at a bus

### 2.5. Functionality

- Peer-to-peer (process data exchange [DATA EX]) or Multicast (control commands to all slaves)

- Cyclic process data exchange between DP master and DP slaves.
- Additional acyclic data exchange between DP master and DP slaves for Profibus DP with V1 services.
- Checking the configuration of the DP slaves
- Synchronisation of inputs and/or outputs

---

## **2.6. Protective functions**

- All messages are transmitted with Hamming Distance HD=4.
- Watchdog timer at DP slaves
- Access protection for the inputs/outputs of DP slaves (Sync and Freeze)
- Process data exchange monitoring with configurable timer interval at the master
- Adjustable failure behaviour

---

## **2.7. Device types**

- DP master class 2 (DPM2), e.g. programming/configuration tools
- DP master class 1 (DPM1), e.g. central controllers such as PLC, PC
- DP slave, e.g. AUMA Profibus DP devices. Devices with binary or analogue inputs/outputs, actuators, plug valves



### 3. Commissioning

#### 3.1. Introduction

When commissioning a Profibus DP network, the devices on the Profibus DP must be parametrised and configured using the programming software at the controls (Profibus configurator).

The programming software first reads the GSD file (**GeneralStationData**) of the individual actuators. The GSD file contains information about the device properties needed by the master.

Afterwards, the user can configure and parametrise the device at the Profibus DP for the programming software of the process control system.

This information is then stored in the controls (DP master) and sent to the actuators (DP slaves) each time cyclic communication is started.

The process representation input and output bytes are used to control the actuator and to supply the feedback signals. If a configuration with consistent data is selected, certain PLCs require special function blocks for the control of the Profibus DP slaves.

**Certification** AUMA actuators with Profibus DP are certified by the Profibus user organisation (PNO).

**ID number** Each DP slave and each DP master have individual ID numbers. The ID number is required for the DP master to identify the type of device connected without significant protocol overhead. The master compares the ID numbers of the connected DP devices to the ID number in the specified configuration data. The process data transfer will only be started if the correct device types with the correct station addresses were connected to the fieldbus. This ensures a high security against configuration errors.

The PNO manages the ID numbers together with the device master data (GSD).

TIGRON actuators are listed with the following Ident number at PNO:

- Ident number of the standard version: **0x1144** with functions for:
  - Single channel Profibus DP interface (not redundant)
  - Optional Profibus DP-V1 services

**Device Master Data (GSD)** For Profibus DP, the performance features of the devices are documented by the manufacturer and made available to the users as device data sheet and device master data file. Structure, contents and coding of the General Station Description (GSD) are standardised. They enable comfortable configuration of any DP slaves with configuration devices by different manufacturers.

The following GSD files are available for TIGRON actuators:

- Standard version: **AUMA1144.GSD** with functions for:
  - Single channel Profibus DP interface (not redundant)
  - Optional Profibus DP-V1 services

**Information** GSD files can be downloaded from our website: [www.auma.com](http://www.auma.com).

#### 3.2. Parameter setting

The parameter setting is partly defined in the Profibus standard, e.g. one bit for switching bus monitoring on and off (watchdog).

#### 3.3. Bus address (slave address)

Each participant at the bus is addressed via its specific bus address (slave address). The bus address may be assigned only once per fieldbus network.

Bus address storage is non-volatile.

On delivery, address 126 (default value) is set for all devices.

The bus address (slave address) can be set in the following ways:



- Locally via the display  
For details on setting refer to the Operation Instructions to the actuator or Manual (Operation and Setting).
- Using AUMA CDT service software (via PC or laptop with Bluetooth).  
The latest version of AUMA CDT can be downloaded from our website: [www.auma.com](http://www.auma.com).
- Via fieldbus, please note that only one device with the address 126 (default value) is be connected to Profibus DP. A new bus address may be assigned to the actuator using the SAP 55 (Service-Access-Point Set Slave Address).

**3.4. Configuration of Profibus DP interface**

During configuration, the number of input and output bytes reserved for each device in the controls' memory is selected. Additionally, the method of data processing is defined: consistent or non-consistent.

**Information** Only the number of bytes defined in the configuration are transmitted between DP master and DP slave.

The following configurations are possible with AUMA Profibus DP actuators:

Number of input bytes	Number of output bytes
1	1
1	4
1	8
2	1
2	4
2	8
2	16
4	1
4	4
4	8
4	16
6	8
6	16
8	4
8	8
8	12
12	4
12	8
12	12
12	16
20	4
20	8
20	12
32	4
32	8
32	12
32	16
40	26

All these configurations (except 1 In, 1 Out) can be selected as consistent or non-consistent.

The number of input bytes indicates how many of the maximum 40 bytes are sent to the DP master by the DP slave.

The number of output bytes indicates how many of the maximum 26 bytes are sent to the DP slave by the DP master.

If, for example, a configuration with 8 input bytes is selected, only the first 8 bytes are sent by the DP slave to the DP master during data exchange. In this case, the master does not have access to bytes 9 to 40. This way, the DP master saves memory space since only 8 input bytes are reserved for the actuator.

Data issued by AUMA actuators shall be consistently processed by the DP master. This ensures that the value of a 2-byte variable (position transmitter, analogue customer input) does not change after reading out the first byte and, thus, does not distort the value. If a master does not offer the option of consistent configuration because of the DCS, configuration without consistency can be selected.

### 3.5. Communication start-up

When switching on the DP master, it first sends one parameter and one configuration telegram to each DP slave. If parameters and configuration are correct, the DP slave enters the 'Data Exchange' mode to exchange process data between controls and slave. Then, the DP master can control the DP slave and read its current state via the process representation.

If communication is interrupted (e.g. when switching the slave off or in the event of Profibus cable rupture), it is automatically resumed by the DP master once the cause of the fault is eliminated.

### 3.6. Adaptation options

TIGRON actuators provide the option to adapt to existing DCS configurations of actuator ranges AC 01.2/ACExC 01.2 as well as AC 01.1/ACExC 01.1. For this, TIGRON actuators can be set as to support the standard arrangement of Profibus DP-V0 process representation input of AC 01.2/ACExC 01.2 without changing the Profibus configuration of the DCS.

- Information**
- Only the Profibus DP-V0 standard arrangement of the process representation input of AC 01.2/ACExC 01.2 is supported, deviating arrangements of the Profibus DP-V0 process data input require use/installation of the AUMA1144D.gsd file in the DCS.

### 3.7. Communication monitoring

#### 3.7.1. Connection monitoring of the Profibus DP communication

The connection monitoring within the master has to be activated to monitor both master and cable connection between master and actuator (parameter telegram byte 1 bit 3 WD\_ON = 1).

Only if the connection monitoring is active can the actuator react in the even of loss of communication once the monitoring time also set in the master has elapsed.

The reaction of the actuator also depends on the settings for failure behaviour or EMERGENCY behaviour.

#### 3.7.2. Fail Safe and Global Control Clear Telegrams

Another possibility to set the slave to a safe state in the event of a fault are the fail safe telegrams (telegrams with data length = 0). If fail safe telegrams are received, the actuator remains in the Data Exchange state; depending on the respective setting, the actuator may initiate the failure behaviour or the EMERGENCY behaviour. The actuator quits the fail safe state as soon as valid telegrams with data length ≠ 0 are received.

Furthermore, the Global Control Clear (GC Clear) master telegrams can also be used to initiate the failure behaviour or the EMERGENCY behaviour. This state can be disabled using a Global Control Operate telegram (GC Operate).

**For activated EMERGENCY behaviour:**



**Risk of actuator operation due to an EMERGENCY signal or a loss of communication!**

*Risk of personal injuries or damage to the valve.*

- For commissioning and maintenance work: Set selector switch to position **OFF**. Motor operation can only be interrupted in this selector switch position.
- If the actuator starts unexpectedly: Immediately turn selector switch to **OFF**.

**3.8. I & M functions**

The actuator supports the I & M function according to PNO guideline 3.502.

With the term **I**dentification & **M**aintenance (I & M) functions, the Profibus user organisation e.V. (PNO) introduced a new functionality for all Profibus devices with acyclic communication channel that may prove very useful for plant operators. The I & M functions define how certain device-describing data (according to name plate) is to be uniformly stored in the Profibus devices. Engineering tools may then read and interpret the data according to a code which can be accessed on the PNO server. This provides uniform and powerful access to all important and current device data, one of the major requirements for asset management.

Part of the device-specific I & M information is the unambiguous (asset) identification using a manufacturer ID (MANUFACTURER\_ID, for AUMA actuators = 319), the order number (ORDER\_ID) of the actuator as and well as the individual serial number (SERIAL\_NUMBER). Further data supplements the asset information.

Content	Size
Header	
Manufacturer specific	10 Octets
I&M Block	
MANUFACTURER_ID	2 Octets
ORDER_ID	20 Octets
SERIAL_NUMBER	16 Octets
HARDWARE_REVISION	2 Octets
SOFTWARE_REVISION	4 Octets
REVISION_COUNTER	2 Octets
PROFILE_ID	2 Octets
PROFILE_SPECIFIC_TYPE	2 Octets
IM_VERSION	2 Octets
IM_SUPPORTED	2 Octets

## 4. Description of the data interface

### 4.1. Input data (process representation input) – signals

The process representation input allows the master (controls) to read the state of the slave (actuator).

#### 4.1.1. Process representation input (default process representation)

Grey bits are collective signals. They contain the results of a disjunction (OR operation) of other information.

Byte 1: Logic signals

	Fault
	Warnings
	Running CLOSE
	Running OPEN
	Not ready REMOTE
	Setpoint reached
	End position CLOSED
	End position OPEN
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 2: Actuator signals

	Torque sw. CLOSED
	Torque sw. OPEN
	Limit switch CLOSED
	Limit switch OPEN
	Selector sw. LOCAL
	Selector sw. REMOTE
	Phase failure
	Thermal fault
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 3: Actual position (H)

Actual position high byte (position transmitter)	
---	--

Byte 4: Actual position (L)

Actual position low byte (position transmitter)	
--	--

Byte 5: Device status

	Device ok
	Failure
	Function check
	Out of spec.
	Maintenance requ.
	Fault
	Warnings
	Not ready REMOATE
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 6: Operation status

	Running LOCAL
	Running REMOTE
	Handwheel oper.
	Actuator running
	MPV position reached
	Start step mode
	In intermed. position
	Op. pause active
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 7: Intermediate positions

	Intermed. pos. 8
	Intermed. pos. 7
	Intermed. pos. 6
	Intermed. pos. 5
	Intermed. pos. 4
	Intermed. pos. 3
	Intermed. pos. 2
	Intermed. pos. 1
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 8: Discrete inputs

	Bluetooth Connected
	--
	Input DIN 6
	Input DIN 5
	Input DIN 4
	Input DIN 3
	Input DIN 2
	Input DIN 1
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 9: Input AIN 1 (H)

Input AIN 1	
-------------	--

Byte 10: Input AIN 1 (L)

Input AIN 1	
-------------	--

Byte 11: Torque (H)

Torque High byte	
---------------------	--

Byte 12: Torque (L)

Torque Low byte	
--------------------	--

Byte 13: Not ready REMOTE 1

	I/O interface
	FailState fieldbus
	EMCY behav.act.
	EMCY STOP act.
	Local STOP
	Interlock active
	Sel. sw. not REMOTE
	Incorrect op.cmd
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 14: Not ready REMOTE 2

	Handwheel active
	Service active
	PVST active
	Interlock by-pass
	Disabled
	SIL function active
	-
	-
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 15: Fault 1

	No reaction
	Internal error
	Torque fault CLOSE
	Torque fault OPEN
	Phase failure
	Thermal fault
	Mains quality
	Configuration error
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 16: Fault 2

	Incorrect phase seq
	Config. error REMOTE
	Incorrect dir. rotation
	-
	-
	-
	-
	-
Bit 7	
Bit 6	
Bit 5	
Bit 4	
Bit 3	
Bit 2	
Bit 1	
Bit 0	

Byte 17: Warnings 1

Wrn no reaction	SIL fault	Torque wrn OPEN	Torque wrn CLOSE	--	--	--	Maintenance required
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 18: Warnings 2

Config. warning	RTC not set	RTC button cell	--	24 V DC external	--	--	Wrn controls temp.
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 19: Warnings 3

Op. time warning	Wrn on time running	Wrn on time starts	Internal warning	Wrn input AIN 1	Wrn input AIN 2	--	--
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 20: Warnings 4

PVST fault	PVST abort	Failure beh. active	--	PVST required	Wrn setpoint position	--	--
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 21: Input AIN 2 (H)

Input AIN 2
-------------

Byte 22: Input AIN 2 (L)

Input AIN 2
-------------

Byte 23: Failure

Fault	--	--	--	--	--	--	--
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 24: Maintenance required

--	--	--	Maintenance interval	Maintenance contactors	Maintenance lubricant	Maintenance seals	Maintenance mechanics
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 25: Out of specification 1

Wrn no reaction	SIL fault	Torque wrn OPEN	Torque wrn CLOSE	--	--	--	--
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 26: Out of specification 2

Config. warning	RTC not set	RTC button cell	--	24 V DC external	Wrn motor temp.	Wrn gearbox temp.	Wrn controls temp.
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 27: Out of specification 3

Op. time warning	Wrn on time running	Wrn on time starts	Internal warning	Wrn input AIN 1	Wrn input AIN 2	--	--
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 28: Out of specification 4

PVST fault	PVST abort	Failure beh. active	--	PVST required	Wrn setpoint position	--	--
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 29: Function check 1

--	--	PVST active	EMCY STOP act.	Handwheel active	Service active	Sel. sw. not REMOTE	Local STOP
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 30: Function check 2

--	--	--	--	--	--	--	--
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 31: Status fieldbus

Channel 2 activity	Channel 1 activity	Ch. 2 FailState Fieldb.	Ch. 1 FailState Fieldb.	Channel 2 DataEx	Channel 1 DataEx	Channel 2 active	Channel 1 active
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 32: SIL signals

--	--	--	--	SIL function active	SIL fault	Safe STOP	Safe ESD
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 33: Reserve

--

Byte 34: Reserve

--

Byte 35: Reserve

--

Byte 36: Reserve

--

Byte 37: Reserve

--

Byte 38: Reserve

--

Byte 39: Reserve

--

Byte 40: Reserve

--

#### 4.1.2. Description of the bytes in the process representation input

##### Byte 1: Logic signals

Bits 3, 6, and 7 are collective signals.

Bits 5 and 4 of the logical signals (byte1) indicate a logical operation of the actuator, i.e. they are set when the actuator has received the command for an electrical operation (also active when e.g. the actuator is in a stepping pause during stepping mode or waiting for the end of the dead time).

Table 1: Byte 1: Logic signals

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	End position OPEN	(2) = "Bit: End p. OPEN"	1	For limit seating: Limit switch operated in direction OPEN. For torque seating: Torque switch and limit switch operated in direction OPEN.
			0	No signal.
1	End position CLOSED	(1) = "Bit: End p. CLOSED"	1	For limit seating: Limit switch operated in direction CLOSE. For torque seating: Torque switch and limit switch operated in direction CLOSE.
			0	No signal.
2	Setpoint pos.reached	(5) = "Bit: Setpoint reached"	1	The position setpoint is within max. error variable (outer dead band). Is only signalled if Profibus DP master has set the <b>Fieldbus SETPOINT</b> bit (process representation output).
			0	No signal.
3	Not ready REMOTE	(22) = "Bit: Not ready REMOTE"	1	Collective signal 04: Contains the result of a disjunction (OR-operation) of all bits comprised in bytes 13 and 14 (Not ready REMOTE 1 and Not ready REMOTE 2). The actuator cannot be operated from REMOTE. The actuator can only be operated via the local controls.
			0	In bytes 13 and 14, no signals are active (all bits are set to 0).
4	Running OPEN	(7) = "Bit: Running OPEN"	1	An operation command via the local controls or via fieldbus in direction OPEN is performed: <b>Fieldbus OPEN</b> or <b>Fieldbus SETPOINT</b> (process representation output). This bit remains also set during operation pauses (e.g. due to the dead time or the reversing prevention time).
			0	Operation in direction OPEN via fieldbus is not executed.
5	Running CLOSE	(6) = "Bit: Running CLOSE"	1	An operation command via the local controls or via fieldbus in direction CLOSE is performed: <b>Fieldbus CLOSE</b> or <b>Fieldbus SETPOINT</b> (process representation output). This bit remains also set during operation pauses (e.g. due to the dead time or the reversing prevention time).
			0	Operation in direction CLOSE via fieldbus is not executed.
6	Warning	(21) = "Bit: Warnings"	1	Collective signal 02: Contains the result of a disjunction (OR-operation) of all bits of bytes 17 to 20 (Warning 1 to Warning 4).
			0	In bytes 17 and 20, no warnings are active (all bits are set to 0).
7	Fault	(20) = "Bit: Fault"	1	Collective signal 03: Contains the result of a disjunction (OR-operation) of all bits of bytes 15 and 16 (Fault 1 and Fault 2). The actuator cannot be operated.
			0	In bytes 15 and 16, no faults are active (all bits are set to 0).



**Byte 2: Actuator signals**

Table 2: Byte 2: Actuator signals

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Thermal fault	(56) = "Bit: Thermal fault"	1	Motor protection tripped.
			0	No signal.
1	Phase fault	(57) = "Bit: Phase fault"	1	<ul style="list-style-type: none"> <li>When connecting to a 3-phase AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing.</li> <li>When connecting to a 3-phase or 1-phase AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing.</li> </ul>
			0	All phases are available.
2	Selector sw. REMOTE	(9) = "Bit: Sel. sw. REMOTE"	1	Selector switch is in position REMOTE.
			0	Selector switch is not in position REMOTE.
3	Selector sw. LOCAL	(8) = "Bit: Selector sw. LOCAL"	1	Selector switch is in position LOCAL.
			0	Selector switch is not in position LOCAL.
4	Limit switch OPEN	(12) = "Bit: Limit sw. OPEN"	1	Limit switch in end position OPEN active.
			0	No signal.
5	Limit switch CLOSED	(11) = "Bit: Limit sw. CLOSED"	1	Limit switch in end position CLOSED active.
			0	No signal.
6	Torque sw. OPEN	(14) = "Bit: Torque sw. OPEN"	1	Torque switch operated in direction OPEN.
			0	No signal.
7	Torque sw. CLOSED	(13) = "Bit: Torque sw. CLOSE"	1	Torque switch operated in direction CLOSE.
			0	No signal.

**Bytes 3 and 4: Actual position**

Byte 3 = high byte, byte 4 = low byte.

If a position transmitter is installed in the actuator, bytes 3 and 4 are used to transmit the current actuator position. The value is transmitted in per mil (value: 0 – 1,000).

**Byte 5: Device status**

Table 3: Byte 5: Device status

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Not ready REMOTE	(22) = "Bit: Not ready REMOTE"	1	Collective signal 04: Contains the result of a disjunction (OR-operation) of all bits comprised in bytes 13 and 14 (Not ready REMOTE 1 and Not ready REMOTE 2). The actuator cannot be operated from REMOTE. The actuator can only be operated via the local controls.
			0	In bytes 13 and 14, no signals are active (all bits are set to 0).
1	Warning	(21) = "Bit: Warnings"	1	Collective signal 02: Contains the result of a disjunction (OR-operation) of all bits of bytes 17 to 20 (Warning 1 to Warning 4).
			0	In bytes 17 and 20, no warnings are active (all bits are set to 0).
2	Fault	(20) = "Bit: Fault"	1	Collective signal 03: Contains the result of a disjunction (OR-operation) of all bits of bytes 15 and 16 (Fault 1 and Fault 2). The actuator cannot be operated.
			0	In bytes 15 and 16, no faults are active (all bits are set to 0).



Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
3	NAMUR mainten. req.	(19) = "Bit: Maintenance requ."	1	Collective signal 09: Indication according to NAMUR recommendation NE 107 Recommendation to perform maintenance. Contains the result of a disjunction (OR-operation) of all bits of byte 24 (Maintenance required).
			0	In all bits of byte 24, no signals are active (all bits are set to 0).
4	NAMUR out of spec.	(18) = "Bit: Out of spec."	1	Collective signal 07: Indication according to NAMUR recommendation NE 107 Actuator is operated outside the normal operation conditions. Contains the result of a disjunction (OR-operation) of all bits of bytes 25 to 28 (Out of specification 1 to 4).
			0	In bytes 25 and 28, no signals are active (all bits are set to 0).
5	NAMUR funct. check	(17) = "Bit: Function check"	1	Collective signal 08: Indication according to NAMUR recommendation NE 107 The actuator is being worked on; output signals are temporarily invalid. Contains the result of a disjunction (OR-operation) of all bits of bytes 29 and 30 (Function check 1 and 2).
			0	In bytes 29 and 30, no signals are active (all bits are set to 0).
6	NAMUR failure	(16) = "Bit: Failure"	1	Collective signal 10: Indication according to NAMUR recommendation NE 107 Actuator function failure, output signals are invalid. Contains the result of a disjunction (OR-operation) of all bits of byte 23 (Failure).
			0	In all bits of byte 23, no signals are active (all bits are set to 0).
7	Device ok	(15) = "Bit: Device ok"	1	Collective signal 05: The device is ready for remote control. No AUMA warnings, AUMA faults or signals according to NAMUR are present. Bit 7 is set if bits 0 to 6 are deleted.
			0	Contains the result of a disjunction (OR-operation) of bits 0 to 6 (device status).

### Byte 6: Operation status

They include information about the actuator movement.

Table 4: Byte 6: Operation status

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Operation pause active	(23) = "Bit: Op. pause active"	1	The actuator is in off-time (e.g. reversing prevention time).
			0	No signal.
1	In intermediate pos.	(29) = "Bit: In interm. position"	1	The actuator is in an intermediate position e.g. neither in end position OPEN nor in end position CLOSED.
			0	No signal.
2	Start stepping mode	(24) = "Bit: Start step mode"	1	The actuator is within the set stepping range.
			0	The actuator is outside the set stepping range.
3	—	—		No signal (reserved).
4	Actuator running	(25) = "Bit: Actuator running"	1	Actuator is running (output drive is moving) Hard wired collective signal consisting of signals: <ul style="list-style-type: none"> <li>(26) Running LOCAL</li> <li>(27) Running REMOTE</li> <li>(28) Handwheel oper.</li> </ul>
			0	No signal.

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
5	Handwheel oper.	(28) = "Bit: Running via handw."	1	Output drive rotates without electric operation command.
			0	No signal.
6	Running REMOTE	(27) = "Bit: Running REMOTE"	1	Output drive rotates due to operation command from REMOTE.
			0	No signal.
7	Running LOCAL	(26) = "Bit: Running LOCAL"	1	Output drive rotates due to operation command from LOCAL.
			0	No signal.

### Byte 7: Intermediate positions

Table 5: Byte 7: Intermediate positions

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Intermediate pos. 1	(31) = "Bit: Intermediate pos. 1"	1	Intermediate position 1 reached.
			0	No signal.
1	Intermediate pos. 2	(32) = "Bit: Intermediate pos. 2"	1	Intermediate position 2 reached.
			0	No signal.
2	Intermediate pos. 3	(33) = "Bit: Intermediate pos. 3"	1	Intermediate position 3 reached.
			0	No signal.
3	Intermediate pos. 4	(34) = "Bit: Intermediate pos. 4"	1	Intermediate position 4 reached.
			0	No signal.
4	Intermediate pos. 5	(35) = "Bit: Intermediate pos. 5"	1	Intermediate position 5 reached.
			0	No signal.
5	Intermediate pos. 6	(36) = "Bit: Intermediate pos. 6"	1	Intermediate position 6 reached.
			0	No signal.
6	Intermediate pos. 7	(37) = "Bit: Intermediate pos. 7"	1	Intermediate position 7 reached.
			0	No signal.
7	Intermediate pos. 8	(38) = "Bit: Intermediate pos. 8"	1	Intermediate position 8 reached.
			0	No signal.

### Byte 8: Discrete inputs

Table 6: Byte 8: Discrete inputs

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Input DIN 1	(39) = "Bit: Input DIN 1"	1	A high signal (+24 V DC) is present at digital input 1.
			0	No signal.
1	Input DIN 2	(40) = "Bit: Input DIN 2"	1	A high signal (+24 V DC) is present at digital input 2.
			0	No signal.
2	Input DIN 3	(41) = "Bit: Input DIN 3"	1	A high signal (+24 V DC) is present at digital input 3.
			0	No signal.
3	Input DIN 4	(42) = "Bit: Input DIN 4"	1	A high signal (+24 V DC) is present at digital input 4.
			0	No signal.
4	Input DIN 5	(43) = "Bit: Input DIN 5"	1	A high signal (+24 V DC) is present at digital input 5.
			0	No signal.
5	Input DIN 6	(44) = "Bit: Input DIN 6"	1	A high signal (+24 V DC) is present at digital input 6.
			0	No signal.
6	—	—		No signal (reserved).
7	Bluetooth connected	(46) = "Bit: Input DIN 7"	1	The Bluetooth interface is connected.
			0	No signal.

**Bytes 9 and 10: Input AIN 1**

Byte 9 = high byte, byte 10 = low byte.

Bytes 9 and 10 transmit the value of the first additional free analogue current input of the Profibus DP interface. The start and end values can be set via the display. (For operation, please refer to the respective operation instructions for the actuator.)

If the measuring values are 0.3 mA below the initial value, a signal loss is indicated.

The value is transmitted in per mil (value: 0 – 1,000).

**Bytes 11 and 12: Torque**

Byte 11 = high byte, byte 12 = low byte.

The current actuator torque is transmitted in byte 11 and byte 12.

The value transmitted is the current torque in percent or per mil of the nominal actuator torque.

The value is transmitted in per mil (value: 0 – 1,000).

- The value 1,000 corresponds to 127.0 % torque in direction OPEN.
- The value 500 is the torque zero point.
- The value 0 corresponds to 127.0 % torque in direction CLOSE.

**Byte 13: Not ready REMOTE 1**

Table 7: Byte 13: Not ready REMOTE 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Wrong oper. cmd	(98) = "Bit: Wrong operation cmd"	1	Wrong operation command Indicates that several operation commands were received simultaneously via Profibus DP (e.g. Remote OPEN and Remote CLOSE simultaneously or Remote CLOSE/Remote OPEN and Remote SETPOINT simultaneously) or that the max. value for a setpoint position has been exceeded (setpoint position > 1,000).
			0	Operation commands are ok.
1	Sel. sw. not REMOTE	(53) = "Bit: Sel. sw. not REMOTE"	1	Selector switch is in position <b>LOCAL</b> or <b>OFF</b> :
			0	Selector switch is in position <b>REMOTE</b> .
2	Interlock active	(52) = "Bit: Interlock active"	1	Actuator is locked.
			0	No signal.
3	Local STOP	(97) = "Bit: Local Stop"	1	Local controls: STOP is operated.
			0	No signal.
4	EMCY stop active	(50) = "Bit: EMCY stop active"	1	Operation mode EMERGENCY stop is active (EMERGENCY stop button has been pressed).
			0	EMERGENCY stop button not pressed (normal operation).
5	EMCY behav. active	(49) = "Bit: EMCY behav.act."	1	Operation mode EMERGENCY behaviour is active (EMERGENCY signal was sent).
			0	No signal.
6	FailState fieldbus	(47) = "Bit: FailState fieldbus"	1	No valid communication via fieldbus (despite available connection)
			0	Communication via fieldbus is ok.
7	I/O interface	(48) = "Bit: I/O interface"	1	The actuator is controlled via the I/O interface (parallel).
			0	The actuator is controlled via the fieldbus.

**Byte 14: Not ready REMOTE 2**

Table 8: Byte 14: Not ready REMOTE 2

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	SIL function active <sup>1)</sup>	(207) = "SIL function active"	1	Safety function of the SIL module is active.
			0	No signal.
3	Disabled	(107) = "Bit: Disabled"	1	The actuator is in operation mode Disabled.
			0	No signal.
4	Interlock by-pass	(121) = "Bit: Bypass Interlock"	1	Bypass of interlock function is active.
			0	No signal.
5	PVST active	(116) = "Bit: PVST active"	1	Partial Valve Stroke Test (PVST) is active.
			0	No signal.
6	Service active	(51) = "Bit: Service active"	1	Operation mode Service is active.
			0	No signal.
7	Handwheel active	(54) = "Bit: Handwheel active"	1	Manual operation is active (handwheel is engaged); optional signal
			0	No signal.

1) The safety function indications via fieldbus are for information only and must not be used as part of a safety function. The digital I/O signals of the SIL module must be used for this purpose.

**Byte 15: Fault 1**

The fault signals contain the causes why the actuator cannot be operated.

Table 9: Byte 15: Fault 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Configuration error	(72) = "Bit: Configuration error"	1	Incorrect configuration, i.e. the current setting of the is invalid.
			0	Configuration is ok.
1	Mains quality	(59) = "Bit: Mains quality"	1	Due to insufficient mains quality, the controls cannot detect the phase sequence (sequence of phase conductors L1, L2 and L3) within the pre-set time frame provided for monitoring.
			0	No signal.
2	Thermal fault	(56) = "Bit: Thermal fault"	1	Motor protection tripped.
			0	No signal.
3	Phase fault	(57) = "Bit: Phase fault"	1	<ul style="list-style-type: none"> <li>When connecting to a 3-phase AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing.</li> <li>When connecting to a 3-phase or 1-phase AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing.</li> </ul>
			0	No signal.
4	Torque fault OPEN	(61) = "Bit: Torque fault OPEN"	1	Torque fault in direction OPEN
			0	No signal.
5	Torque fault CLOSE	(60) = "Bit: Torque fault CLOSE"	1	Torque fault in direction CLOSE
			0	No signal.
6	Internal error	(69) = "Bit: Internal fault"	1	Collective signal 14: Internal error.
			0	No internal fault
7	Wrn no reaction	(71) = "Bit: No reaction"	1	No actuator reaction to operation commands within the set reaction time.
			0	No signal.

**Byte 16: Fault 2**

The fault signals contain the causes why the actuator cannot be operated.

Table 10: Byte 16: Fault 2

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	—	—		No signal (reserved).
3	—	—		No signal (reserved).
4	—	—		No signal (reserved).
5		—		No signal.
6	Config. error REMOTE	(123) = "Bit: Config error remote"	1	Config. error of REMOTE interface active.
			0	No signal.
7	Incorrect phase seq	(58) = "Bit: Wrong phase sequence"	1	The phase conductors L1, L2 and L3 are connected in the wrong sequence.
			0	Phase sequence is ok.

**Byte 17: Warnings 1**

The warning signals are for information only and do not interrupt or disable an operation (as opposed to faults).

Table 11: Byte 17: Warnings 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	—	—		No signal (reserved).
3	—	—		No signal.
4	Torque wrn CLOSE	(125) = "Bit: Torque wrn CLOSE"	1	Warning: Limit value for torque warning in direction CLOSE exceeded.
			0	No signal.
5	Torque wrn OPEN	(124) = "Bit: Torque wrn OPEN"	1	Warning: Limit value for torque warning in direction OPEN exceeded.
			0	No signal.
6	SIL fault <sup>1)</sup>	(206) = "SIL fault"	1	Warning: A SIL fault of the SIL module has occurred.
			0	No signal.
7	Wrn no reaction	(71) = "Bit: No reaction"	1	Warning: No actuator reaction to operation commands within the set reaction time.
			0	No signal.

- 1) The safety function indications via fieldbus are for information only and must not be used as part of a safety function. The digital I/O signals of the SIL module must be used for this purpose.

**Byte 18: Warnings 2**

Table 12: Byte 18: Warnings 2

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Wrn controls temp.	(88) = "Bit: WrnControlsTemp"	1	Warning: Temperature within actuator controls housing too high.
			0	No signal.
1	—	—		No signal (reserved).
2	—	—		No signal (reserved).

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
3	24 V DC external	(68) = "Bit: 24 V DC, external"	1	The external 24 V DC voltage supply of the controls has exceeded the power supply limits.
			0	No signal.
4	—	—		No signal (reserved).
5	RTC voltage	(126) = "Bit: RTC button cell"	1	Warning: Voltage of RTC button cell too low.
			0	No signal.
6	Time not set	(77) = "Bit: RTC not set"	1	The real time clock has not yet been set on the basis of valid values.
			0	No signal.
7	Config. warning	(108) = "Bit: Config. Warning"	1	Warning: Configuration setting is incorrect. The device can still be operated with restrictions.
			0	No signal.

### Byte 19: Warnings 3

Table 13: Byte 19: Warnings 3

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	Wrn input AIN 2	(92) = "Bit: Wrn input AIN 2"	1	Warning: Loss of signal analogue input 2
			0	No signal.
3	Wrn input AIN 1	(91) = "Bit: Wrn input AIN 1"	1	Warning: Loss of signal analogue input 1
			0	No signal.
4	Internal warning	(70) = "Bit: Internal warning"	1	Collective signal 15: Internal warning
			0	No internal warning
5	Wrn op.mode starts	(85) = "Bit: WrnOnTiStarts"	1	Warning: Max. number of motor starts (starts) exceeded
			0	No signal.
6	Wrn op.mode run time	(84) = "Bit: WrnOnTiRunning"	1	Warning: Max. running time/h exceeded
			0	No signal.
7	Op. time warning	(63) = "Bit: Operat. time warning"	1	Warning: Max. permissible operating time for an operation (OPEN-CLOSE) exceeded
			0	No signal.

### Byte 20: Warnings 4

Table 14: Byte 20: Warnings 4

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	Wrn setpoint position	(95) = "Bit: WrnSetpoint-Pos"	1	Warning: Signal loss of actuator setpoint position.
			0	No signal.
3	PVST required	(208) = "PVST required"	1	Warning: A Partial Valve Stroke Test (PVST) should be performed.
			0	No signal.
4	—	—		No signal (reserved).
5	Failure behav. active	(30) = "Bit: Failure behav. active"	1	The failure behaviour is active.
			0	No signal.
6	PVST abort	(118) = "Bit: PVST abort"	1	Partial Valve Stroke Test (PVST) was aborted or could not be started. Remedy: Perform RESET or restart PVST.
			0	No signal.
7	PVST fault	(117) = "Bit: PVST fault"	1	Partial Valve Stroke Test (PVST) could not be successfully completed.
			0	No signal.

**Bytes 21 and 22: Input AIN 2**

Byte 21 = high byte, byte 22 = low byte.

Bytes 9 and 10 transmit the value of the second additional free analogue current input of the Profibus DP interface. The start and end values can be set via the display. (For operation, please refer to the respective operation instructions for the actuator.)

If the measuring values are 0.3 mA below the initial value, a signal loss is indicated.

The value is transmitted in per mil (value: 0 – 1,000).

**Byte 23: Failure**

Causes of the Failure signal in accordance with NAMUR recommendation NE 107.

Table 15: Byte 23: Failure

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	—	—		No signal (reserved).
3	—	—		No signal (reserved).
4	—	—		No signal (reserved).
5	—	—		No signal (reserved).
6	—	—		No signal (reserved).
7	Fault	(20) = "Bit: Fault"	1	Collective signal 03: Contains the result of a disjunction (OR-operation) of all bits of bytes 15 and 16 (Fault 1 and Fault 2). The actuator cannot be operated.
			0	In bytes 15 and 16, no faults are active (all bits are set to 0).

**Byte 24: Maintenance required**

Causes of the Maintenance required signal in accordance with NAMUR recommendation NE 107.

Table 16: Byte 24: Maintenance required

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Mainten. mechanics	(209) = "Mechanic lifetime"	1	Mechanic maintenance requirement (AUMA Service)
			0	No signal.
1	Mainten. seals	(210) = "Seal lifetime"	1	Seal maintenance requirement (AUMA Service)
			0	No signal.
2	Mainten. lubricant	(211) = "Seal lifetime"	1	Lubricant maintenance requirement (AUMA Service)
			0	No signal.
3	Mainten. contactors	(212) = "Contactor lifetime"	1	Contactor maintenance requirement (AUMA Service)
			0	No signal.
4	Mainten. interval	(213) = "Maintenance interval"	1	The set maintenance interval has expired.
			0	No signal.
5	—	—		No signal (reserved).
6	—	—		No signal (reserved).
7	—	—		No signal (reserved).

**Byte 25: Out of specification 1**

Causes of the Out of specification signal in accordance with NAMUR recommendation NE 107.



Table 17: Byte 25: Out of specification 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	—	—		No signal (reserved).
3	—	—		No signal.
4	Torque wrn CLOSE	(125) = "Bit: Torque wrn CLOSE"	1	Warning: Limit value for torque warning in direction CLOSE exceeded.
			0	No signal.
5	Torque wrn OPEN	(124) = "Bit: Torque wrn OPEN"	1	Warning: Limit value for torque warning in direction OPEN exceeded.
			0	No signal.
6	SIL fault <sup>1)</sup>	(206) = "SIL fault"	1	Warning: A SIL fault of the SIL module has occurred.
			0	No signal.
7	Wrn no reaction	(71) = "Bit: No reaction"	1	Warning: No actuator reaction to operation commands within the set reaction time.
			0	No signal.

- 1) The safety function indications via fieldbus are for information only and must not be used as part of a safety function. The I/O signals of the SIL module must be used for this purpose.

### Byte 26: Out of specification 2

Table 18: Byte 26: Out of specification 2

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Wrn controls temp.	(88) = "Bit: WrnControl-sTemp"	1	Warning: Temperature within actuator controls housing too high.
			0	No signal.
1	—	—		No signal (reserved).
2	—	—		No signal (reserved).
3	24 V DC external	(68) = "Bit: 24 V DC, external"	1	The external 24 V DC voltage supply of the controls has exceeded the power supply limits.
			0	No signal.
4	—	—		No signal (reserved).
5	RTC voltage	(126) = "Bit: RTC button cell"	1	Warning: Voltage of RTC button cell too low.
			0	No signal.
6	Time not set	(77) = "Bit: RTC not set"	1	The real time clock has not yet been set on the basis of valid values.
			0	No signal.
7	Config. warning	(108) = "Bit: Config. Warning"	1	Warning: Configuration setting is incorrect. The device can still be operated with restrictions.
			0	No signal.

### Byte 27: Out of specification 3

Table 19: Byte 27: Out of specification 3

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	Wrn input AIN 2	(92) = "Bit: Wrn input AIN 2"	1	Warning: Loss of signal analogue input 2
			0	No signal.
3	Wrn input AIN 1	(91) = "Bit: Wrn input AIN 1"	1	Warning: Loss of signal analogue input 1
			0	No signal.

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
4	Internal warning	(70) = "Bit: Internal warning"	1	Collective signal 15: Internal warning
			0	No internal warning
5	Wrn op.mode starts	(85) = "Bit: WrnOnTiStarts"	1	Warning: Max. number of motor starts (starts) exceeded
			0	No signal.
6	Wrn op.mode run time	(84) = "Bit: WrnOnTiRunning"	1	Warning: Max. running time/h exceeded
			0	No signal.
7	Op. time warning	(63) = "Bit: Operat. time warning"	1	Warning: Max. permissible operating time for an operation (OPEN-CLOSE) exceeded
			0	No signal.

#### Byte 28: Out of specification 4

Table 20: Byte 28: Out of specification 4

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved).
1	—	—		No signal (reserved).
2	Wrn setpoint position	(95) = "Bit: WrnSetpoint-Pos"	1	Warning: Signal loss of actuator setpoint position.
			0	No signal.
3	PVST required	(208) = "PVST required"	1	Warning: A Partial Valve Stroke Test (PVST) should be performed.
			0	No signal.
4	—	—		No signal (reserved).
5	Failure behav. active	(30) = "Bit: Failure behav. active"	1	The failure behaviour is active.
			0	No signal.
6	PVST abort	(118) = "Bit: PVST abort"	1	Partial Valve Stroke Test (PVST) was aborted or could not be started. Remedy: Perform RESET or restart PVST.
			0	No signal.
7	PVST fault	(117) = "Bit: PVST fault"	1	Partial Valve Stroke Test (PVST) could not be successfully completed.
			0	No signal.

#### Byte 29: Function check 1

Causes of the Function check signal in accordance with NAMUR recommendation NE 107.

Table 21: Byte 29: Function check 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Local STOP	(97) = "Bit: Local Stop"	1	Local controls: STOP is operated.
			0	No signal.
1	Sel. sw. not REMOTE	(53) = "Bit: Sel. sw. not REMOTE"	1	Selector switch is in position <b>LOCAL</b> or <b>OFF</b> :
			0	Selector switch is in position <b>REMOTE</b> .
2	Service active	(51) = "Bit: Service active"	1	Operation mode Service is active.
			0	No signal.
3	Handwheel active	(54) = "Bit: Handwheel active"	1	Manual operation is active (handwheel is engaged); optional signal
			0	No signal.
4	EMCY stop active	(50) = "Bit: EMCY stop active"	1	Operation mode EMERGENCY stop is active (EMERGENCY stop button has been pressed).
			0	EMERGENCY stop button not pressed (normal operation).

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
5	PVST active	(116) = "Bit: PVST active"	1	Partial Valve Stroke Test function (PVST) is active.
			0	No signal.
6	—	—		No signal (reserved).
7	—	—		No signal (reserved).

### Byte 30: Function check 2

The contents are reserved for further Function check signals in accordance with NAMUR recommendation NE 107.

### Byte 31: Status fieldbus

Information on fieldbus status.

Table 22: Byte 31: Status fieldbus

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Channel 1 active	(99) = "Fieldbus Channel 1 active"	1	Channel 1 is the active operation command channel.
			0	No signal.
1	Channel 2 active	(100) = "Fieldbus Channel 2 active"	1	Channel 2 is the active operation command channel.
			0	No signal.
2	Channel 1 DataEx	(109) = "Bit: Pb DataEx Ch1"	1	Channel 1 is in the data exchange state (DataEx).
			0	No signal.
3	Channel 2 DataEx	(110) = "Bit: Pb DataEx Ch2"	1	Channel 2 is in the data exchange state (DataEx).
			0	No signal.
4	Ch.1 FailState Fieldb.	(112) = "Bit: Fieldbus-FailsafeAct.1"	1	No valid fieldbus communication via channel 1 (application does not communicate with the DCS).
			0	No signal.
5	Ch.2 FailState Fieldb.	(113) = "Bit: Fieldbus-FailsafeAct.2"	1	No valid fieldbus communication via channel 2 (application does not communicate with the DCS).
			0	No signal.
6	Channel 1 activity	(114) = "Bit: Chan1 BusComm"	1	Fieldbus communication on channel 1
			0	No signal.
7	Channel 2 activity	(115) = "Bit: Chan2 BusComm"	1	Fieldbus communication on channel 2
			0	No signal.

### Byte 32: SIL signals

Causes of the Maintenance required signal in accordance with NAMUR recommendation NE 107.

Table 23: Byte 32: SIL signals

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
1	Safe ESD <sup>1)</sup>	(204) = "Safe ESD"	1	Safe ESD (Emergency Shut Down) safety function of the SIL module is active.
			0	No signal.
2	Safe Stop <sup>1)</sup>	(205) = "Safe Stop"	1	Safe STOP safety function of the SIL module is active.
			0	No signal.
3	SIL fault <sup>1)</sup>	(206) = "SIL fault"	1	Collective signal Warning: A SIL fault of the SIL module has occurred.
			0	No signal.
4	SIL function active <sup>1)</sup>	(207) = "SIL function active"	1	A safety function of the SIL module is active.
			0	No signal.
4	—	—		No signal (reserved).

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
5	—	—		No signal (reserved).
6	—	—		No signal (reserved).
7	—	—		No signal (reserved).

1) The safety function indications via fieldbus are for information only and must not be used as part of a safety function. The I/O signals of the SIL module must be used for this purpose.

**Byte 33 to byte 40: Reserve**

The contents are reserved for future extensions.

**4.2. Output data (process representation output)**

The master (controls) can control the slave (actuator) via the process representation output.

**4.2.1. Process representation output arrangement**

**Information** To perform remote operations, the selector switch must be in position **REMOTE** .

Byte 1: Commands

	:	:	:	Fieldbus STOP	Fieldbus RESET	Fieldbus SETPOINT	Fieldbus CLOSE	Fieldbus OPEN
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	

Byte 2: Reserve 1

Reserved for future extensions
--------------------------------

Byte 3: Position setpoint (H)

Fieldbus Setpoint position/ (Process setpoint) High byte
--

Byte 4: Setpoint position (L)

Fieldbus Setpoint position/ (Process setpoint) Low byte
---

Byte 5: Additional commands

PVST	Fieldbus EMCY	Fieldbus channel 2	Fieldbus channel 1	Bluetooth activation	Fieldb. enable CLOSE	Fieldb. enable OPEN	Fieldb. enable LOCAL
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 6: Intermediate positions

Fieldb. interm.pos 8	Fieldb. interm.pos 7	Fieldb. interm.pos 6	Fieldb. interm.pos 5	Fieldb. interm.pos 4	Fieldb. interm.pos 3	Fieldb. interm.pos 2	Fieldb. interm.pos 1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 7: Digital outputs 1

:	:	:	:	reserved	reserved	reserved	reserved
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 8: Digital outputs 2

Enable commissioning	reserved	Fieldbus DOUT 6	Fieldbus DOUT 5	Fieldbus DOUT 4	Fieldbus DOUT 3	Fieldbus DOUT 2	Fieldbus DOUT 1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 9: Actual process value (H)

Option (only for use with process controller)
---

Byte 10: Actual process value (L)

Option (only for use with process controller)
---

Byte 11: Output AOUT 1 (H)

Fieldbus Output AOUT 1 High byte
----------------------------------

Byte 12: Output AOUT 1 (L)

Fieldbus Output AOUT 1 Low byte
---------------------------------

Byte 13: Output AOUT2 (H)

Fieldbus Output AOUT2 High byte
---------------------------------

Byte 14: Output AOUT2 (L)

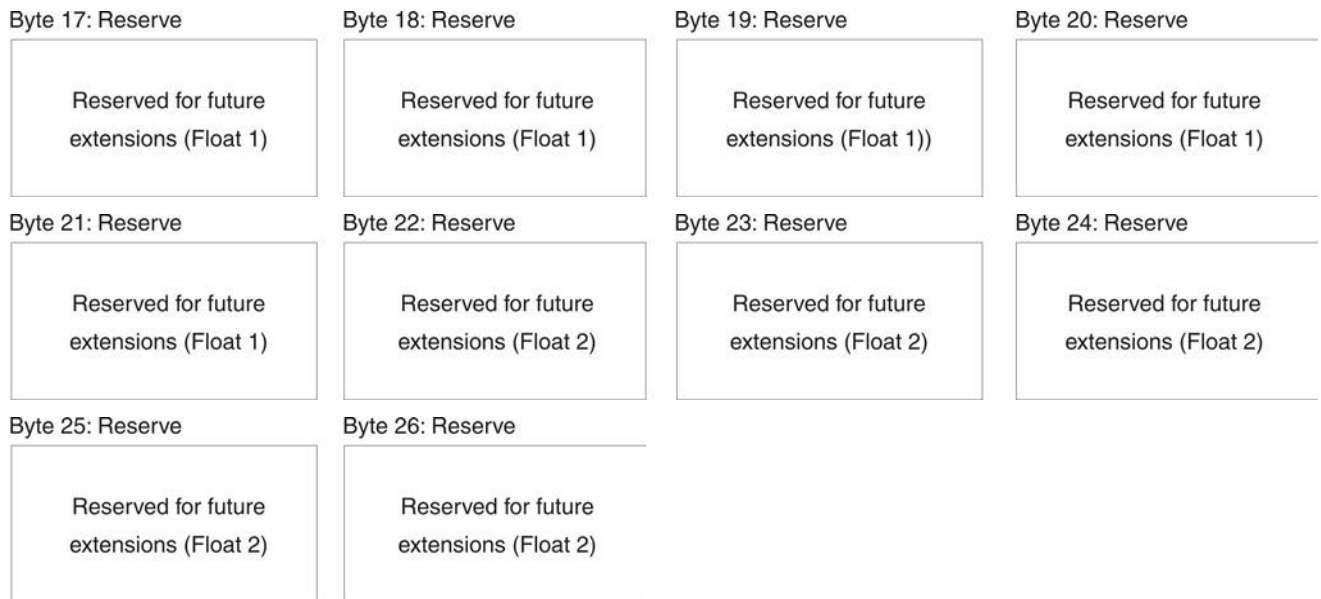
Fieldbus Output AOUT2 Low byte
--------------------------------

Byte 15: Comparative operation

Start torque Comparative operation
------------------------------------

Byte 16: Reserve

Reserved for future extensions
--------------------------------



**4.2.2. Description of the output data**

**Byte 1: Commands**

Table 24: Byte 1: Commands

Bit	Designation (process representation)	Value	Description
0	Fieldbus OPEN	1	Operation command in direction OPEN.
		0	No command
1	Fieldbus CLOSE	1	Operation command in direction CLOSE.
		0	No command
2	Fieldbus SETPOINT	1	Run to setpoint. Setpoint is provided via bytes 3 and 4. In combination with a process controller, this bit is used to select between process controller operation and OPEN - CLOSE operation.
		0	No command. In combination with a process controller, this bit is used to select between process controller operation and OPEN - CLOSE operation.
3	Fieldbus RESET	1	Certain indications of the actuator controls can be reset using this command in selector switch position <b>Remote control</b> (REMOTE) via fieldbus (e.g. PTC tripping device and torque fault). The function of this bit corresponds to the <b>ESC</b> at the local controls.
		0	No command
4	Not used		Fieldbus STOP.
5	—		No command (reserved)
6	—		No command (reserved)
7	—		No command (reserved)

**Bits 0, 1, 2 = operation commands**

Bits 0 – 2 are used to transmit operation commands to the actuator. Only one of these bits may be set to 1 at any given time. If several bits are set, no operation is performed and the following signal is given: **Wrong oper. cmd**

For operation commands via bit 2 (Fieldbus SETPOINT):

- If the setpoint is 0 per mil, the actuator runs to end position CLOSED; it runs to end position OPEN for 1000 per mil .
- If the limit of 1,000 is exceeded, the actuator completely runs to end position OPEN.

- To avoid placing too much strain on the actuator mechanics, reversion of direction is delayed. The default setting in the factory for the reversing prevention time is 300 ms.

**Bits 4, 5, 6, 7** Bits 4 through 7 are not used and must be set to 0.

#### Byte 2: Reserve

The contents are reserved for future extensions.

#### Bytes 3 and 4: Setpoint /(process setpoint, option)

Byte 3 = high byte, byte 4 = low byte.

The setpoint position is transmitted via bytes 3 and 4 (value: 0 – 1,000), using the position controller.

- The value 1,000 corresponds to the maximum setpoint, e.g. end position OPEN.
- The value 0 corresponds to the minimum setpoint, e.g. end position CLOSED.

As an alternative, the process setpoint can be transmitted via bytes 3 and 4 (value 0...1,000), using a process controller (option). Value 1,000 corresponds to the maximum process setpoint, value 0 to the minimum process setpoint.

#### Byte 5: Additional commands

Table 25: Byte 5: Additional commands

Bit	Designation (process representation)	Value	Description
0	Fieldb. enable LOCAL	1	Actuator operation via local controls enabled.
		0	Actuator operation via local controls disabled.
1	Fieldb. enable OPEN	1	Enabling operation command in direction OPEN
		0	Operation command in direction OPEN disabled.
2	Fieldb. enable CLOSE	1	Enables operation command in direction CLOSE
		0	Operation command in direction CLOSE disabled.
3	BluetoothActivDigIn	1	Activation of Bluetooth interface.
		0	Activation of Bluetooth interface disabled.
4	Fieldbus channel 1	1	Initiate change-over to channel 1
		0	No operation command
5	Fieldbus channel 2	1	Initiate change-over to channel 2
		0	No operation command
6	Fieldbus EMCY	1	EMERGENCY signal, triggers EMERGENCY behaviour.
		0	No command
7	PVST	1	Start Partial Valve Stroke Test (functional test)
		0	No operation command

#### Byte 6: Intermediate positions

Byte 6 is used for coding operation commands. Thus, 8 intermediate positions can be directly selected via fieldbus commands. Hereby, the selected intermediate position is approached directly, without stopping in another intermediate position.

In this case, the actuator continues running until the selected intermediate position has been reached. Example: Operation from position 5 to 7 without stopping at position 6.



Table 26: Byte 6: Operation commands for intermediate positions

Value	Behaviour
0x01	Position 1 is approached selecting the shortest travel.
0x02	Position 2 is approached selecting the shortest travel.
0x04	Position 3 is approached selecting the shortest travel.
0x08	Position 4 is approached selecting the shortest travel.
0x10	Position 5 is approached selecting the shortest travel.
0x20	Position 6 is approached selecting the shortest travel.
0x40	Position 7 is approached selecting the shortest travel.
0x80	Position 8 is approached selecting the shortest travel.

For further information, please refer to the Manual (Operation and setting).

Table 27: Operation commands via byte 6 for activated multiport valve function

Value	△ Operation direction/position	Behaviour
0x01	Position 1	Position 1 is approached selecting the shortest travel.
0x02	Position 2	Position 2 is approached selecting the shortest travel.
0x04	Position 3	Position 3 is approached selecting the shortest travel.
0x08	Position 4	Position 4 is approached selecting the shortest travel.
0x10	Position 5	Position 5 is approached selecting the shortest travel.
0x20	Position 6	Position 6 is approached selecting the shortest travel.
0x40	Position 7	Position 7 is approached selecting the shortest travel.
0x80	Position 8	Position 8 is approached selecting the shortest travel.
0x81	Position 9	Position 9 is approached selecting the shortest travel.
0x82	Position 10	Position 10 is approached selecting the shortest travel.
0x83	Position 11	Position 11 is approached selecting the shortest travel.
0x84	Position 12	Position 12 is approached selecting the shortest travel.
0x90	CW	Actuator operates in clockwise direction (without stop at any position).
0x91	CW Position 1	Position 1 is approached in clockwise direction (CW).
0x92	CW Position 2	Position 2 is approached in clockwise direction (CW).
0x93	CW Position 3	Position 3 is approached in clockwise direction (CW).
0x94	CW Position 4	Position 4 is approached in clockwise direction (CW).
0x95	CW Position 5	Position 5 is approached in clockwise direction (CW).
0x96	CW Position 6	Position 6 is approached in clockwise direction (CW).
0x97	CW Position 7	Position 7 is approached in clockwise direction (CW).
0x98	CW Position 8	Position 8 is approached in clockwise direction (CW).



Value	△ Operation direction/position	Behaviour
0x99	CW Position 9	Position 9 is approached in clockwise direction (CW).
0x9A	CW Position 10	Position 10 is approached in clockwise direction (CW).
0x9B	CW Position 11	Position 11 is approached in clockwise direction (CW).
0x9C	CW Position 12	Position 12 is approached in clockwise direction (CW).
0xA0	CCW	Actuator operation in counterclockwise direction (without stop at any position).
0xA1	CCW Position 1	Position 1 is approached in counterclockwise direction (CCW).
0xA2	CCW Position 2	Position 2 is approached in counterclockwise direction (CCW).
0xA3	CCW Position 3	Position 3 is approached in counterclockwise direction (CCW).
0xA4	CCW Position 4	Position 4 is approached in counterclockwise direction (CCW).
0xA5	CCW Position 5	Position 5 is approached in counterclockwise direction (CCW).
0xA6	CCW Position 6	Position 6 is approached in counterclockwise direction (CCW).
0xA7	CCW Position 7	Position 7 is approached in counterclockwise direction (CCW).
0xA8	CCW Position 8	Position 8 is approached in counterclockwise direction (CCW).
0xA9	CCW Position 9	Position 9 is approached in counterclockwise direction (CCW).
0xAA	CCW Position 10	Position 10 is approached in counterclockwise direction (CCW).
0xAB	CCW Position 11	Position 11 is approached in counterclockwise direction (CCW).
0xAC	CCW Position 12	Position 12 is approached in counterclockwise direction (CCW).

### Byte 7: Digital outputs 1

The digital outputs Fieldbus DOUT 1 – DOUT 6 of the fieldbus interface can be used as commands for the output contacts. For this, the outputs of the output contacts have to be assigned with the signals **Fieldbus DOUT 1 – Fieldbus DOUT 6**.

Table 28: Byte 7: Digital outputs 1

Bit	Designation (process representation)	Value	Description
0	—		No command (reserved)
1	—		No command (reserved)
2	—		No command (reserved)
3	—		No command (reserved)
4	—		No command (reserved)
5	—		No command (reserved)
6	—		No command (reserved)
7	—		No command (reserved)

**Byte 8: Digital outputs 2**

Table 29: Byte 8: Digital outputs 2

Bit	Designation (process representation)	Value	Description
0	Fieldbus DOUT 1	1	Digital output 1 is activated.
		0	Output is deactivated.
1	Fieldbus DOUT 2	1	Digital output 2 is activated.
		0	Output is deactivated.
2	Fieldbus DOUT 3	1	Digital output 3 is activated.
		0	Output is deactivated.
3	Fieldbus DOUT 4	1	Digital output 4 is activated.
		0	Output is deactivated.
4	Fieldbus DOUT 5	1	Digital output 5 is activated.
		0	Output is deactivated.
5	Fieldbus DOUT 6	1	Digital output 6 is activated.
		0	Output is deactivated.
6	—		No command (reserved)
7	Enable commissioning	1	Digital output 7 is activated.
		0	Output is deactivated.

**Bytes 9 and 10: Actual process value**

Byte 9 = high byte, byte 10 = low byte.

Byte 9 and byte 10 in combination with a process controller (option) can be used to transmit the actual process value.

**Bytes 11 and 12: Fieldbus output AOUT 1**

Byte 11 = high byte, byte 12 = low byte.

Bytes 11 and 12 can be used to send an analogue value to the actuator.

The value is transmitted in per mil (value: 0 – 1,000).

The outputs "Fieldbus output AOUT 1" and "Fieldbus output AOUT 2" can be used as output values via the analogue outputs. For this, the outputs of the analogue outputs have to be assigned with the signals **Fieldbus AOUT 1** or **Fieldbus AOUT 2**.

**Bytes 13 and 14: Fieldbus output AOUT 2**

Byte 13 = high byte, byte 14 = low byte.

Bytes 13 and 14 can be used to send a second analogue value to the actuator.

The value is transmitted in per mil (value: 0 – 1,000).

**Byte 15: Start torque comparative operation**

Byte 15 - Torque comparative operation.

**Byte 15 to byte 26: Reserve**

The contents are reserved for future extensions.

**4.3. Profibus DP-V1 services**

Apart from the cyclic DP-V0 process data exchange, the Profibus DP-V1 services can establish an additional acyclic communication via the fieldbus.

An actuator with activated Profibus DP-V1 services grants access to the contents of the device ID, the operational information, and the most important parameters for setting and the maintenance information.

This allows access from a central control station to all data of actuators connected to the Profibus DP network for preventive maintenance or uniform parameter setting.

The actuator supports an acyclic DP-V1 connection with controls (DPM1 = master of class 1) and one acyclic DP-V1 connection with engineering stations (DPM2 = master of class 2).

The following DP-V1 fault indications are supported:

	Fault indication	Error Class	Error Code	Cause
Read	Access.Invalid Slot	11	2	An invalid slot was accessed.
	Access.Invalid Index	11	0	An invalid index was accessed.
Write	Access.Invalid Slot	11	2	An invalid slot was accessed.
	Access.Invalid Index	11	0	An invalid index was accessed.
	Access.write length	11	1	The transmitted data length is invalid.
	Access.invalid parameter	11	8	Invalid parameter value
	Access.access denied	11	6	No write access permitted
	Application write error	10	1	Slot/index is read only

Depending on the DCS, either a DTM (Device Type Manager) Batch or an FDI batch is required to integrate device-specific information, data and parameters, which can be accessed via Profibus DP-V1, into the engineering station.

The availability of the Profibus DP-V1 services is preset in the factory. For the description of DP-V1 services, refer to appendix.

## 5. Corrective action

### 5.1. Troubleshooting

In case of problems with Profibus DP communication, the actuator provides important information on troubleshooting via the display (menu **Diagnostics M0022**).

The indication and diagnostic LEDs on the Profibus DP board can also be used as support.

Table 30: Troubleshooting table

			Causes and remedies
1	Can the actuator be controlled via Profibus DP?	Yes	No fault
		No	→ Continue with 2
2	Select menu: <b>Diagnostics M0022</b>		→ Continue with 3
3	Select menu: for channel 1: <b>Profibus DP1 M0240</b>		→ Continue with 4
4	Select menu: for channel 1: <b>DP1 Profibus status</b>	<b>Data Ex</b>	Profibus DP communication is ok. → Continue with 5
		<b>Wait Prm</b>	No communication between slave and master Possible causes and remedies: <ul style="list-style-type: none"> <li>Parameter data incorrect → Correct parameter data in master</li> <li>Parameters have not yet been sent → Send parameters</li> <li>Incorrect GSD file was possibly used → Check GSD file</li> <li>Cable connection might be interrupted or connected with incorrect polarity → Check cable connection</li> </ul>
		<b>Wait Cfg</b>	No communication between slave and master Possible causes and remedies: <ul style="list-style-type: none"> <li>Configuration data incorrect → Correct configuration in master.</li> <li>Configuration data not yet sent → Send configuration data</li> </ul>
5	Select menu: for channel 1: <b>DP1 GC clear M0556</b>	<b>GC Clear active</b>	Slave is in the fail safe state Possible remedies: <ul style="list-style-type: none"> <li>→ Check all other implemented slaves at the Profibus.</li> <li>→ Deactivate Autoclear function in the master, if required.</li> <li>→ Send GC OPERATE telegram.</li> </ul>
		<b>GC Clear inactive</b>	→ Continue with 6
6	Select menu: for channel 1: <b>DP1 data length 0</b>	<b>Data length 0 active</b>	Slave is in the fail safe state Possible remedies: <ul style="list-style-type: none"> <li>→ Check all other implemented slaves at the Profibus.</li> <li>→ Deactivate Autoclear function in the master, if required.</li> <li>→ Send GC OPERATE telegram.</li> </ul>
		<b>Data length 0 inactive</b>	→ Continue with 7
7	Fahrt über die Ortssteuerstelle möglich?	Yes	Possible causes and remedies: <ul style="list-style-type: none"> <li>Master does not send an operation command.</li> <li>Master sends wrong operation command.</li> </ul> → Check program of controls
		No	Possible causes and remedies: <ul style="list-style-type: none"> <li>Faults such as torque, thermal or internal fault</li> </ul> → Check logic board, motor control and motor. → Continue with 8

### 5.2. Diagnostics

Menu **Diagnostics M0022** can be used to check the different states of the Profibus DP interface.

The <Information on Profibus DP 1> table shows the menus for the 1st DP interface.

Table 31: Information on Profibus DP 1

Indication on display	Value and description	
DP1 slave address M0547	Bus address (slave address)	
DP1 baud rate M0099	Baud rate	
DP1 watchdog status M0411	Watchdog status	
	Baud search	The Profibus DP interface searches a baud rate. If no baud rate was found: <ul style="list-style-type: none"> <li>• Connect bus cable</li> <li>• Check bus cables</li> <li>• Switch on DP master</li> </ul>
	Baud control	The detected baud rate is monitored. The DP watchdog in the master is not activated. In this instance, the safety function is not available.
	DP control	DP communication monitored, the DP watchdog in the master is activated. The safety function is therefore not available.
DP1 Profibus status M0554	Profibus Status	
	Wait Prm	The Profibus DP interface is waiting for correct parameter data.
	Wait Cfg	The Profibus DP interface is waiting for correct configuration data.
	Data Ex	The Profibus DP interface is currently exchanging data with the master.
DP1 GC clear M0556	Global Control Clear Status	
	GC Clear inactive	
	GC Clear active	The Profibus DP interface has received the Global Control Clear telegram and is waiting for the Global Control Operate telegram. In this mode, DP communication works perfectly, however the actuator cannot be operated via PLC. If the safety function is activated it will be initiated.
DP1 data length 0 M0557	Data length 0 status	
	Data length 0 inactive	
	Data length 0 active	The Profibus DP interface receives data telegrams of the length 0. In this mode, DP communication works perfectly, however the actuator cannot be operated via PLC. If the safety function is activated it will be initiated.
DP1 GC freeze M0558	Global Control Freeze Status	
	GC Freeze inactive	The Unfreeze Global Control Telegram is used to cancel the Freeze state.
	GC Freeze active	The Freeze Global Control Telegram is used to freeze the inputs of the Profibus DP (feedback signals).
DP1 GC sync M059	Global Control Sync Status	
	GC Sync inactive	The Unsync Global Control Telegram is used to cancel the Sync state.
	GC Sync active	The Sync Global Control Telegram is used to freeze the outputs of the Profibus DP (operation commands signals).
DP1 config. data M1195	Configuration data (number of input and output bytes) set by the master.	

Table 32: Profibus Details

Indication on display	Value and description	
DP-V1 control	In this state, the actuators can only be operated using the acyclic Profibus DP-V1 services (only possible if no cyclic DP-V0 connection is available)	
DP-V1 active	At least one acyclic Profibus DP-V1 connection is active	
Channel 1 active	Profibus interface of channel 1 is used	
Primary	Profibus DP2, (Profibus DP, channel 1)	
	None	No channel is used as primary channel
	Channel 1	Channel 1 is used as primary channel
	Channel 2	Channel 2 is used as primary channel
Profibus Ident no.	Depending on the available functions, different IDENT numbers are assigned to the actuator:	
	0x1144	for Profibus DP-V0 and DP-V1

Indication on display	Value and description	
DP-V1 (SetPrm)	DP-V1 function in parameter telegram (SetPrm)	
	<b>Deactivated</b>	DP-V1 services were deactivated using the parameters of the parameter telegram (SetPrm).
	<b>Activated</b>	DP-V1 services were activated using the parameters of the parameter telegram (SetPrm).
Alarms (SetPrm)	Signalling alarms within the parameter telegram (SetPrm)	
	<b>Deactivated</b>	Alarms were deactivated using the parameters of the parameter telegram (SetPrm).
	<b>Activated</b>	Alarms were activated using the parameters of the parameter telegram (SetPrm).

## 6. Technical data

**Information** The following tables include standard and optional features. For detailed information on the customer-specific version, refer to the order-related data sheet. The technical data sheet can be downloaded from the Internet in both German and English at <http://www.auma.com> (please state the order number).

### 6.1. Profibus DP interface

#### Settings/programming the Profibus DP interface

Baud rate setting	Automatic baud rate recognition
Setting the fieldbus address	The Profibus DP address is set via the display of the device.
Configurable process representation via GSD file	For an optimum adaptation to the process control system, the process representation input (feedback signals) can be configured as desired.

#### General Profibus DP interface data

Communication protocol	Profibus DP according to IEC 61158 and IEC 61784		
Network topology	Line (fieldbus) structure. When using repeaters, tree structures can also be implemented. Coupling and uncoupling of devices during operation without affecting other devices is possible.		
Transmission medium	Twisted, screened copper cable according to IEC 61158		
Profibus DP interface	EIA-485 (RS-485)		
Transmission rate/cable length	Baud rate (kbit/s)	Max. cable length (segment length) without repeater	Possible cable length with repeater (total network cable length):
	9.6 – 93.75	1,200 m	approx. 10 km
	187.5	1,000 m	approx. 10 km
	500	400 m	approx. 4 km
	1,500	200 m	approx. 2 km
Device types	DP master class 1, e.g. central controllers such as PLC, PC, ... DP master class 2, e.g. programming/configuration tools DP slave, e.g. devices with digital and/or analogue inputs/outputs such as actuators, sensors		
Number of devices	32 devices without repeater, with repeater expandable to 126		
Fieldbus access	Token-passing between masters and polling for slaves. Mono-master or multi-master systems are possible.		
Supported Profibus DP functions	Cyclic data exchange, sync mode, freeze mode, fail safe mode		
Profibus DP ident no.	0x1144:	Standard applications with Profibus DP-V0 and DP-V1	



<b>Commands and signals of the Profibus DP interface</b>	
Process representation output (command signals)	OPEN, STOP, CLOSE, position setpoint, RESET, EMERGENCY operation command, enable local controls, Interlock OPEN/CLOSE
Process representation input (feedback signals)	<ul style="list-style-type: none"> <li>• End positions OPEN, CLOSED</li> <li>• Actual position value</li> <li>• Actual torque value, requires MWG in actuator</li> <li>• Selector switch in position LOCAL/REMOTE</li> <li>• Running indication (directional)</li> <li>• Torque switches OPEN, CLOSED</li> <li>• Limit switches OPEN, CLOSED</li> <li>• Manual operation by handwheel or via local controls</li> <li>• Analogue (2) and digital (4) customer inputs</li> </ul>
Process representation input (fault signals)	<ul style="list-style-type: none"> <li>• Motor protection tripped</li> <li>• Torque switch tripped in mid-travel</li> <li>• Failure of analogue customer inputs</li> </ul>
Behaviour on loss of communication	<p>The behaviour of the actuator is programmable:</p> <ul style="list-style-type: none"> <li>• Stop in current position</li> <li>• Travel to end position OPEN or CLOSED</li> <li>• Travel to any intermediate position</li> <li>• Execute last received operation command</li> </ul>

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