Actuator controls

AUMATIC AC 01.2/ACExC 01.2

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, operation, commissioning) for actuator
- Manual (Operation and setting) AUMATIC AC 01.2 Profibus DP

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

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1. Safety instructions

1.1. Basic information on safety

Standards/directives

AUMA products are designed and manufactured in compliance with recognised standards and directives. This is certified in a Declaration of Incorporation and a EC Declaration of Conformity.

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 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 exclusively by suitably qualified personnel having been 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.

Commissioning

Prior to commissioning, it is important to 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 the national regulations.
- During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend to the check surface temperature with an appropriate thermometer prior to working with device and to wear protective gloves, if required.

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

Any device modification requires the consent of the manufacturer.

1.2. Range of application

AUMA actuator controls are exclusively designed for the operation of AUMA actuators.

Other applications require explicit (written) confirmation by the manufacturer. The following applications are not permitted, e.g.:

- motor control
- pump control

No liability can be assumed for inappropriate or unintended use.

Observance of these 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).

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

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

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

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

Arrangement and typographic structure of the warnings

DANGER

Type of hazard and respective source!

Potential consequence(s) in case of non-observance (option)

→ Measures to avoid the danger

→ Further measure(s)

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)

✓ Important information before the next step. This symbol indicates what is required for the next step or what has to be prepared or observed.

M ▷ **Via the menu to parameter**

Describes the path within the menu to the parameter. By using the push buttons of the local controls you may quickly find the desired parameter in the display.

< > **Reference to other sections**

Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

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.
- DP-V2 redundancy according to PNO guideline 2.212
- DP-V2 time stamp according to PNO guideline 2.192 or IEC 61158 / 64784
- 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 parameterized and configured using the programming software at the controls (Profibus configurator).

The programming software first reads the GSD file (**G**eneral**S**tation**D**ata) of the individual actuators. The GSD file contains information about the device properties needed by the master.

Afterwards, the user can configure and parameterize 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 functional elements 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 signification 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 bus. This ensures a high security against configuration errors.

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

AUMA actuators with actuator controls AC 01.2 are listed under the following ID numbers at the PNO:

- ID number of the standard version: **0x0C4F** with functions for:
  - Single channel Profibus DP interface (not redundant)
  - Redundant Profibus DP interface according to AUMA redundancy (I or II)
  - Optional Profibus DP V1 services
- ID number of the extended version: **0x0CBD** with functions for:
  - Redundant Profibus DP interface according to Profibus DP-V2 redundancy
  - Time stamp and alarms according to Profibus DP-V2
  - 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. Structure, contents and coding of the device master data (GSD) are standardised. They enable comfortable configuration of any DP slaves with configuration devices by different manufacturers.

For AUMA actuators with AC 01.2 controls, the following GSD files are available:

- Standard version: **AUMA0C4F.GSD** with functions for:
  - Single channel Profibus DP interface (not redundant)
  - Redundant Profibus DP interface according to AUMA redundancy
  - Optional Profibus DP V1 services
- Optional version: **AUMA0CBD.GSD** with functions for:
  - Redundant Profibus DP interface according to Profibus DP-V2 redundancy
  - Time stamp and alarms according to Profibus DP-V2
  - Optional Profibus DP V1 services

Information

GSD files can be downloaded from our website: 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).

In addition, the Profibus DP interface can receive further user parameters thus enabling complete configuration of the process representation input. These parameters can be modified via the programming software of the controls. New programming software supports the parameter setting via text and a menu selection. For older versions, the parameters must be entered as hexadecimal numbers.

Table 1: Structure of the parameter telegram

Byte	Bit								Remark
	7	6	5	4	3	2	1	0	
1	Lock	Unlock	Sync	Freeze	WD_ON	0	0	0	
2									WD factor 1
3									WD factor 2
4									MinTSDR
5									ID no. high
6									ID no. low
7									Group ID
8	DPV1 Enable	0	0	0	0	WD_Base	0	0	DP-V1 status 1
9	PrmCmd	Enable Process Alarm	0	0	0	0	0	0	DP-V1 status 2
10	0	0	0	0	PrmStruct	Alarm Mode			DP-V1 status 3

Settings for basic functions of the Profibus:

WD_Base WD_Base = 0 (time base 10 ms)

WD_Base = 1 (time base 1 ms)

Connection monitoring time of the Profibus DP communication:

T_{WD} = (1 or 10 ms, depending on WD_Base) x (WD factor 1) x (WD factor 2)

MinTSDR Minimum response time of the actuator (in T_{Bit})

ID no. ID number of the actuator

Group ID Group assignment by the master

Settings for Profibus DP-V1 services (option):

DPV1 Enable Activates the DP-V1 services available as an option; must be set to 1 when using DP-V1 services.

Settings for Profibus DP-V2 functions (option):

Enable Process Alarm Enables the process alarm (required for time synchronisation with time stamp), must be set to 1.

Alarm Mode Number of supported alarms, must be set to 0 (i.e. one alarm of each type is supported).

PrmStruct Structured parameter setting possible, must be set to 1.

PrmCmd Parameter command activated, must be set to 1 for Profibus DP-V2 redundancy.

In the bytes following byte 10 of the parameter telegram the user parameters for adaptation of the process representation input to the DCS can among others be found (AUMA specific parameters).

The GSD file available on the website does not contain any user parameters for adapting the process representation input to DCS requirements. The actuator will use the default process representation with this GSD file. For further information please refer to <Process representation input (default process representation)>.

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.

The bus address is stored in a non-volatile memory.

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 push buttons (indication in the display).
  For details on setting refer to the operation instructions to the actuator or Manual (Operation and Setting) AUMATIC AC 01.1 Profibus DP.
- Using the AUMA CDT service software (via PC or laptop with Bluetooth).
  The latest version of the AUMA CDT can be downloaded from our website: www.auma.com.
- Via fieldbus. Please note that only one device with the address 126 (default value) may 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).

For redundant version according to Profibus DP-V2 redundancy, only the address of the primary channel can be set; the address of the backup channel is derived from the primary.

For redundant version according to AUMA redundancy, the addresses of both channels can be set individually.

3.4. Configuring the 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: consistently or non-consistently.

Information Only the number of bytes determined in the configuration is transferred 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

Number of input bytes	Number of output bytes
32	4
32	8
32	12
32	16
40	26

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

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

The number of output bytes states how many of the maximum of 26 bytes the DP master sends to the DP slave.

If, for example, the configuration with 8 bytes input is selected, only the first 8 bytes are sent from the DP slave to the DP master. 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.

The data of the AUMA actuators should 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 possibility to use consistent configurations by means of the process control system, a non-consistent configuration 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. AUMA user parameters (AUMA specific parameters)

The process representation input can be updated by means of the user parameters. Default values and selection options are defined in a specific GSD file available on request.

Two GSD files are available for AUMATIC AC 01.2/ACExC 01.2. A standard version (AUMA04CF for ident-no. 0x0C4F) and an optional version with additional user parameters for setting time stamp and alarms according to Profibus DP-V2 (AUMA0CBD for ident no. 0x0CBD).

3.6.1. Process representation input arrangement (user parameters)

The process representation input data can be arranged in any order. Arrangement is defined by means of the user parameters in the GSD file, available on request. Users may assign a specific indication to each Profibus DP signal. The data volume of the transmitted data depends on the type of signals selected (u8, u16, i, individual signals).

3.6.2. Settable (user definable) signals

Table 2: Description of the parameter settings

Prm-Text-Def GSD file	Designation (process representation)	Description
(0) = "Bit: Reserved"	–	
(1) = "Bit: End p. CLOSED"	Bit: End p. CLOSED	For limit seating: Limit switch operated in direction CLOSE For torque seating: Torque switch and limit switch operated in direction CLOSE
(2) = "Bit: End p. OPEN"	Bit: End p. OPEN	For limit seating: Limit switch operated in direction OPEN For torque seating: Torque switch and limit switch operated in direction OPEN
(3) = "Bit: End p. CLOSED, blink"	Bit: EP CLOSED, blink	End position CLOSED reached or intermediate position reached (The intermediate position is only indicated if parameter Signal interm. pos. M0167 = OPEN/CLOSED = On.) Signal blinking: Actuator runs in direction CLOSE.
(4) = "Bit: End p. OPEN, blink"	Bit: EP OPEN, blink	End position OPEN reached or intermediate position reached. (The intermediate position is only indicated if parameter Signal interm. pos. M0167 = OPEN/CLOSED = On.) Signal blinking: Actuator runs in direction OPEN.
(5) = "Bit: Setpoint reached"	Bit: Setpoint reached	The position setpoint is is within max. error variable (outer dead band). Is only signalled if Profibus DP master has set the Fieldbus SETPOINT bit (process representation output).
(6) = "Bit: Running CLOSE"	Bit: Running CLOSE	An operation command in direction CLOSE is performed via fieldbus: Fieldbus CLOSE or Fieldbus SETPOINT (process representation output). This bit remains also set during operation pauses (e.g. due to the dead time or the reversing prevention time).
(7) = "Bit: Running OPEN"	Bit: Running OPEN	An operation command in direction OPEN is performed via fieldbus: Fieldbus OPEN or Fieldbus SETPOINT (process representation output). This bit remains also set during operation pauses (e.g. due to the dead time or the reversing prevention time).
(8) = "Bit: Selector sw. LOCAL"	Bit: Sel. sw. LOCAL	Selector switch is in position LOCAL.
(9) = "Bit: Sel. sw. REMOTE"	Bit: Sel. sw. REMOTE	Selector switch is in position REMOTE.
(10) = "Bit: Sel. sw. OFF"	Bit: Sel. sw. OFF	Selector switch is in position OFF.
(11) = "Bit: Limit sw. CLOSED"	Bit: Limit sw. CLOSED	Limit switch operated in end position CLOSED
(12) = "Bit: Limit sw. OPEN"	Bit: Limit sw. OPEN	Limit switch operated in end position OPEN
(13) = "Bit: Torque sw. CLOSE"	Bit: Torque sw.CLOSE	Torque switch operated in direction CLOSE
(14) = "Bit: Torque sw. OPEN"	Bit: Torque sw.OPEN	Torque switch operated in direction OPEN
(15) = "Bit: Device ok"	Bit: Device ok	Collective signal 05: The device is ready for remote control. No AUMA warnings, AUMA faults or signals according to NAMUR are present.
(16) = "Bit: Failure"	Bit: Failure	Collective signal 10: Indication according to NAMUR recommendation NE 107 Actuator function failure, output signals are invalid.
(17) = "Bit: Function check"	Bit: Function check	Collective signal 08: Indication according to NAMUR recommendation NE 107 The actuator is being worked on; output signals are temporarily invalid.
(18) = "Bit: Out of spec."	Bit: Out of spec.	Collective signal 07: Indication according to NAMUR recommendation NE 107 Actuator is operated outside the normal operation conditions.
(19) = "Bit: Maintenance requ."	Bit: Maintenance requ.	Collective signal 09: Indication according to NAMUR recommendation NE 107 Recommendation to perform maintenance.

Prm-Text-Def GSD file	Designation (process representation)	Description
(20) = "Bit: Fault"	Bit: Fault	Collective signal 03: Contains the result of a disjunction (OR operation) of all faults. The actuator cannot be operated.
(21) = "Bit: Warnings"	Bit: Warnings	Collective signal 02: Contains the result of an OR disjunction of all warnings.
(22) = "Bit: Not ready REMOTE"	Bit: Not ready REMOTE	Collective signal 04: Contains the result of a disjunction (OR-operation) of the signals, forming the "Not ready REMOTE" group. The actuator cannot be operated from REMOTE.
(23) = "Bit: Op. pause active"	Bit: Op. pause active	The actuator is in off-time (e.g. stepping mode or reversing prevention time).
(24) = "Bit: Start step mode"	Bit: Start step mode	The actuator is within the set stepping range.
(25) = "Bit: Actuator running"	Bit: Actuator running	Actuator is running (output drive is moving) Hard wired collective signal consisting of signals: • (26) Bit: Running LOCAL • (27) Bit: Running REMOTE • (28) Bit: Handwheel oper.
(26) = "Bit: Running LOCAL"	Bit: Running LOCAL	Output drive rotates due to operation command from LOCAL.
(27) = "Bit: Running REMOTE"	Bit: Running REMOTE	Output drive rotates due to operation command from REMOTE.
(28) = "Bit: Running via handw."	Bit: Handwheel oper.	Output drive rotates without electric operation command (manual operation).
(29) = "Bit: In interm. position"	Bit: In interm. position	The actuator is in an intermediate position e.g. neither in end position OPEN nor in end position CLOSED.
(30) = "Bit: Failure behav. active"	Bit: Failure behav. act.	The failure behaviour is active.
(31) = "Bit: Intermediate pos. 1"	Bit: Interm. pos. 1	Intermediate position 1 reached
(32) = "Bit: Intermediate pos. 2"	Bit: Interm. pos. 2	Intermediate position 2 reached
(33) = "Bit: Intermediate pos. 3"	Bit: Interm. pos. 3	Intermediate position 3 reached
(34) = "Bit: Intermediate pos. 4"	Bit: Interm. pos. 4	Intermediate position 4 reached
(35) = "Bit: Intermediate pos. 5"	Bit: Interm. pos. 5	Intermediate position 5 reached
(36) = "Bit: Intermediate pos. 6"	Bit: Interm. pos. 6	Intermediate position 6 reached
(37) = "Bit: Intermediate pos. 7"	Bit: Interm. pos. 7	Intermediate position 7 reached
(38) = "Bit: Intermediate pos. 8"	Bit: Interm. pos. 8	Intermediate position 8 reached
(39) = "Bit: Input DIN 1"	Bit: Input DIN 1	A high signal (+24 V DC) is present at digital input 1.
(40) = "Bit: Input DIN 2"	Bit: Input DIN 2	A high signal (+24 V DC) is present at digital input 2.
(41) = "Bit: Input DIN 3"	Bit: Input DIN 3	A high signal (+24 V DC) is present at digital input 3.
(42) = "Bit: Input DIN 4"	Bit: Input DIN 4	A high signal (+24 V DC) is present at digital input 4.
(43) = "Bit: Input DIN 5"	Bit: Input DIN 5	A high signal (+24 V DC) is present at digital input 5.
(44) = "Bit: Input DIN 6"	Bit: Input DIN 6	A high signal (+24 V DC) is present at digital input 6.
(45) = "Bit: Input DIN 7"	Bit: Input DIN 7	Parameter not available
(46) = "Bit: Input DIN 8"	Bit: Input DIN 8	Parameter not available
(47) = "Bit: FailState fieldbus"	Bit: FailState fieldbus	No valid communication via fieldbus (despite available connection)
(48) = "Bit: I/O interface"	Bit: I/O interface	The actuator is controlled via the I/O interface (parallel).
(49) = "Bit: EMCY behav.act."	Bit: EMCY behav. act.	Operation mode EMERGENCY is active (EMERGENCY signal was sent).
(50) = "Bit: EMCY stop active"	Bit: EMCY stop active	Operation mode EMERGENCY stop is active (EMERGENCY stop button pressed).
(51) = "Bit: Service active"	Bit: Service active	Operation mode Service (via Bluetooth) is active.
(52) = "Bit: Interlock active"	Bit: Interlock active	Actuator is interlocked.
(53) = "Bit: Sel. sw. not REMOTE"	Bit: Sel. sw. not REMOTE	Selector switch is in position **Local control** (LOCAL) or **0** (OFF).
(54) = "Bit: Handwheel active"	Bit: Handwheel active	Manual operation is active (handwheel is engaged); optional signal

Prm-Text-Def GSD file	Designation (process representation)	Description
(55) = "Bit: Wrong command"	Bit: Setpoint disabled	Received setpoint cannot be performed as the positioner is not available.
(56) = "Bit: Thermal fault"	Bit: Thermal fault	Motor protection tripped.
(57) = "Bit: Phase fault"	Bit: Phase failure	• When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. • When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing.
(58) = "Bit: Wrong phase sequence"	Bit: Incorrect phase seq	The phase conductors L1, L2 and L3 are connected in the wrong sequence.
(59) = "Bit: Mains quality"	Bit: Mains quality	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.
(60) = "Bit: Torque fault CLOSE"	Bit: Torque fault CLOSE	Torque fault in direction CLOSE
(61) = "Bit: Torque fault OPEN"	Bit: Torque fault OPEN	Torque fault in direction OPEN
(62) = "Bit: Torque fault"	Bit: Torque fault	Torque fault in directions CLOSE or OPEN
(63) = "Bit: Operat. time warning"	Bit: Op. time warning	Warning: Max. permissible operating time for an operation (OPEN-CLOSE) exceeded
(64) = "Bit: On time warning"	Bit: On time warning	Warning: Max. number of motor starts (starts) or max. running time/h exceeded
(65) = "Bit: 24 V AC, internal"	Bit: 24 V AC internal	The internal 24 V AC voltage supply of the controls has exceeded the power supply limits. The 24 V AC voltage supply is used to control the reversing contactors, to assess the thermoswitches, to supply the internal actuator heater and, as an option, to generate the 115 V AC supply for the customer.
(66) = "Bit: 24 V DC control volt."	Bit: 24 V DC control volt.	The 24 V DC auxiliary voltage (e.g. for supply of the control outputs) is outside the supply voltage limits.
(67) = "Bit: 24 V DC, internal"	Bit: 24 V DC internal	The internal 24 V DC supply voltage of the controls for supply of the electronic components is outside the supply voltage limits.
(68) = "Bit: 24 V DC, external"	Bit: 24 V DC, external	The external 24 V DC voltage supply of the controls has exceeded the power supply limits.
(69) = "Bit: Internal error"	Bit: Internal error	Collective signal 14: Internal error
(70) = "Bit: Internal warning"	Bit: Internal warning	Collective signal 15: Internal warning
(71) = "Bit: No reaction"	Bit: No reaction	No actuator reaction to operation commands within the set reaction time.
(72) = "Bit: Configuration error"	Bit: Configuration error	Incorrect configuration, i.e. the current setting is invalid.
(73) = "Bit: Temp. fault controls"	Bit: Temp. fault controls	Parameter not available
(74) = "Bit: Temp. fault motor"	Bit: Temp. fault motor	Parameter not available
(75) = "Bit: Temp.fault gearbox"	Bit: Temp. fault gear	Parameter not available
(76) = "Bit: Wrn heater"	Bit: Wrn heater	Heater failure at actuator (control unit)
(77) = "Bit: RTC not set"	Bit: RTC not set	Real time clock has not yet been set.
(78) = "Bit: Wrn humidity"	Bit: Wrn humidity	Parameter not available
(79) = "Bit: WrnRefActPos"	Bit: WrnRefActPos	Warning: Position feedback of actuator was not yet referenced for limit end positions.
(80) = "Bit: WrnSigRgeActPos"	Bit: WrnSigRgeActPos	Warning: Current position feedback signal range is outside the permissible range.
(81) = "Bit: WrnSigLossActPos"	Bit: WrnSigLossActPos	Warning: A signal loss has occurred for actuator position feedback.
(82) = "Bit: WrnActPosition"	Bit: WrnActPosition	Warning: Actual position of actuator Collective signal consisting of: • (79) Bit: WrnRefActPos • (80) Bit: WrnSigRgeActPos • (81) Bit: WrnSigLossActPos

Prm-Text-Def GSD file	Designation (process representation)	Description
(83) = "Bit: Wrn FO ring"	Bit: Wrn FO cables	Warning: Optical receiving signal (channel 1) incorrect (no or insufficient Rx receive level) or RS-485 format error (incorrect bit(s))
(84) = "Bit: WrnOnTiRunning"	Bit: WrnOnTiRunning	Warning on time max. running time/h exceeded
(85) = "Bit: WrnOnTiStarts"	Bit: WrnOnTiStarts	Warning on time max. number of motor starts (starts) exceeded
(86) = "Bit: Wrn vibration"	Bit: WrnOnTiRunning	Parameter not available
(87) = "Bit: Wrn dew point"	Bit: WrnOnTiStarts	Parameter not available
(88) = "Bit: WrnControlsTemp"	Bit: Wrn controls temp	Warning: Temperature within controls housing too high
(89) = "Bit: Wrn motor temp."	Bit: Wrn motor temp	Parameter not available
(90) = "Bit: Wrn gearbox temp."	Bit: Wrn gearbox temp	Parameter not available
(91) = "Bit: Wrn input AIN 1"	Bit: Wrn input AIN 1	Warning: Loss of signal analogue input 1
(92) = "Bit: Wrn input AIN 2"	Bit: Wrn input AIN 2	Warning: Loss of signal analogue input 2
(93) = "Bit: WrnActProcVal"	Bit: WrnActProcVal	Warning: Loss of signal actual process value
(94) = "Bit: WrnProcSetpoint"	Bit: WrnProcSetpoint	Warning: Loss of signal process setpoint
(95) = "Bit: WrnSetpointPos"	Bit: WrnSetpointPos	Warning: Loss of signal of actuator setpoint position
(96) = "Bit: Fieldbus failure"	Bit: Fieldbus failure	Fieldbus failure
(97) = "Bit: Local Stop"	Bit: Local STOP	A local STOP is active. Push button STOP of local controls is operated.
(98) = "Bit: Wrong operation cmd"	Bit: Wrong oper. cmd	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).
(99) = "Bit: Channel 1 active"	Bit: Channel 1 active	Channel 1 is the active operation command channel.
(100) = "Bit: Channel 2 active"	Bit: Channel 2 active	Channel 2 is the active operation command channel.
(101) = "Bit: Motor running Close"	Bit:Motor runs CLOSE	Motor runs in direction CLOSE.
(102) = "Bit: Motor running Open"	Bit:Motor runs OPEN	Motor runs in direction OPEN.
(103) = "Bit: Time Sync active"	Bit: DP TimeSynch (SetPrm)	Time synchronisation is active.
(104) = "Bit: Interlock Remote"	Bit: Interlock Remote	The Interlock function prevents an operation in operation mode REMOTE.
(105) = "Bit: Interlock Local"	Bit: Interlock Local	The Interlock function prevents an operation in operation mode LOCAL.
(106) = "Bit: Interlock"	Bit: Interlock	The Interlock function prevents an operation in operation mode REMOTE or in operation mode LOCAL.
(107) = "Bit: Disabled"	Bit: Disabled	Operation mode disabled.
(108) = "Bit: Config. Warning"	Bit: Config. warning	Warning: Configuration setting is incorrect. The device can still be operated with restrictions.
(109) = "Bit: Pb DataEx Ch1"	Bit: Channel 1 DataEx	Channel 1 is in the data exchange state (DataEx).
(110) = "Bit: Pb DataEx Ch2"	Bit: Channel 2 DataEx	Channel 2 is in the data exchange state (DataEx).
(111) = "Bit: Wrn FOC budget"	Bit: Wrn FOC budget	Warning: FO cable system reserve reached (critical or permissible Rx receive level)
(112) = "Bit: FieldbusFailsafeAct.1"	Bit: Chan 1 FailState fieldbus	No valid fieldbus communication via channel 1 (application does not communicate with the DCS).
(113) = "Bit: FieldbusFailsafeAct.2"	Bit: Chan 2 FailState fieldbus	No valid fieldbus communication via channel 2 (application does not communicate with the DCS).
(114) = "Bit: Chan1 BusComm"	Bit: Channel 1 activity	Bus communication available on channel 1.
(115) = "Bit: Chan2 BusComm"	Bit: Channel 2 activity	Bus communication available on channel 2.
(116) = "Bit: PVST active"	Bit: PVST active	Partial Valve Stroke Test (PVST) is active.
(117) = "Bit: PVST fault"	Bit: PVST error	Partial Valve Stroke Test (PVST) could not be successfully completed.

Prm-Text-Def GSD file	Designation (process representation)	Description
(118) = "Bit: PVST abort"	Bit: PVST abort	Partial Valve Stroke Test (PVST) was aborted or could not be started. Remedy: Perform RESET or restart PVST.
(119) = "Bit: Interlock OPEN"	Bit: Interlock OPEN	Release signal OPEN not active: Operation commands in direction OPEN are disabled.
(120) = "Bit: Interlock CLOSE"	Bit: Interlock CLOSE	Release signal CLOSE not active: Operation commands in direction CLOSE are disabled.
(121) = "Bit: Bypass Interlock"	Bit: Interlock by-pass	Bypass of interlock function is active.
(122) = "Bit: Fault no reaction"	Bit: No reaction (fault)	No reaction detected at actuator output drive.
(123) = "Bit: Config error remote"	Bit: Config. error REMOTE	Config. error of REMOTE interface active.
(124) = "Bit: Torque wrn OPEN"	Bit: Torque warn. OPEN	Warning: Limit value for torque warning in direction OPEN exceeded.
(125) = "Bit: Torque wrn CLOSE"	Bit: Torque warn. CLOSE	Warning: Limit value for torque warning in direction CLOSE exceeded.
(126) = "Bit: RTC button cell"	Bit: RTC button cell	Warning: Voltage of RTC button cell too low.
(127) = "Bit: Wrn FOC connection"	Bit: Wrn FOC connection	Warning: FO cable connection is not available.
(128) = "u16: Actual position"	u16: Actual position	Actual actuator position (0 – 1,000 per mil)
(129) = "u16: Input AIN 1"	u16: Input AIN 1	Analogue input 1
(130) = "u16: Input AIN 2"	u16: Input AIN 2	Analogue input 2
(131) = "u16: Torque CLOSE %"	u16: Torque CLOSE %	Torque in direction CLOSE, unit in %
(132) = "u16: Torque OPEN %"	u16: Torque OPEN %	Torque in direction OPEN, unit in %
(133) = "u16: Torque CLOSE Nm"	u16: Torque CLOSE Nm	Torque in direction CLOSE, unit in Nm
(134) = "u16: Torque OPEN Nm"	u16: Torque OPEN Nm	Torque in direction OPEN, unit in Nm
(135) = "u16: torque CLOSE ft-lb"	u16: torque CLOSE ft-lb	Torque in direction CLOSE, unit in ft-lb
(136) = "u16: Torque OPEN ft-lb"	u16: Torque OPEN ft-lb	Torque in direction OPEN, unit in ft-lb
(137) = "u16: Torque"	u16: Torque	Actual torque value
(139) = "u16: Actual Position 0-100%"	Actual position 0-100 %	Actual actuator position (0 – 100 percent)
(160) = "i16: Actual position"		Parameter not available
(161) = "i16: Input AIN 1"		Parameter not available
(162) = "i16: Input AIN 2"		Parameter not available
(163) = "i16: Torque CLOSE %"		Parameter not available
(164) = "i16: Torque OPEN %"		Parameter not available
(192) = "float: Actual position"		Parameter not available
(193) = "float: Input AIN 1"		Parameter not available
(194) = "float: Input AIN 2"		Parameter not available
(195) = "float: T CLOSE %"		Parameter not available
(196) = "float: T OPEN %"		Parameter not available
(197) = "float: T CLOSE Nm"		Parameter not available
(198) = "float: T OPEN Nm"		Parameter not available
(199) = "float: T CLOSE lbs/ft."		Parameter not available
(200) = "float: T OPEN lbs/ft."		Parameter not available
(201) = "Cylinder printing max."	Bit: Cylinder pressure max.	Parameter not available
(202) = "Hydraulics fault"	Bit: Hydraulic pressure fault	Parameter not available
(203) = "Hydraulics warning"	Bit: Wrn hydraulics	Parameter not available
(204) = "Safe ESD"	Bit: Safe ESD [1)]	Safe ESD function (Emergency Shut Down) is active.
(205) = "Safe Stop"	Bit: Safe STOP [1)]	Safe STOP function is active.
(206) = "SIL fault"	Bit: SIL fault [1)]	A SIL fault has occurred (collective signal).
(207) = "SIL function active"	Bit: SIL function active [1)]	A SIL function is active.
(208) = "PVST required"	Bit: PVST required	(PVST) Partial Valve Stroke Test should be executed
(209) = "Mechanic lifetime"	Bit: Maintenance mechanics	Mechanic maintenance requirement

Prm-Text-Def GSD file	Designation (process representation)	Description
(210) = "Seal lifetime"	Bit: Maintenance seals	Seal maintenance requirement
(211) = "Seal lifetime"	Bit: Maintenance lubricant	Lubricant maintenance requirement
(212) = "Contactor lifetime"	Bit: Maintenance contact-ors	Contactor maintenance requirement
(213) = "Maintenance interval"	Bit: Maintenance interval	The set maintenance interval has expired.
(214) = "Maintenance required"	Bit: Maintenance required	Maintenance required

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.

3.6.3. Additional (user-definable) parameters (option)

Parameter description of additional user parameters for setting the time stamp and alarms according to Profibus DP-V2, available with the optional version **AUMA0CBD.gsd**.

Table 3: Description of additional settings

Prm-Text GSD Datei ExtUserPrmData =	Setting	Description
1 "Setpoint valid bit"	–	No function
2 "Timestamp (TS)"	Text(0) = "disable"	DP-V2 time stamp deactivated.
	Text(1) = "enable"	DP-V2 time stamp activated.
3 "TS -> End Position Close"	Text(0) = "disable"	DP-V2 time stamp of End position CLOSED signal deactiv-ated.
	Text(1) = "enable"	DP-V2 time stamp of End position CLOSED signal activated.
4 "TS -> End Position Open"	Text(0) = "disable"	DP-V2 time stamp of End position OPEN signal deactivated.
	Text(1) = "enable"	DP-V2 time stamp of End position OPEN signal activated.
5 "TS -> Torque Limit Switch Close"	Text(0) = "disable"	DP-V2 time stamp of Torque sw. CLOSED signal deactiv-ated.
	Text(1) = "enable"	DP-V2 time stamp of Torque sw. CLOSED signal activated.
6 "TS -> Torque Limit Switch Open"	Text(0) = "disable"	DP-V2 time stamp of Torque sw. OPEN signal deactivated.
	Text(1) = "enable"	DP-V2 time stamp of Torque sw. OPEN signal activated.
7 "TS -> Ready and Remote"	Text(0) = "disable"	DP-V2 time stamp of Selector sw. REMOTE signal deactiv-ated.
	Text(1) = "enable"	DP-V2 time stamp of Selector sw. REMOTE signal activated.
8 "TS -> Fault"	Text(0) = "disable"	DP-V2 time stamp of Fault signal deactivated.
	Text(1) = "enable"	DP-V2 time stamp of Fault signal activated.
9 "TS -> Power Supply Fault"	Text(0) = "disable"	DP-V2 time stamp of Phase fault signal deactivated.
	Text(1) = "enable"	DP-V2 time stamp of Phase fault signal activated.
10 "TS -> reserved"	–	Without function (reserved)
11 "reserved Byte"	–	Without function (reserved)

3.6.4. Further adaptation options

From firmware 04.05.xx, the actuator controls provide the option to adapt to the existing DCS configurations of the actuator type range AC 01.**1**/ACExC 01.**1**. Actuator controls of type range AC 01.**2**/ACExC 01.**2** can be adapted as to support the default arrangement of the Profibus DP-V0 process representation input of AC 01.**1**/ACExC 01.**1** without changing the Profibus configuration of the DCS.

Setting is performed using the following parameter: Device configuration>Profibus>Connection type = AUMATIC .1

Information

- Only the Profibus DP-V0 standard arrangement of the process representation input of AC 01**.1**/ACExC 01**.1** is supported, deviating arrangements of the Profibus DP-V0 process data input require use/installation of AUMA04CF.gsd or AUMA0CBD.gsd file in the DCS.
- With connection type = AUMATIC.1 the AC 01**.2**/ACExC 01**.2** does not provide any diagnostic NAMUR NE 107 information within the cyclic process data representation.
- EDD or DTM of the AC 01**.2**/ACExC 01**.2** must imperatively be used for acyclic communication via Profibus DP-V1 with AC 01**.2**/ACExC 01**.2**!
- Factory setting: Connection type = AUMATIC.2

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 fails safe telegrams are received, the actuator remains in the DataExchange 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 the 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:

⚠ CAUTION

The actuator can start its 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 **0** (OFF). The motor operation can only be interrupted in this selector switch position.

→ If the actuator starts its operation by accident: Set selector switch to position **0** (OFF).

3.8. I & M functions

The actuator controls support the I & M functions 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 inteprete 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 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.

Byte1: Logical signals

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

Byte 2: Actuator signals

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

Byte 3: Actual position value (H)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Acutal position High byte (positioner)							

Byte 4: Actual position value (L)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Actual position Low byte (positioner)							

Byte 5: Device status

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

Byte 6: Operation status

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

Byte 7: Intermediate positions

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

Byte 8: Discrete inputs

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

Byte 9: Input AIN 1 (H)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input AIN 1							

Byte 10: Input AIN 1 (L)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input AIN 1							

Byte 11: Torque (H)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Torque High byte							

Byte 12: Torque (L)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Torque Low byte							

Byte13: Not ready REMOTE 1

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

Byte 14: Not ready REMOTE 2

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

Byte 15: Fault 1

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

Byte 16: Fault 2

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

Byte 17: Warning 1

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

Byte 18: Warning 2

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

Byte 19: Warning 3

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Op. time warning	WrnOnTiRunning	WrnOnTiStarts	Internal warning	Wrn input AIN 1	Wrn input AIN 2	Wrn FOC	Wrn FO cable budget

Byte 20: Warning 4

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PVST fault	PVST abort	Failure behav. active	Wrn FOC connection	PVST required	WrnSetpointPos	--	--

Byte 21: Input AIN 2 (H)

Input AIN 2

Byte 22: Input AIN 2 (L)

Input AIN 2

Byte 23: Failure

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

Byte 24: Maintenance required

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

Byte 25: Out of specification 1

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

Byte 26: Out of specification 2

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

Byte 27: Out of specification 3

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Op. time warning	WrnOnTiRunning	WrnOnTiStarts	Internal warning	Wrn input AIN 1	Wrn input AIN 2	Wrn FOC	Wrn FO cable budget

Byte 28: Out of specification 4

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PVST fault	PVST abort	Failure behav. active	Wrn FOC connection	PVST required	WrnSetpointPos	--	--

Byte 29: Function check 1

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

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

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

Byte 32: SIL signals

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

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: Logical 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 to perform 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 4: Byte 1: Logical signals

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: End p. 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	Bit: End p. 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	Bit: Setpoint reached	(5) = "Bit: Setpoint reached"	1	The setpoint is within max. error variable (outer dead band). Is only signalled if Profibus DP master has set the Fieldbus SETPOINT bit (process representation output).
			0	No signal
3	Bit: 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	Bit: Running OPEN	(7) = "Bit: Running OPEN"	1	An operation command in direction OPEN is performed via fieldbus: Fieldbus OPEN or Fieldbus SETPOINT (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	Bit: Running CLOSE	(6) = "Bit: Running CLOSE"	1	An operation command in direction CLOSE is performed via fieldbus: Fieldbus CLOSE or Fieldbus SETPOINT (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	Bit: Warnings	(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	Bit: 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 5: Byte 2: Actuator signals

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Thermal fault	(56) = "Bit: Thermal fault"	1	Motor protection tripped
			0	No signal
1	Bit: Phase failure	(57) = "Bit: Phase fault"	1	• When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. • When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing.
			0	All phases are available.
2	Bit: Sel. sw. REMOTE	(9) = "Bit: Sel. sw. REMOTE"	1	Selector switch is in position REMOTE.
			0	Selector switch is not in position REMOTE.
3	Bit: Sel. sw. LOCAL	(8) = "Bit: Selector sw. LOCAL"	1	Selector switch is in position LOCAL.
			0	Selector switch is not in position LOCAL.
4	Bit: Limit sw. OPEN	(12) = "Bit: Limit sw. OPEN"	1	Limit switch operated in end position OPEN
			0	No signal
5	Bit: Limit sw. CLOSED	(11) = "Bit: Limit sw. CLOSED"	1	Limit switch operated in end position CLOSED
			0	No signal
6	Bit: Torque sw.OPEN	(14) = "Bit: Torque sw. OPEN"	1	Torque switch operated in direction OPEN.
			0	No signal
7	Bit: Torque sw.CLOSE	(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 (potentiometer, RWG, EWG, or MWG) 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 6: Byte 5: Device status

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: 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	Bit: Warnings	(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	Bit: 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	Bit: Maintenance requ.	(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	Bit: 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	Bit: Function 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	Bit: 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	Bit: Device ok	(15) = "Bit: Device ok"	1	Sammelmeldung 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

This byte stores information about actuator movement.

Table 7: Byte 6: Operation status

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Op. pause active	(23) = "Bit: Op. pause active"	1	The actuator is in off-time (e.g. reversing prevention time)
			0	No signal
1	Bit: In interm. position	(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	Bit: Start step 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	Bit: Actuator running	(25) = "Bit: Actuator running"	1	Actuator is running (output drive is moving) Hard wired collective signal consisting of signals: • (26) Bit: Running LOCAL • (27) Bit: Running REMOTE • (28) Bit: Handwheel oper.
			0	No signal

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

Byte 7: Intermediate positions

Table 8: Byte 7: Intermediate positions

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

Byte 8: Discrete inputs

Table 9: Byte 8: Discrete inputs

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: 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	Bit: 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	Bit: 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	Bit: 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	Bit: 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	Bit: 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	—	—		No signal (reserved)

Byte 9 and byte 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 at the AC via push buttons and 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 11 and byte 12: Torque

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

Bytes 11 and 12 transmit the current torque of the actuator (only if an MWG is installed in the actuator).

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 10: Byte 13: Not ready REMOTE 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Wrong oper. cmd	(98) = "Bit: Wrong operation cmd"	1	Wrong operation command Indicates the fact 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	Bit: Sel. sw. not REMOTE	(53) = "Bit: Sel. sw. not REMOTE""	1	Selector switch is in position **Local control** (LOCAL) or **0** (OFF).
			0	Selector switch is in position **Remote control** (REMOTE).
2	Bit: Interlock active	(52) = "Bit: Interlock active"	1	Actuator is interlocked.
			0	No signal
3	Bit: Local STOP	(97) = "Bit: Local Stop"	1	Push button STOP of local controls is operated.
			0	No signal
4	Bit: 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	Bit: EMCY behav. act.	(49) = "Bit: EMCY behav.act."	1	Operation mode EMERGENCY behaviour is active (EMERGENCY signal was sent).
			0	No signal
6	Bit: FailState fieldbus	(47) = "Bit: FailState fieldbus"	1	No valid communication via fieldbus (despite available connection)
			0	Communication via fieldbus is ok.
7	Bit: 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 fieldbus.

Byte 14: Not ready REMOTE 2

Table 11: 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	Bit: SIL function active [1)]	(207) = "SIL function active"	1	The safety function of the SIL sub-assembly is active.
			0	No signal.
3	Bit: Disabled	(107) = "Bit: Disabled"	1	Actuator is in operation mode Disabled.
			0	No signal
4	Bit: Interlock by-pass	(121) = "Bit: Bypass Interlock"	1	By-pass of interlock function is active.
			0	No signal
5	Bit: PVST active	(116) = "Bit: PVST active"	1	Partial Valve Stroke Test (PVST) is active.
			0	No signal
6	Bit: Service active	(51) = "Bit: Service active"	1	Operation mode Service is active.
			0	No signal
7	Bit: 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 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 12: Byte 15: Fault 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Configuration error	(72) = "Bit: Configuration error"	1	Incorrect configuration, i.e. the current setting of the actuator controls is invalid.
			0	Configuration is ok.
1	Bit: 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	Bit: Thermal fault	(56) = "Bit: Thermal fault"	1	Motor protection tripped
			0	No signal
3	Bit: Phase failure	(57) = "Bit: Phase fault"	1	• When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. • When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing.
			0	No signal
4	Bit: Torque fault OPEN	(61) = "Bit: Torque fault OPEN"	1	Torque fault in direction OPEN
			0	No signal
5	Bit: Torque fault CLOSE	(60) = "Bit: Torque fault CLOSE"	1	Torque fault in direction CLOSE
			0	No signal
6	Bit: Internal error	(69) = "Bit: Internal fault"	1	Collective signal 14: Internal fault
			0	No internal fault
7	Bit: 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 13: 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 (reserved)
6	Bit: Config. error REMOTE	(123) = "Bit: Config error remote"	1	Configuration error of REMOTE interface active.
			0	No signal.
7	Bit: 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 14: 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 (reserved)
4	Bit: Torque warn. CLOSE	(125) = "Bit: Torque wrn CLOSE"	1	Warning: Limit value for Torque warning CLOSE exceeded
			0	No signal
5	Bit: Torque warn. OPEN	(124) = "Bit: Torque wrn OPEN"	1	Warning: Limit value for Torque warning OPEN exceeded
			0	No signal
6	Bit: SIL fault [1)]	(206) = "SIL fault"	1	Warning: A SIL fault of the SIL sub-assembly has occurred.
			0	No signal
7	Bit: 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 18: Warnings 2

Table 15: Byte 18: Warnings 2

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

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
4	—	—		No signal (reserved)
5	Bit: RTC button cell	(126) = "Bit: RTC button cell"	1	Warning: The voltage of the RTC button cell is too low.
			0	No signal
6	Bit: RTC 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	Bit: 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 16: Byte 19: Warnings 3

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Wrn FOC budget	(111) = “Bit: Wrn FOC budget”	1	Warning: FO cable system reserve reached (critical or permissible Rx receive level)
			0	No signal
1	Bit: Wrn FO cables	(83) = "Bit: Wrn FO loop"	1	Warning: Optical receiving signal (channel 1) incorrect (no or insufficient Rx receive level) or RS-485 format error (incorrect bit(s))
			0	No signal
2	Bit: Wrn input AIN 2	(92) = "Bit: Wrn input AIN 2"	1	Warning: Loss of signal analogue input 2
			0	No signal
3	Bit: Wrn input AIN 1	(91) = "Bit: Wrn input AIN 1"	1	Warning: Loss of signal analogue input 1
			0	No signal
4	Bit: Internal warning	(70) = "Bit: Internal warning"	1	Collective signal 15: Internal warning
			0	No internal warning
5	Bit: WrnOnTiStarts	(85) = "Bit: WrnOnTiStarts"	1	Warning: Max. number of motor starts (starts) exceeded
			0	No signal
6	Bit: WrnOnTiRunning	(84) = "Bit: WrnOnTiRunning"	1	Warning: Max. running time/h exceeded
			0	No signal
7	Bit: 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 17: Byte 20: Warnings 4

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	—	—		No signal (reserved)
1	—	—		No signal (reserved)
2	Bit: WrnSetpointPos	(95) = "Bit: WrnSetpointPos"	1	Warning: Loss of signal of actuator setpoint position
			0	No signal
3	Bit: PVST required	(208) = "PVST required"	1	Warning: A Partial Valve Stroke Test (PVST) should be performed.
			0	
4	Bit: Wrn FOC connection	(127) = "Bit: Wrn FOC connection"	1	Warning: FO cable connection not available.
			0	No signal
5	Bit: Failure behav. act.	(30) = "Bit: Failure behav. active"	1	The failure behaviour is active.
			0	No signal

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
6	Bit: 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	Bit: PVST error	(117) = "Bit: PVST fault"	1	Partial Valve Stroke Test (PVST) could not be successfully completed.
			0	No signal

Byte 21 and byte 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 at the AC via push buttons and 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 18: 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	Bit: 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 19: Byte 24: Maintenance required

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

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
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 20: 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 (reserved)
4	Bit: Torque warn. CLOSE	(125) = "Bit: Torque wrn CLOSE"	1	Warning: Limit value for Torque warning CLOSE exceeded
			0	No signal
5	Bit: Torque warn. OPEN	(124) = "Bit: Torque wrn OPEN"	1	Warning: Limit value for Torque warning OPEN exceeded
			0	No signal
6	Bit: SIL fault [1)]	(206) = "SIL fault"	1	Warning: A SIL fault of the SIL sub-assembly has occurred.
			0	No signal
7	Bit: 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 21: Byte 26: Out of specification 2

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Wrn controls temp	(88) = "Bit: WrnControlsTemp"	1	Warning: Temperature within controls housing too high
			0	No signal
1	—	—		No signal (reserved)
2	—	—		No signal (reserved)
3	Bit: 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	Bit: RTC button cell	(126) = "Bit: RTC button cell"	1	Warning: The voltage of the RTC button cell is too low.
			0	No signal
6	Bit: RTC 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	Bit: 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 22: Byte 27: Out of specification 3

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Wrn FOC budget	(111) = “Bit: Wrn FOC budget”	1	Warning: FO cable system reserve reached (critical or permissible Rx receive level)
			0	No signal
1	Bit: Wrn FO cables	(83) = "Bit: Wrn FO loop"	1	Warning: Optical receiving signal (channel 1) incorrect (no or insufficient Rx receive level) or RS-485 format error (incorrect bit(s))
			0	No signal
2	Bit: Wrn input AIN 2	(92) = "Bit: Wrn input AIN 2"	1	Warning: Loss of signal analogue input 2
			0	No signal
3	Bit: Wrn input AIN 1	(91) = "Bit: Wrn input AIN 1"	1	Warning: Loss of signal analogue input 1
			0	No signal
4	Bit: Internal warning	(70) = "Bit: Internal warning"	1	Collective signal 15: Internal warning
			0	No internal warning
5	Bit: WrnOnTiStarts	(85) = "Bit: WrnOnTiStarts"	1	Warning: Max. number of motor starts (starts) exceeded
			0	No signal
6	Bit: WrnOnTiRunning	(84) = "Bit: WrnOnTiRunning"	1	Warning: Max. running time/h exceeded
			0	No signal
7	Bit: 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 23: 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	Bit: WrnSetpointPos	(95) = "Bit: WrnSetpointPos"	1	Warning: Loss of signal of actuator setpoint position
			0	No signal
3	Bit: PVST required	(208) = "PVST required"	1	Warning: A Partial Valve Stroke Test (PVST) should be performed.
			0	
4	Bit: Wrn FOC connection	(127) = "Bit: Wrn FOC connection"	1	Warning: FO cable connection not available.
			0	No signal
5	Bit: Failure behav. act.	(30) = "Bit: Failure behav. active"	1	The failure behaviour is active.
			0	No signal
6	Bit: 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	Bit: PVST error	(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 24: Byte 29: Function check 1

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Local STOP	(97) = "Bit: Local Stop"	1	Push button STOP of the local controls is operated.
			0	No signal
1	Bit: Sel. sw. not REMOTE	(53) = "Bit: Sel. sw. not REMOTE""	1	Selector switch is in position **Local control** (LOCAL) or **0** (OFF).
			0	Selector switch is in position **Remote control** (REMOTE).
2	Bit: Service active	(51) = "Bit: Service active"	1	Operation mode Service is active.
			0	No signal
3	Bit: Handwheel active	(54) = "Bit: Handwheel active"	1	Manual operation is active (handwheel is engaged); optional signal
			0	No signal
4	Bit: 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	Bit: PVST active	(116) = "Bit: PVST active"	1	Partial Valve Stroke Test (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 the fieldbus status.

Table 25: Byte 31: Status fieldbus

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

Byte 32: SIL indications

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

Table 26: Byte 32: SIL indications

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

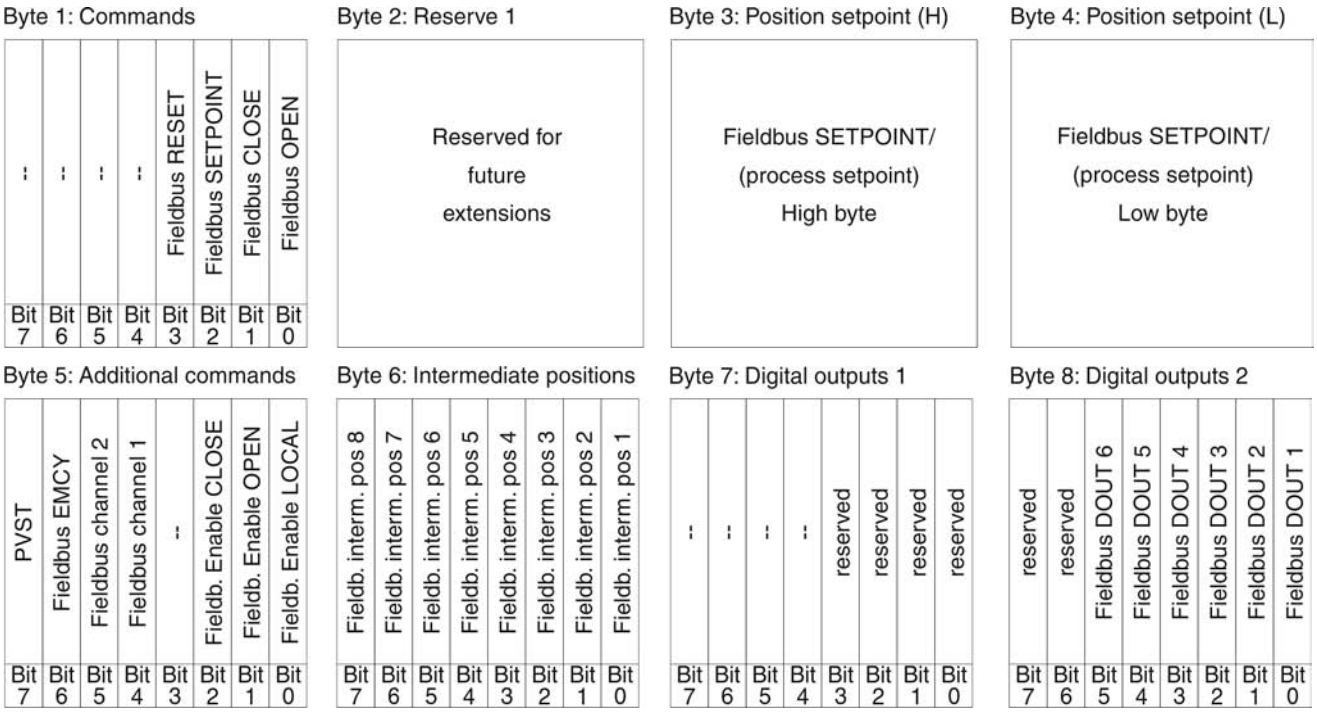
The contents are reserved for future extensions.

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 control** (REMOTE).



Byte 9: Actual process value (H)	Byte 10: Actual process value (L)	Byte 11: Output AOUT 1 (H)	Byte 12: Output AOUT 1 (L)
Option (only for use with process controller)	Option (only for use with process controller)	Fieldbus Output AOUT 1 High byte	Fieldbus Output AOUT 1 Low byte
Byte 13: Output AOUT 2 (H)	**Byte 14: Output AOUT 2 (L)**	**Byte 15: Reserve**	**Byte 16: Reserve**
Fieldbus Output AOUT 2 High byte	Fieldbus Output AOUT 2 Low byte	Reserved for future extensions	Reserved for future extensions
Byte 17: Reserve	**Byte 18: Reserve**	**Byte 19: Reserve**	**Byte 20: Reserve**
Reserved for future extensions (Float 1)	Reserved for future extensions (Float 1)	Reserved for future extensions (Float 1))	Reserved for future extensions (Float 1)
Byte 21: Reserve	**Byte 22: Reserve**	**Byte 23: Reserve**	**Byte 24: Reserve**
Reserved for future extensions (Float 1)	Reserved for future extensions (Float 2)	Reserved for future extensions (Float 2)	Reserved for future extensions (Float 2)
Byte 25: Reserve	**Byte 26: Reserve**		
Reserved for future extensions (Float 2)	Reserved for future extensions (Float 2)		

4.2.2. Description of the output data

Byte 1: Commands

Table 27: 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 proces controller, this bit is used to change-over between process controller mode and OPEN-CLOSE control.
		0	No command
3	Fieldbus RESET	1	Certain indications of the actuator controls can be reset via fieldbus while the selector switch is in position **Remote control** (REMOTE) via fieldbus (e.g. PTC tripping device and torque fault). The function of this bit corresponds to the push button **RESET** at the local controls.
		0	No command
4	—		No command (reserved)

Bit	Designation (process representation)	Value	Description
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):

- Condition: Position transmitter (potentiometer, RWG, EWG or MWG) installed in the actuator
- If the setpoint is 0 per mil, the actuators runs to the end position CLOSED; it runs to the 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 mechanics, the reversing 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: Reserved 1

The contents are reserved for future extensions.

Bytes 3 and 4: Setpoint position /(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, i.e. end position OPEN.
- The value 0 corresponds to the minimum setpoint, i.e. 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 28: 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	Enabling operation command in direction CLOSE
		0	Operation command in direction CLOSE disabled.
3	—		No command (reserved)
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

Table 29: Byte 6: Intermediate positions

Bit	Designation (process representation)	Value	Description
0	Fieldb. interm. pos. 1	1	Run to intermediate position 1.
		0	No command
1	Fieldb. interm. pos. 2	1	Run to intermediate position 2.
		0	No command
2	Fieldb. interm. pos. 3	1	Run to intermediate position 3.
		0	No command
3	Fieldb. interm. pos. 4	1	Run to intermediate position 4.
		0	No command
4	Fieldb. interm. pos. 5	1	Run to intermediate position 5.
		0	No command
5	Fieldb. interm. pos. 6	1	Run to intermediate position 6.
		0	No command
6	Fieldb. interm. pos. 7	1	Run to intermediate position 7.
		0	No command
7	Fieldb. interm. pos. 8	1	Run to intermediate position 8.
		0	No command

Bits 0 – 7 allow the direct selection of 8 intermediate positions 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.

For further information, please refer to Manual (Operation and setting) AUMATIC AC 01.2 Profibus DP.

If the multiport valve function is active (option), the entire byte 6 is used for coding of multiport valve operation commands. Up to 12 positions can either be approached selecting the shortest path, in clockwise direction (CW), or in counterclockwise direction (CCW). Furthermore, the actuator can also be operated without any position indications in clockwise or counterclockwise direction (CW or CCW).

Table 30: 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 path
0x02	Position 2	Position 2 is approached selecting the shortest path
0x04	Position 3	Position 3 is approached selecting the shortest path
0x08	Position 4	Position 4 is approached selecting the shortest path
0x10	Position 5	Position 5 is approached selecting the shortest path
0x20	Position 6	Position 6 is approached selecting the shortest path
0x40	Position 7	Position 7 is approached selecting the shortest path
0x80	Position 8	Position 8 is approached selecting the shortest path
0x81	Position 9	Position 9 is approached selecting the shortest path

Value	≙ Operation direction/position	Behaviour
0x82	Position 10	Position 10 is approached selecting the shortest path
0x83	Position 11	Position 11 is approached selecting the shortest path
0x84	Position 12	Position 12 is approached selecting the shortest path
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).
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 contact. For this, the outputs of the output contacts have to be assigned with the signals Fieldbus DOUT 1 – Fieldbus DOUT 6.

Table 31: 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 32: 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	—		No command (reserved)

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). 0 – 1000

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.

A second analogue value can be sent to the actuator using bytes 13 and 14.

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

Bytes 15 to 26: Reserve

The contents are reserved for future extensions.

4.3. Profibus DP V1 services

— Option —

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

Actuator controls with activated Profibus DP-V1 services grant access to the contents of the device ID, the operating data, and the most important parameters for setting and the maintenance information.

Access to the data of all actuators connected by the Profibus DP network is therefore enabled for preventive maintenance or uniform parameter setting.

Actuator controls support 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 ind.	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 can only be read.

Depending on the DCS, either a DTM (Device Type Manager) or an EDD (Electronic Device Description) 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 a description of the DP-V1 services, refer to the appendix.

4.4. Redundancy

— Option —

To increase the security of the installation, the actuator controls may be equipped with a redundant Profibus DP interface.

The following redundant operation modes are supported:

1. Redundant behaviour according to AUMA redundancy (AUMA redundancy I or AUMA redundancy II)
   (use of AUMA 0C4F.GSD in combination with the ident. no. of the standard version: **0x0C4F**)
2. Redundant behaviour according to Profibus DP-V2 redundancy in accordance with PNO guideline 2.212 (system redundancy or flying redundancy)
   (use of AUMA AUMA 0CBD.GSD in combination with the ident. no. of the standard version: **0x0CBD**)

The redundant behaviour is set using the following parameter: Device configuration > Profibus > Redundancy M0601

4.4.1. Redundant behaviour according to AUMA redundancy

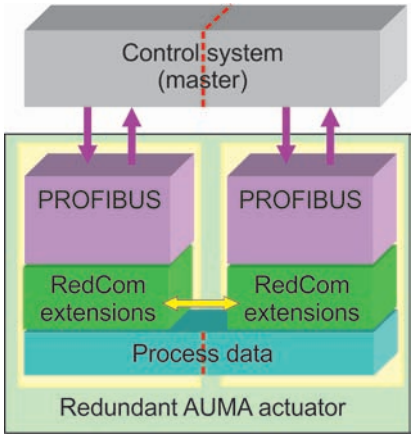
This redundancy type can be selected if the DCS does not support Profibus DP-V2 redundancy according to Profibus DP guideline 2.212 but a redundant structure is nevertheless required.

The physical structure of the redundant Profibus DP interfaces within the controls is based on two independent, galvanically isolated Profibus DP interfaces with an internal RedCom data channel for exchanging the communication status.

AUMA redundancy I

In general, the actuator decides autonomously which of the Profibus DP communication channels will be the active channel and therefore be able to operate the actuator and which channel will be the passive channel only providing feedback signals of the actuator. **The slave addresses can be individually assigned for both channels.**

Figure 1: Basic structure for AUMA redundancy I



The operation of both communication channels is logically, physically and chronologically separated.

The communication channel, which first exchanges process data with the controls (data exchange state), is the active channel, the second channel will automatically become the passive channel. The actuator can only be controlled via the active channel.

Controls (DPM1 = master of class 1) can only write and read acyclic data via the active channel. Engineering stations (DPM2 = master of class 2) can use both channels to read and write acyclic DP-V1 data (writing the same parameter via both communication channels simultaneously is, however, not possible).

Byte 31 Fieldbus status is used to signal the following communication states of the two channels to the DCS:

- Active or passive channel (Bit: Channel 1 active, Bit: Channel 2 active)
- Profibus DP Watchdog Status (Bit: Channel 1 DataEx, Bit: Channel 2 DataEx)
- Fault state (Bit: Chan 1 FailState fieldbus, Bit: Chan 2 FailState fieldbus)
- Available fieldbus communication (Bit: Channel 1 activity, Bit: Channel 2 activity), i.e. Profibus Watchdog Status ≠ Baud Search

The DCS may change over the active channel if both channels do not signal a fault state (neither Global Control Clear nor telegrams with the data length 0) and are in the DataEx state. Change-over is made during the logical 0–1 change of bits Fieldbus channel 1 or Fieldbus channel 2 in byte 5 of the output data (process representation output).

Change-over can be initiated both via the active and the passive channel.

Automatic change-over to another channel is performed if either the communication of the active channel fails or if Fail Safe telegrams (telegrams with the data length = 0) or Global Control Clear (GC Clear) telegrams are received via the active channel.

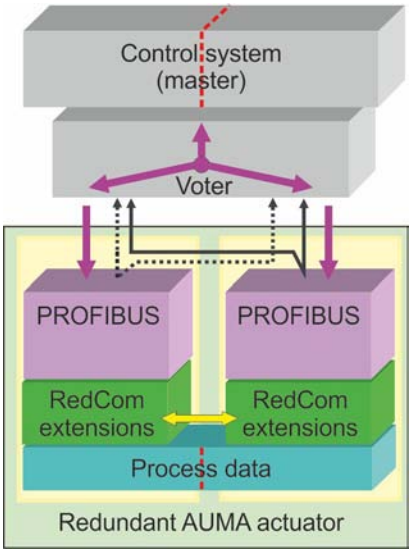
Changing channels does not result in a loss of data.

If neither of the channels exchange process data with the controls or if both channels receive Fail Safe telegrams (telegrams with the data length = 0) or Global Control Clear (GC Clear) telegrams, the set failure behaviour or EMERGENCY behaviour is started.

AUMA redundancy II

In general, the actuator decides autonomously which of the Profibus DP communication channels will be the active channel and therefore be able to operate the actuator and which channel will be the passive channel only providing feedback signals of the actuator. **Only one slave address can be assigned for both channels.**

Figure 2: Basic structure for AUMA redundancy II



Response path of the active channel

Response path after change-over

The operation of both communication channels is physically separated, however they are logically and chronologically synchronised.

The communication channel, which first exchanges process data with the controls (data exchange state), is the active channel, the second channel will automatically become the passive channel. The actuator can only be controlled via the active channel.

Controls (DPM1 = master of class 1) can only write and read acyclic data via the active channel. Engineering stations (DPM2 = master of class 2) can use both channels to read and write acyclic DP-V1 data (writing the same parameter via both communication channels simultaneously is, however, not possible).

Byte 31 Fieldbus status is used to signal the following communication states of the two channels to the DCS:

- Active or passive channel (Bit: Channel 1 active, Bit: Channel 2 active)
- Profibus DP Watchdog Status (Bit: Channel 1 DataEx, Bit: Channel 2 DataEx)
- Fault state (Bit: Chan 1 FailState fieldbus, Bit: Chan 2 FailState fieldbus)
- Available fieldbus communication (Bit: Channel 1 activity, Bit: Channel 2 activity), i.e. Profibus Watchdog Status ≠ Baud Search

The DCS may change-over the active channel if both channels do not signal a fault state (neither Global control clear nor telegrams with the data length 0) and are in the DataEx state. Change-over is made during the logical 0–1 change of bits Fieldbus channel 1 or Fieldbus channel 2 in byte 5 of the output data (process representation output).

Change-over can be initiated both via the active and the passive channel.

Changing channels does not result in a loss of data.

If neither of the channels exchange process data with the controls or if both channels receive Fail Safe telegrams (telegrams with the data length = 0) or Global Control Clear (GC Clear) telegrams, the set failure behaviour or EMERGENCY behaviour is started.

The special feature of AUMA redundancy II is its absolute, chronologically synchronised response of the Profibus telegrams via both communication channels with simultaneous monitoring of the passive channel on the basis of the received DataEx request telegrams. This redundancy behaviour is imperatively required in combination with DCS splitting a Profibus Stack to two redundant channels using a voter.

The Behaviour Tx parameter can be used to influence the transmission of response telegrams via the passive channel:

Tx active channel — Response telegrams are only sent via the active channel.

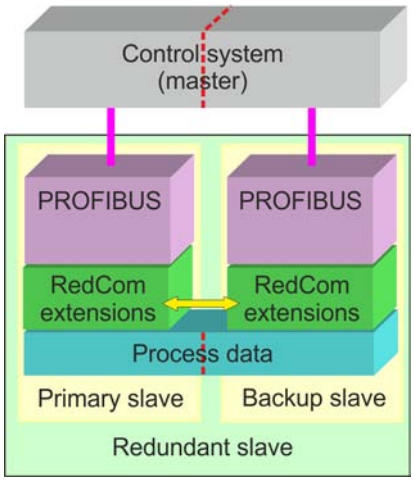
Tx both channels — Response telegrams are sent via both channels, the active and the passive channel.

4.4.2. Redundant behaviour according to Profibus DP-V2 redundancy (PNO guideline 2.212)

This redundancy type can be selected if the DCS supports Profibus DP-V2 redundancy according to Profibus DP guideline 2.212.

The physical structure of the redundant Profibus DP interfaces within the actuator corresponds to the structure for AUMA redundancy; two independent, galvanically isolated Profibus DP interfaces with an internal Redcom data channel for exchanging the communication status.

Figure 3: Structure for DP-V2 redundancy according to guideline 2.212



The master generally uses parameter telegrams to determine which Profibus DP communication channel is the primary channel and which is the backup channel. The primary channel is used to operate the actuator, the backup channel can also be used to establish a Profibus DP connection as an option; operation commands of the backup channel will, however, be ignored by the actuator.

Feedback signals on the communication status of the two Profibus DP interfaces and on received requests for changing the channels are performed by the extended diagnostic (Red_Status, 3 bytes); not all DCS support this extended diagnostic telegram.

Controls (DPM1 = master of class 1) can only write and read acyclic DP-V1 data via the primary channel. Engineering stations (DPM2 = master of class 2) can use both channels to read and write acyclic DP-V1 data (writing the same parameter via both communication channels simultaneously is, however, not possible).

Details for change-over and behaviour are stipulated in PNO guideline 2.212.

If neither of the channels exchange process data with the controls or if both channels receive Fail Safe telegrams (telegrams with the data length = 0) or Global Control Clear (GC Clear) telegrams, the set failure behaviour or EMERGENCY behaviour is started.

The redundant behaviour according to Profibus DP-V2 redundancy requires activation of the Profibus DP-V2 functions.

4.5. Profibus DP-V2 functions

— Option —

In addition to the cyclic Profibus DP-V0 process data exchange and in addition to the acyclic Profibus DP-V1 data exchange, the Profibus DP-V2 functions define further, more comprehensive functions:

- Isochronous mode
- Cross traffic between slaves
- Upload and download
- Redundancy
- Time synchronisation with time stamp

The actuator controls AUMATIC AC 01.2 supports the following functions:

- Redundancy
- Time synchronisation with time stamp

This means the two functions are only available combined. If only the time synchronisation with time stamp is exclusively required, the redundant channel can remain unconnected (connection with Profibus DP master not imperatively required.)

Profibus DP-V2 functions can be activated via the following parameters: Device configuration > Application functions > Activation > Profibus DP-V2 M0587

4.5.1. Profibus DP-V2 redundancy

The behaviour and the states of a redundant slave are defined in the "Specification Slave Redundancy 2.212" (also refer to <Redundant behaviour according to Profibus DP-V2 redundancy (PNO guideline 2.212)>). A distinction is made between a primary and a backup channel, with different effects on the properties of Profibus DP communication:

- Cyclic Profibus DP-V0 communication
  - Operation commands of the primary channel are processed and executed by the actuator; operation commands by the backup channel are ignored, the communication for the backup channel is only used for monitoring.
  - Feedback signals of the actuator can be sent via both channels.
  - Diagnostic feedback signals of the primary channel contain diagnostic status data of both the primary and the backup channel.
- Acyclic Profibus DP-V1 services of the controls (DPM1 = master class 1) are only supported by the primary channel.
- Acyclic Profibus DP-V1 services of the engineering stations (DPM2 = master class 2) are only supported by the primary channel.

Furthermore, a distinction is made between two configuration types within the Profibus DP-V2 redundancy:

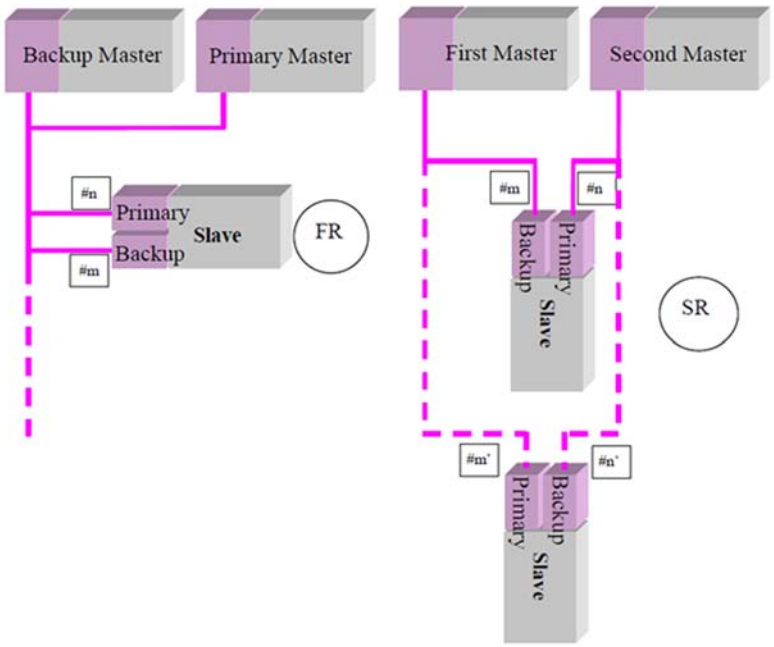
Flying redundancy (FR)

- The slave address of the primary channel is different from the address of the backup channel (slave address backup = slave address primary + 64, for this reason the slave address of the primary must be < 62).
- Only the slave address of the primary channel has to be set.
- The master never communicates via the backup channel with the slave.

System redundancy (SR)

- The slave address of the primary channel corresponds to the slave address of the backup channel.
- The master can configure both channels and can establish a cyclic DP-V0 connection via both channels.

Figure 4: Configuration type for Profibus DP-V2



Setting the bus address (slave address)

Each channel has its own address. After setting the primary address, the backup automatically accepts the address of the primary plus a configurable offset (either 0 or 64).

Startup behaviour

The channels automatically change between the startup_primary and startup_waiting states until the master starts the communication with the actuator. In the startup_primary state, the actuator waits with the primary slave address for the master to start the communication. The cycle starts with 2 s, this time is doubled after each cycle to max. 32 s.

Change over

The actuator does not decide autonomously on change-over. The master detects a loss of communication of the primary channel and may initiate change-over using a parameter telegram (parameter command PrmCmd). The former backup channel becomes the new primary channel.

Parameter command

Apart from the change-over commands, different parameters for the configuration of the Profibus DP-V2 redundancy are transmitted using the PrmCmd parameter command.

For Profibus DP-V2, the parameter command is part of the parameter telegram which is sent to the actuator on startup of the communication.

Table 33: Structure of the PrmCmd parameter command

Byte	Bit								Remark
	7	6	5	4	3	2	1	0	
1	0	0	0	0	1	0	0	0	Block length (= 0x08)
2	0	0	0	0	0	0	1	0	Structure type (= 0x02, PrmCmd parameter command for DP-V2 redundancy
3	0	0	0	0	0	0	0	0	Slot
4	Sequence number					Reserved			Specifier

Byte	Bit								Remark
	7	6	5	4	3	2	1	0	
5	Res	Master State Clear	Res	Check Proper-ties	Start MSAC1S	Stop MSAC1S	Primary Request	Res	Function
6	Reserved				Address Offset64	Address Change	Start/ Stop MSAC1S used	Primary Req_MS0_MS1 used	Properties
7									Output Hold Time high
8									Output Hold Time low

Output Hold Time

In the event of change-over, the outputs will not be changed during this time (time base = 10 ms)

Address Offset64/ Address Change

Change-over between flying redundancy and system redundancy

AddressOffset64 = 1 and AddressChange = 1, > Flying redundancy is selected

AddressOffset64 = 0 and AddressChange = 1, > System redundancy is selected

Extended diagnostic

For activated Profibus DP-V2 redundancy, the primary channel of the actuator sends a high priority response telegram; after that, the master reads the extended diagnostic data Red_Status (Status_Type = 0x9F) with the new states.

When transmitting the PrmCmd parameter command via the master, the actuator responds with Prm_Cmd_Ack (Status_Type = 0x9E).

With Red_Status/ Prm_Cmd_Ack, the actuator signals both the status of the primary and of the backup channel.

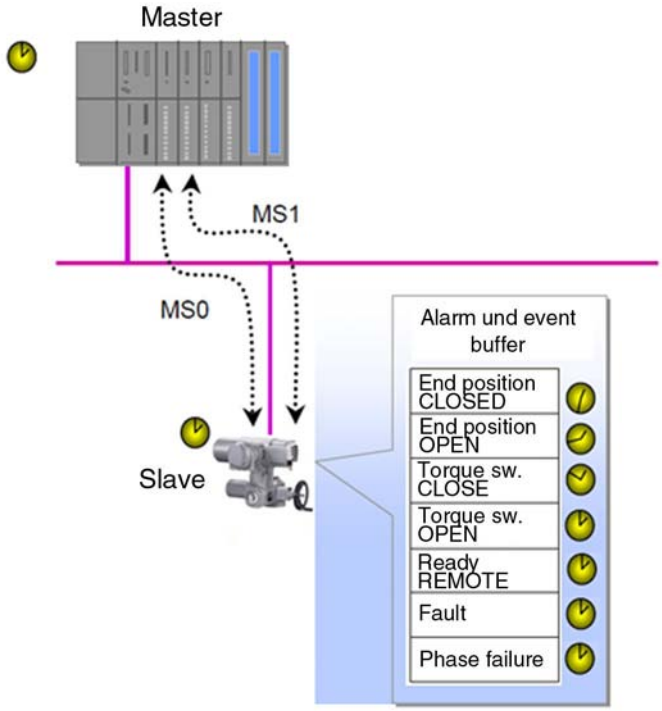
Table 34: Prm_Cmd_Ack/ Red_Status

Byte	Bit								Remark
	7	6	5	4	3	2	1	0	
1	0	0	0	0	1	0	0	0	Header (0x08)
2									Status_Type 0x9E = Prm_Cmd_Ack 0x9F = Red_Status
3	0	0	0	0	0	0	0	0	Slot
4	Sequence number					Reserved			Specifier
5	Res	Master State Clear	Res	Check Properties	Start MSAC1S	Stop MSAC1S	Primary Re-quest	Res	Function
6	Res	Output Hold Time started	Baud rate found	Master State Clear	Data Ex-change	Hardware defective	Primary	Backup	Red_State_1 (Primary status)
7	Res	Output Hold Time started	Baud rate found	Master State Clear	Data Ex-change	Hardware defective	Primary	Backup	Red_State_2 (Backup status)
8	Not used								Red_State_3

4.5.2. Profibus DP-V2 time-synchronisation with time stamp

Certain events within the actuator can be marked with a time stamp. The event is sent to the master using an alarm signal; the master then reads the event with time stamp from the actuator.

Figure 5: Time synchronisation



To ensure that all events within an installation are recorded in the correct sequence, all Profibus DP-V2 field devices must have the same time information. For this purpose, the master cyclically sends the current time to all field devices.

Basic procedure during communication startup

1. During communication startup, a parameter telegram is sent from the master to the actuator. The parameter telegram contains parameters for configuring the time stamp and time synchronisation.
2. The master then cyclically sends Time_Event and Clock_Value telegrams to synchronise the time.
3. The actuator sends the startup data of the time stamp (current state of the signals to be stamped).

Procedure during operation:

1. The actuator detects an event, stamps the time and sends a high priority response telegram (in the DataExchange state).
2. The master reads the alarm information from the actuator using a diagnostic telegram.
3. The master acknowledges the alarm.
4. The master reads the indicated data record (event with time) from the actuator.

The following events are stamped by the actuator with a resolution of 10 ms

End position CLOSED

End position OPEN

Torque sw. CLOSED

Torque sw. OPEN

Selector sw. REMOTE

Fault

Phase fault

A time stamp is made for any change of state of these signals, for both rising and falling signal flank.

Configuration of the time stamp

The parameters of the time stamp are part of the AUMA user parameters transmitted to the actuator during communication startup.

The time stamp is activated via byte 2 of the parameters.

Table 35: Parameters of the time stamp

Byte	Bit								Remark
	7	6	5	4	3	2	1	0	
1	0	0	0	0	0	0	0	0	Reserved
2	0	0	0	0	0	0	0	X	Activate time stamp 0 = deactivated 1 = activated
3	Res	Phase fault	Fault	Selector sw. RE-MOTE	Torque sw. OPEN	Torque sw. CLOSED	End position OPEN	End position CLOSED	Enabling the individual indications 0 = not active 1 = active
4	Not used								Reserved

Configuration of the time synchronisation

This parameter block is part of the structured parameterisation transmitted to the actuator during communication startup.

Table 36: TIme AR parameter

Byte	Bit								Remark
	7	6	5	4	3	2	1	0	
1	0	0	0	0	1	0	0	0	Block length (= 0x08)
2	0	0	0	0	1	0	0	0	Structure type (= 0x08, Time AR parameter command for time synchronisation)
3	0	0	0	0	0	0	0	0	Slot
4	0	0	0	0	0	0	0	0	Reserved
5	Default value 1000 (0x03F8, corresponds to 10 s)								Clock _Sync_Interval (time basis 10 ms)
6									
7	Seconds (2^{31} .. 0)								Clock_Sync Delay Time
8									
9									
10									
11	Split seconds (2^{31} .. 0) unit: $1/2^{32}$ seconds								
12									
13									
14									

Clock_Sync_Interval

The following time intervals are supported:

- 1 s
- 10 s
- 1 min.
- 10 min.

Transmission of time information

The time is transmitted in two steps:

- Master sends Time_Event telegram (layer 2 data telegram)
- Master sends Clock_Value telegram indicating the precise time when the time event was sent.

Table 37: Clock Value telegram

Byte	Bit								Remark
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
1	Seconds (2^{31} .. 0) since1.1.1900 0:00,00 or if value < 0x9DFF4400, since 7.2.2036 6:28,16								Clock_value of Time_Event (TE)
2									
3									
4									
5	Split seconds (2^{31} .. 0) unit: $1/2^{32}$ seconds								
6									
7									
8									
9	Seconds (2^{31} .. 0) since 1.1.1900 0:00,00 or if value < 0x9DFF4400 since 7.2.2036 6:28,16								Clock_value of the previous-Time_Events (TE)
10									
11									
12									
13	Split seconds (2^{31} .. 0) unit: $1/2^{32}$ seconds								
14									
15									
16									
17	C	CV					Reserved		Clock_Value_Status1
18	ANH	SWT	Res	CR		Reserved		SYF	Clock_Value_Status2

The information of Clock_Value_Status1 and Clock_Value_Status2 is used for the transmission of time corrections (C and CV), the synchronisation status (SYF), the daylight saving time information (ANH and SWT) and the accuracy (CR).

Process alarm

The diagnostic telegram is used to signal to the master that a time-stamped event has been recorded. The actuator only supports process alarms.

Table 38: Process alarm

Byte	Bit								Remark
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
1	0	0	0	0	1	0	0	0	Block length (= 0x08)
2	0	0	0	0	0	0	1	0	Alarm_Type 0x02 = Time Stamped Process Alarm
3	0	0	0	0	0	0	0	0	Slot
4	Sequence number					0	0	0	Specifier
5				Restarted			Buffer Over-run		Time stamp state Buffer Overrun = Internal buffer full, time stamp stopped Restarted = Time stamp started anew
6									Index of the data record (value range 100 to 115)
7									Number of indications within the data record (value range 1 -17)
8	0	0	0	0	1	1	0	1	Type of data record Permanently assigned to 0x0D: Delta_Trigger_Discrete

Read time-stamped data

The data record signalled via a process alarm (slot 0 index 100 to 115) can be read using the Profibus DP-V1 services once the alarm has been acknowledged.

A data record may contain up to 17 alarms, each data record consists of 14 bytes.

Table 39: Alarms

Byte	Bit								Remark
	7	6	5	4	3	2	1	0	
1	0	0	0	0	1	0	0	0	Type of signal 0x01 = Delta_Trigger_Discrete 0x02 = Time_Trigger_Discrete 0x80 = Start-up data 0x84 = End of time stamp 0x85 = Buffer overrun 0x86 = Channel change-over for redundancy 0x87 = Loss of information for redundancy
2	0	0	0	0	0	0	0	0	Slot
3									Signal 1 = End position CLOSED 2 = End position OPEN 3 = Torque sw. CLOSED 4 = Torque sw. OPEN 5 = Selector sw. REMOTE 6 = Fault 7 = Phase fault
4	Active								Status of the indication Active = 1: Indication active (rising signal flank) Active = 0: Indication not active (falling signal flank)
5									Not used
6									Not used
7	Seconds (2^{31} .. 0) since 1.1.1900 0:00,00 or if value< 0x9DFF4400 since 7.2.2036 6:28,16								Time- stamp
8									
9									
10									
11	Split seconds (2^{31} .. 0) unit: $1/2^{32}$ seconds								
12									
13									
14									

Time stamp and redundancy

Time-stamped data is only sent via the primary channel. During a channel change-over, the time-stamped indications are buffered and sent to the master after change-over. In case of a buffer overrun, the startup data is sent.

5. Description of the Profibus DP board

The Profibus DP boards is directly located below the local controls.

Figure 6: Profibus DP board

DANGER

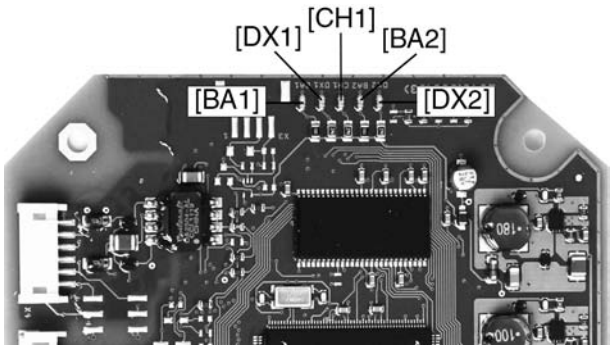
Hazardous voltage!

Risk of electric shock.

→ When connected to the mains, the local controls may only be removed by suitably qualified personnel (electricians).

5.1. Indications (indication and diagnostic LEDs)

Figure 7: Indication and diagnostic LEDs



[BA2] Profibus channel 2 active (green)
[DX1] Data Exchange channel 1 (yellow)
[BA1] Profibus channel 1 active (green)
[CH1] Communication via channels 1/2 (yellow)
[DX2] Data Exchange channel 2 (yellow)

[BA2] Option for redundancy

Illuminated in green if Profibus channel 2 is active.

[DX1] If the LED is illuminated in yellow, the Profibus DP interface has entered the ‘Data Exchange’ state on channel 1. Controlling the actuator by the Profibus DP master and reading the actuator status can be performed in this state only.

[BA1] Illuminated in green if Profibus channel 1 is active.

[CH1] Option for redundancy

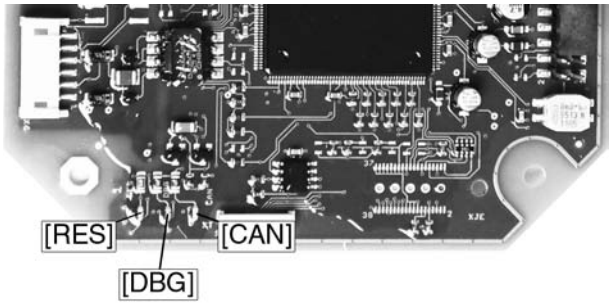
ON (illuminated in yellow): Communication via channel 1

OFF: Communication via channel 2

[DX2] Option for redundancy

If the LED is illuminated in yellow, the Profibus DP interface has entered the ‘Data Exchange’ state on channel 2. Controlling the actuator by the Profibus DP master and reading the actuator status can be performed in this state only.

Figure 8: Status LEDs



[RES] RESET (green)
[DBG] DEBUG (green)
[CAN] CAN (red)

[RES] Illuminated in green after Reset phase: 3.3 V voltage supply is ok.

[DBG] Blinking in green after Reset phase: 5 V voltage supply is ok

Blinking at 1 Hz: PCB test

Blinking at 2 Hz: Application is ok.

[CAN] Illuminated in red: Communication to logic is faulty.

Not illuminated: Communication with logic is ok.

6. Corrective action

6.1. Troubleshooting

In case of problems with Profibus DP communication, the AUMATIC provides important information with regard to troubleshooting via the display (menu Diagnostic M0022).

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

Table 40: Troubleshooting table

			Causes and remedies
1	Can the actuator be controlled via Profibus DP?	Yes	No fault
		No	→ Continue with 2
2	Select menu: Diagnostic M0022		→ Continue with 3
3.	Select menu: for channel 1: Profibus DP1 M0240 for channel 2 (option): Profibus DP2 M0549		→ Continue with 4
4	Select menu: for channel 1: DP1 Profibus status for channel 2 (option): DP2 Profibus status	Data Ex or LEDs on Profibus DP board: [DX1] is illuminated: Channel 1 [DX2] is illuminated: Channel 2	Profibus DP communication is ok. → Continue with 5
		Wait Prm	No communication between slave and master Possible causes and remedies: • Parameter data incorrect→ Correct parameter data in master. • Parameters not yet sent→ Send parameters • Incorrect GSD file was possibly used→ Check GSD file • Cable connection may either be interrupted or connected with the wrong polarity.→ Check cable connection
		Wait Cfg	No communication between slave and master Possible causes and remedies: • Configuration data incorrect → Correct configuration in master. • Configuration data not yet sent → Send configuration data.
5	Select menu: for channel 1: DP1 GC clear M0556 for channel 2 (option): DP2 GC clear	GC Clear active	Slave is in the Fail Safe state. Possible remedies: → Check all other implemented slaves at the Profibus. → Deactivate Autoclear function in the master, if required. → Send GC OPERATE telegram.
		GC Clear inactive	→ Continue with 6
6	Select menu: for channel 1: DP1 data length 0 for channel 2 (option): DP2 data length 0	Data length 0 active	Slave is in the Fail Safe state. Possible remedies: → Check all other implemented slaves at the Profibus. → Deactivate Autoclear function in the master, if required. → Send GC OPERATE telegram.
		Data length 0 inactive	→ Continue with 7
7	Operation via the push button of the local controls possible?	Yes	Possible causes and remedies: • Master does not send an operation command. • Master sends wrong operation command. → Check program of the controls.
		No	Possible causes and remedies: Faults such as torque fault, thermal fault or internal fault → Check logic board, motor control and motor. → continue with 8

			Causes and remedies
8	LED [RES] on Profibus DP board is illuminated in green.	Yes	3.3 V power supply is ok.
		No	3.3 V power supply not available
9	LED [DBG] on Profibus DP board	is blinking in green.	5 V power supply is ok.
		is not illuminated	5 V power supply not available Possible causes and remedies: → Check power supply of the AUMATIC (check fuses). → Check Profibus DP board.

6.2. Diagnostics

Various Profibus DP interface states can be checked via the menu Diagnostic M0022.

The <Information on Profibus DP 1> tables shows the menus for the 1st DP interface. In case a second, redundant DP interface is installed, this table may be used as well. In the menu, DP2 is displayed instead of DP1.

Table 41: Information on Profibus DP 1

Indication in 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: • Connect bus cables. • Check bus cables. • Switch on DP master.
	Baud control	The detected baud rate is monitored. The DP watchdog within the master is not activated. In this case, the failure function is not available.
	DP control	The DP communication is monitored, the DP watchdog within the master is activated. Therefore, the failure function is also 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	With Unfreeze Global Control telegram the Freeze state is deactivated again.
	GC Freeze active	The Freeze Global Control telegram can be used to freeze the Profibus DP inputs (feedback signals).

Indication in display	Value and description	
DP1 GC sync M059	Global Control Sync Status	
	GC Sync inactive	With the Unsync Global Control telegram is the Sync state is deactivated again.
	GC Sync active	The Sync Global Control telegram can be used to freeze the Profibus DP outputs (operation commands).
DP1 config. data M1195	Configuration data (number of input and output bytes) set by the master.	

Table 42: Profibus details

Indication in display	Value and description	
DP-V1 control	In this state, the actuator can only be operated by means of the acyclic Profibus DP-V1 services (only possible if there is no cyclic DP-V0 connection available.	
DP-V1 active	At least one acyclic Profibus DP-V1 connection is active.	
Channel 1 active	Profibus interface of channel 1 is used.	
Channel 2 active	Profibus interface of channel 2 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.
Backup	Profibus DP2 (Profibus DP, channel 2)	
	None	No channel is used as backup channel.
	Channel 1	Channel 1 is used as backup channel.
	Channel 2	Channel 2 is used as backup channel.
Profibus ID no.	The actuator controls are assigned different ident numbers depending on the function.	
	0x0C4F	For Profibus DP-V0 and DP-V1
	0x0CBD	for Profibus DP-V0 and DP-V1 including the DP-V2 functions Redundancy with time synchronisation, time stamp and alarms.
Redundancy	Redundancy	
	None	No redundancy available.
	DP-V2 (SR)	Redundancy activated according to Profibus DP-V2 (SR).
	DP-V2 (FR)	Redundancy activated according to Profibus DP-V2 (FR).
	AUMA redundancy I	General Profibus DP redundancy (AUMA redundancy I)
	AUMA redundancy II	AUMA redundancy II
DP-V1 (SetPrm)	DP-V1 function in the parameter telegram (SetPrm)	
	Deactivated	The DP-V1 services were deactivated using the parameters in the parameter telegram (SetPrm).
	Activated	The DP-V1 services were activated using the parameters in the parameter telegram (SetPrm).
Alarms (SetPrm)	Signalling alarms in the parameter telegram (SetPrm)	
	Deactivated	The alarms were deactivated using the parameters in the parameter telegram (SetPrm).
	Activated	The alarms were activated using the parameters in the parameter telegram (SetPrm).
Redundancy (SetPrm)	Redundancy function in the parameter telegram (SetPrm)	
	Deactivated	The redundancy function according to Profibus DP-V2 was deactivated using the parameters in the parameter telegram (SetPrm).
	Activated	The redundancy function according to Profibus DP-V2 was activated using the parameters in the parameter telegram (SetPrm).
Behaviour Tx	Response behaviour (response) for AUMA redundancy II	
	Tx active channel	Profibus DP response telegrams are exclusively sent via the active channel
	Tx both channels	Profibus DP response telegrams are sent via both channels.

7. Technical data

Information The following technical data includes 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 at **www.auma.com** in both German and English (please state the order number).

7.1. Profibus DP interface

Settings/programming the Profibus DP interface	
Baud rate setting	Automatic baud rate recognition
Setting the Profibus DP interface	The setting of the Profibus DP address is made via the display of the AUMATIC
Configurable process representation via GSD file	For an optimum adaptation to the process control system, the process representation may be freely configured.

Commands and signals of the Profibus interface	
Process representation output (command signals)	OPEN, STOP, CLOSE, position setpoint, RESET, EMERGENCY, Interlock OPEN/CLOSE, Enable LOCAL
Process representation input (feedback signals)	• End position OPEN, CLOSED • Actual position value • Actual torque value[1)] • Selector switch in position LOCAL/REMOTE • Running indication (directional) • Torque switch OPEN, CLOSED • Limit switch OPEN, CLOSED • Manual operation by handwheel or via local controls • 2 analogue and 4 digital customer inputs
Process representation input (fault signals)	• Motor protection tripped • Torque switch tripped in mid-travel • One phase missing • Loss of the analogue customer inputs
Behaviour on loss of communication	The behaviour of the actuator is programmable: • Stop in current position • Travel to end position OPEN or CLOSED • Travel to any intermediate position

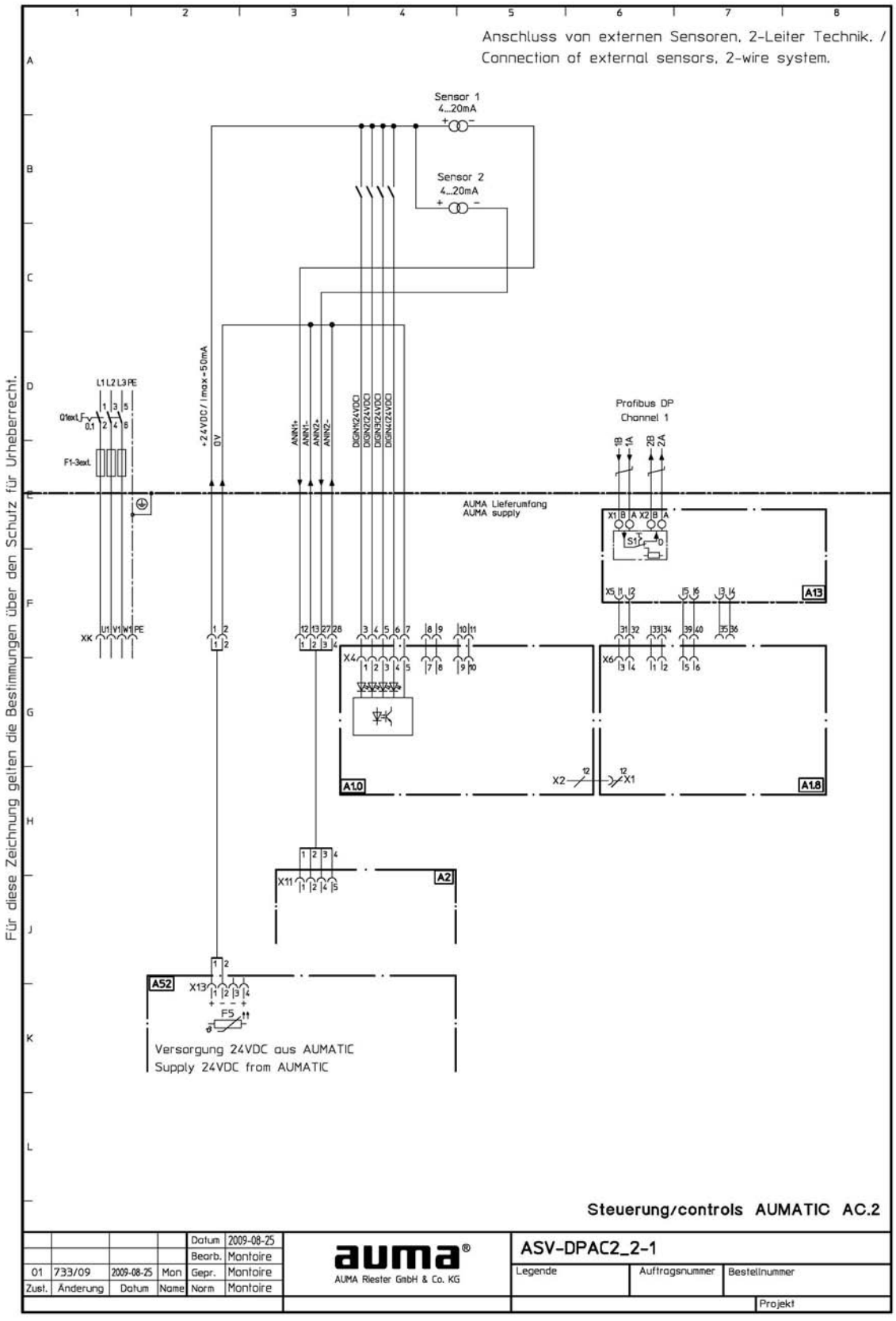
1) Requires magnetic limit and torque transmitter (MWG) in actuator

General Profibus DP interface data	
Communication protocol	Profibus DP according to IEC 61158 and IEC 61784-1
Network topology	• Line (bus) 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
Fieldbus interface	EIA-485 (RS485)

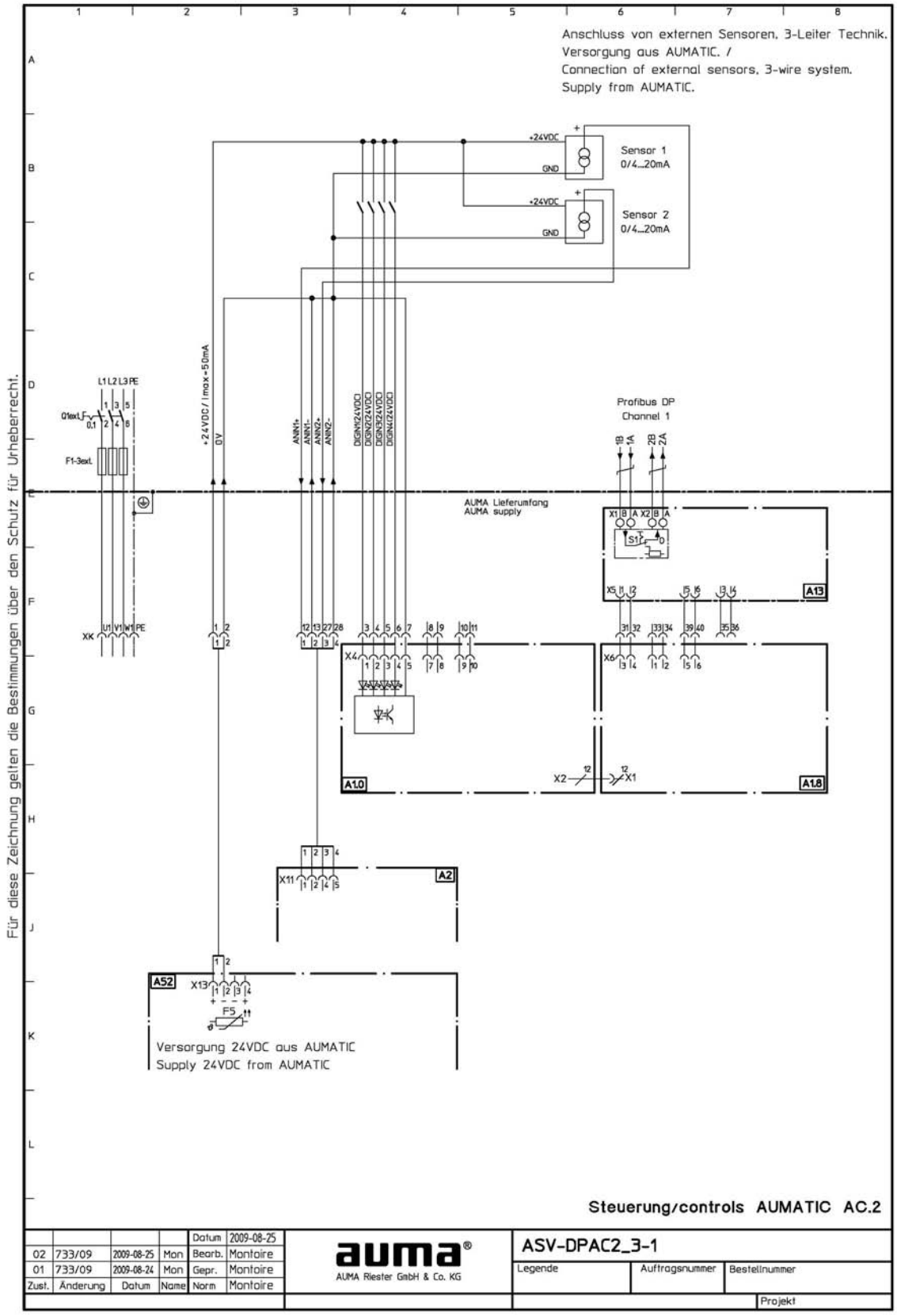
General Profibus DP interface data	
Transmission speed/cable length	• Baud rate and maximum cable length (segment length) without repeater: - between 9.6 and 93.75 kbit/s: 1,200 m - for 187.5 kbit/s: 1,000 m - for 500 kbit/s: 400 m - for 1,500 kbit/s: 200 m • Baud rate and possible cable length with repeater (total network cable length): - between 9.6 and 93.75 kbit/s: approx. 10 km - for 187.5 kbit/s: approx. 10 km - for 500 kbit/s: approx. 4 km - for 1,500 kbit/s: 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
Bus access	• Token-passing between masters and polling for slaves • Mono-master or multi-master systems are possible.
Supported fieldbus functions	Cyclic data exchange, sync mode, freeze mode, fail-safe mode
Profibus DP ident no.	0x0C4F: Standard applications with Profibus DP-V0 and DP-V1 0x0CBD: Applications with Profibus DP-V2

8. Appendix

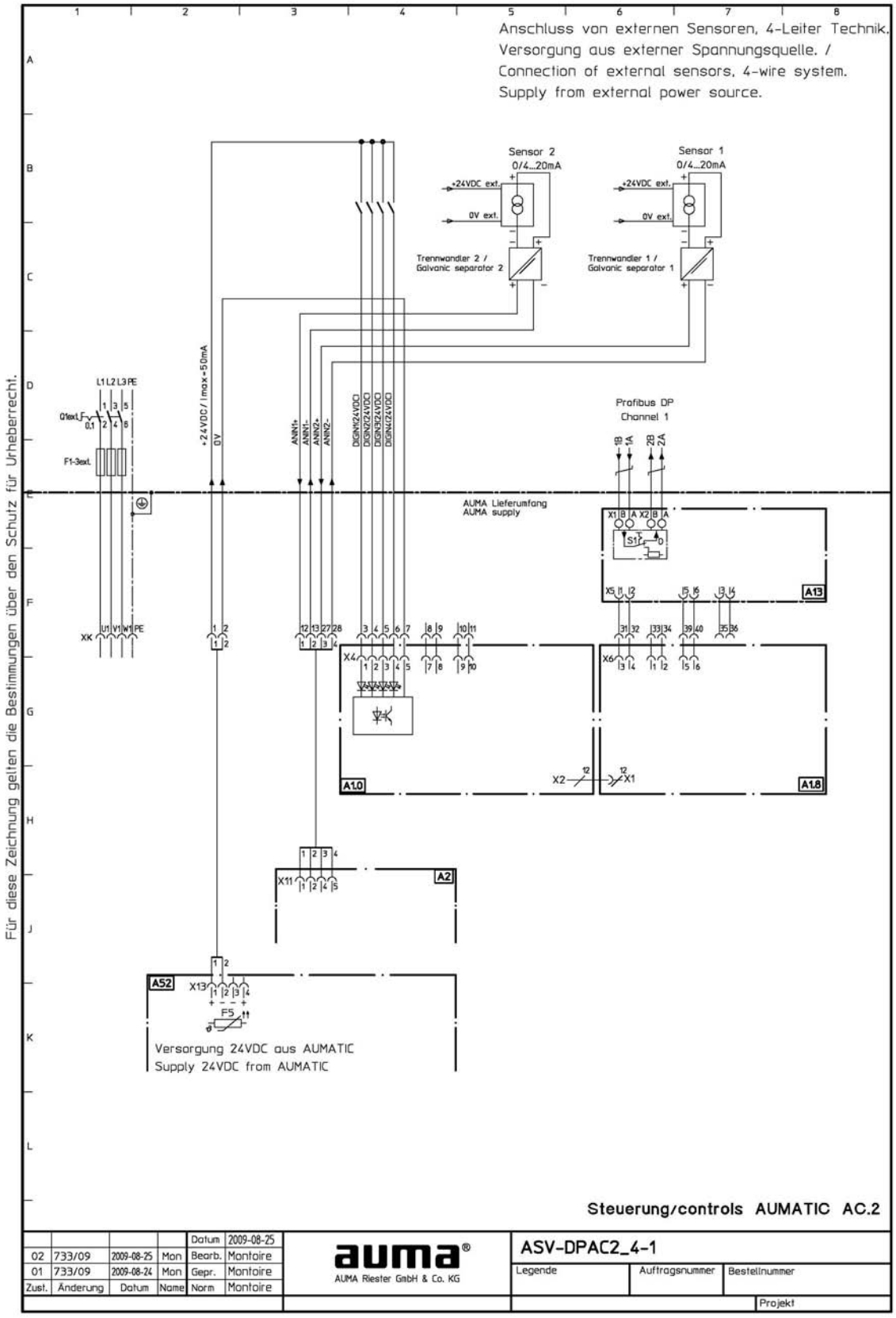
8.1. Proposed wiring diagram for external sensors, 2-wire technology



8.2. Proposed wiring diagram for external sensors, 3-wire technology



8.3. Proposed wiring diagram for external sensors, 4-wire technology



8.4. Parameters

The present appendix contains notes on the parameterization of the actuator controls via Profibus DP-V1 as a table (with read/write access codes).

Several parameters (View Objects) are read or written per DP-V1 request. The data lengths indicated in the tables have to be considered accordingly.

View Objects

View Objects group several parameters enabling easy write access to the grouped parameters. The bus load is reduced as the parameters do no longer have to be read out individually.

Explanations to the table:

No. View Object number (corresponds to Profibus DP-V1 index). Profibus DP-V1 slot is always 254.

Type

Data type	Description	Data length
BOOL	Logical value	4 bytes
BS8/16/32/64	Bit string	2/4/6/8 bytes
DRVCMD4	Process data	4 bytes
enum	Value from the value list	2 bytes
I8/16/32	Integer values	1/2/4 bytes
MMSS01	Time information	2 bytes
OS4/8/16/32/48/64	Octet string	4/8/16/32/48/64 bytes
S10/20/30/40	String	10/20/30/40 bytes
U8/16/32	Unsigned value	1/2/4/ bytes (8/16/32 bits)

Parameters Parameter name. Is indicated in the display of actuator controls.

Access Read and write access

R = Read

W = Write

Default Default value

Setting value Permissible, settable value or setting range. Depending on the data type, scale factor and unit are also indicated in square brackets. Example:

Min = 0 [0.1 s]

Max = 50 [0.1 s]

Corresponds to a setting range between 0.1 and 5.0 seconds

Table 43: Display...

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 14 bytes						
1-1	enum	Language	R/W	1	1 : Deutsch	Language setting
					2 : English	
					3 : Français	
					4 : Español	
					5 : Italiano	
					6 : Русский	
					7 : Polski	
					8 : Português	
					9 : Türkçe	
					10 : Magyar	
					11 : 中国	
					12 : Nederlands	
					13 : Čeština	
					14 : Română	
					15 : 日本語	
					16 : Български	
					17 : Dansk	
					18 : Ελληνικά	
					19 : Suomi	
					20 : 한국어	
					21 : Svenska	
					22 : Tiếng Việt	
					23 : عربي	
					24 : Eesti keel	
					25 : Hrvatski	
					26 : Lietuvių	
					27 : Latviešu	
					28 : Norsk	
					29 : Slovenčina	
					30 : Slovenščina	
					31 : Srpski	
					32 : ไทย	
					33 : Bahasa Indonesia	
1-2	enum	Date format	R/W	1	0 : MM/DD/YYYY	Date format setting
					1 : DD.MM.YYYY	
					2 : YYYY-MM-DD	
1-3	enum	Time format	R/W	1	0 : 12h	Time format setting
					1 : 24h	
1-4	enum	Number format	R/W	0	0 : xx.x	Number format setting
					1 : xx,x	
1-5	enum	Torque unit	R/W	0	0 : Nm	Torque unit setting
					1 : ft-lb	
					2 : %	
1-6	enum	Temperature unit	R/W	0	0 : °C	Temperature unit setting
					1 : °F	
1-7	enum	Diagnostic classific.	R/W	0	0 : AUMA	Selection of diagnostic classification to be indicated within the status area of the display
					1 : NAMUR	

Table 44: Identifications

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 60 bytes						
2-1	S20	Device designation	R	AC 01.2		Device designation of actuator controls
2-2	S20	Device tag	R/W	_GERAETE-TAG_		Information for actuator identification within the plant (e.g. KKS designation - Power Plant Classification system)
2-3	S20	Project name	R/W	_PROJEKT_		Project name of the plant

Table 45: Controls

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 80 bytes						
3-1	S20	Order no. controls	R	_ KOMMNR STEUERUNG _		Order number of controls
3-2	S20	Serial no. controls	R	_ WERKNR STEUERUNG _		Serial number of controls
3-3	S20	Wiring diagram	R	TPC		Wiring diagram
3-4	S20	Date of manufacture	R	_DATE_PRO-DUCTION_		Date of manufacture of the actuator controls

Table 46: Actuator

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 60 bytes						
4-1	S20	Order no. actuator	R	_ KOMMNR ANTRIEB _		Actuator order number
4-2	S20	Serial no. actuator	R	_ WERKNR ANTRIEB _		Actuator serial number
4-3	S20	Wiring diagram actuator	R	TPA		Actuator wiring diagram

Table 47: Version

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 40 bytes						
5-1	S20	Firmware	R	Vxx.xx.xx		Firmware version
5-2	S20	Language	R	Vxxx		Language version

Table 48: Firmware details

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 160 bytes						
6-1	S20	LC	R	0		Firmware version for local controls
6-2	S20	LC (Bootloader)	R	0		Firmware version for local controls (Bootloader)
6-3	S20	Logic	R	0		Logic firmware version
6-4	S20	Logic (Bootloader)	R	0		Logic firmware version (Bootloader)
6-5	S20	Fieldbus	R	0		Fieldbus firmware version
6-6	S20	Fieldbus (Bootloader)	R	0		Fieldbus firmware version (Bootloader)
6-7	S20	MWG	R	0		MWG firmware version
6-8	S20	MWG (Bootloader)	R	0		MWG firmware version (Bootloader)

Table 49: Hardware article no.

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 140 bytes						
7-1	S20	ArtNo LC	R	_ ARTNR OSS _		Article number of 'Local controls' electronics sub-assembly (A9)
7-2	S20	ArtNo logic	R	_ ARTNR LOGIK _		Article number of 'Logic' electronics sub-assembly (A2)
7-3	S20	ArtNo MCM	R	_ ARTNR RELAIS _		Article number of 'MCM' (Motor Control and Monitoring / A52) electronics sub-assembly
7-4	S20	ArtNo PSO	R	_ ARTNR_OPT _		Article number of 'PSO' (Power Supply Options / A52.1) electronics sub-assembly
7-5	S20	ArtNo I/O interface	R	_ ARTNR INTF _		Article number of 'I/O interface' electronics sub-assembly (A1.0)
7-6	S20	ArtNo fieldbus	R	_ ARTNR PBD _		Article number of 'Fieldbus' electronics sub-assembly (A1.8)
7-7	S20	ArtNo MWG	R	_ ARTNR MWG _		Article number of 'MWG' electronics sub-assembly (B6)

Table 50: Type of seating

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
9-1	enum	End position CLOSED	R/W	0	0 : Limit 1 : Torque	Type of seating in end position CLOSED
9-2	enum	End position OPEN	R/W	0	0 : Limit 1 : Torque	Type of seating in end position OPEN

Table 51: Torque switching

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 12 bytes						
10-1	enum	Torque by-pass	R/W	1	0 : Function not active 1 : Function active	Enabling/disabling torque by-pass. Torque by-pass' = function active means that the torque monitoring is suspended for each start and this for the time as defined in the field 'Time torque by-pass'. Consequently, unseating is possible without torque fault tripping.
10-2	U16	Torque by-pass [s]	R/W	0	Min = 0 [0.1 s] Max = 50 [0.1 s]	By-pass duration of torque monitoring at actuator start
10-3	U16	Trip torque CLO [Nm]	R/W	20	Min = 0 [Nm] Max = 65535 [Nm]	Tripping torque in direction CLOSE [Nm]
10-4	U16	Trip torque OPEN [Nm]	R/W	20	Min = 0 [Nm] Max = 65535 [Nm]	Tripping torque in direction OPEN [Nm]

No.	Type	Parameters	Access	Default	Setting value	Explanation
10-5	I16	Wrn torque CLOSE	R/W	80	Min = 20 [%]	Setting of warning torque in direction CLOSE
					Max = 100 [%]	
10-6	I16	Wrn torque OPEN	R/W	80	Min = 20 [%]	Setting of warning torque in direction OPEN
					Max = 100 [%]	

Table 52: Local controls

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 10 bytes						
11-1	enum	Self-retaining Local	R/W	3	0 : Off (push-to-run op.)	Setting the self-retaining local mode
					1 : OPEN	
					2 : CLOSE	
					3 : OPEN and CLOSE	
					4 : OPEN & CL w/o STOP	
11-2	enum	Local STOP	R/W	0	0 : Off	Operation mode local STOP
					1 : Sel.sw.Local + Remote	
11-3	enum	Enable LOCAL	R/W	0	0 : Sel. sw. Local	Operation mode Enable LOCAL
					1 : Sel. sw. Local + Off	
11-4	enum	Priority REMOTE	R/W	0	0 : Selector switch Local	Preserving the operation mode REMOTE in selector switch position LOCAL or OFF depending on the enable signal
					1 : Sel. sw. Local + Off	
11-5	enum	Fieldbus auto enable	R/W	1	0 : Off	Automatic generation of enable signal for priority REMOTE function in case loss of fieldbus communication
					1 : On	

Table 53: I/O interface

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
12-1	enum	Self-retaining Remote	R/W	3	0 : Off (push-to-run op.)	Setting the operation behaviour (push-to-run opereration or self-retaining) for binary operation commands (OPEN, STOP, CLOSE) from remote.
					1 : OPEN	
					2 : CLOSE	
					3 : OPEN and CLOSE	
					4 : OPEN & CL w/o STOP	
12-2	enum	Self-retaining Remote II	R/W	0	0 : Off (push-to-run op.)	Setting the self-retaining Remote II mode
					1 : OPEN	
					2 : CLOSE	
					3 : OPEN and CLOSE	
					4 : OPEN & CL w/o STOP	

Table 54: Profibus DP

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
13-1	U16	DP1 slave address	R/W	126	Min = 0 Max = 126	Profibus DP slave address
13-2	U16	DP2 slave address	R/W	126	Min = 0 Max = 126	Profibus DP slave address, channel 2

Table 55: Positioner

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 30 bytes						
14-1	enum	Adaptive behaviour	R/W	0	0 : Off 1 : Adaptive I	Setting the adaptive behaviour of the positioner
14-2	U16	Dead time	R/W	5	Min = 2 [0.1 s] Max = 600 [0.1 s]	Setting the dead time
14-3	U16	Dead band OPEN	R/W	5	Min = 0 [0.1 %] Max = 100 [0.1 %]	Setting dead band OPEN (irrelevant for adaptive behaviour)
14-4	U16	Dead band CLOSE	R/W	5	Min = 0 [0.1 %] Max = 100 [0.1 %]	Setting dead band CLOSE (irrelevant for adaptive behaviour)
14-5	U16	Positioner hyst. OPEN	R/W	5	Min = 0 [0.1 %] Max = 50 [0.1 %]	Hysteresis in direction OPEN (for adaptive positioner only)
14-6	U16	Positioner hyst. CLOSE	R/W	5	Min = 0 [0.1 %] Max = 50 [0.1 %]	Hysteresis in direction CLOSE (for adaptive positioner only)
14-7	I32	Tolerance CLOSE	R/W	0	Min = 0 [0.1 %] Max = 50 [0.1 %]	Tolerance for the function "Closing fully" for end position CLOSED
14-8	I32	Tolerance OPEN	R/W	1000	Min = 950 [0.1 %] Max = 1000 [0.1 %]	Tolerance for the function "Opening fully" for end position OPEN
14-9	U16	Permissible starts/h	R/W	1200	Min = 1 Min = 1800	Permissible number of starts/h (only in combination with Adaptive behaviour = Adaptive II)
14-10	U16	Outer dead band	R/W	10	Min = 1 [0.1 %] Max = 100 [0.1 %]	Setting the outer dead band (irrelevant for adaptive behaviour)
14-11	enum	Limit positioner range	R/W	0	0 : Function not active 1 : Function active	Function Limit positioner range
14-12	U16	Limit OPEN	R/W	1000	Min = 0 [0.1 %] Max = 1000 [0.1 %]	Limit OPEN
14-13	U16	Limit CLOSE	R/W	0	Min = 0 [0.1 %] Max = 1000 [0.1 %]	Limit CLOSE

Table 56: Process controller

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 26 bytes						
67-1	enum	Setpoint source	R/W	0	0 : I/O interface 1 : Fieldbus interface 2 : Internal setpoint	Setpoint source of process controller
67-2	enum	Beh. setpoint failure	R/W	0	0 : Internal setpoint 1 1 : Internal setpoint 2 2 : Failure behaviour	Behaviour on setpoint failure
67-3	enum	Inverse operation	R/W	0	0 : Function not active 1 : Function active	Inverse operation
67-4	U16	Internal setpoint 1	R/W	500	Min = 0 [0.1 %] Max = 1000 [0.1 %]	Internal setpoint 1 for process controller

No.	Type	Parameters	Access	Default	Setting value	Explanation
67-5	U16	Internal setpoint 2	R/W	500	Min = 0 [0.1 %]	Internal setpoint 2 for process controller
					Max = 1000 [0.1 %]	
67-6	U16	Proport. gain Kp	R/W	10	Min = 1 [0.1]	Proportional gain Kp
					Max = 100 [0.1]	
67-7	U16	Reset time Ti	R/W	1000	Min = 1 [s]	Reset time Ti
					Max = 1000 [s]	
67-8	U16	Rate time Td	R/W	0	Min = 0 [s]	Rate time Td
					Max = 100 [s]	
67-9	U16	Min reaction act. value	R/W	0	Min = 0 [0.1 %]	Minimum reaction required of actual process value within reaction time
					Min = 100 [0.1 %]	
67-10	U16	Max reaction act. value	R/W	1000	Min = 100 [0.1 %]	Maximum reaction required of actual process value within reaction time
					Max = 1000 [0.1 %]	
67-11	U16	React. time act. value	R/W	0	Min = 0 [s]	Reaction time for monitoring min. or max. reaction of actual process value
					Max = 100 [s]	
67-12	enum	Actual value source	R/W	0	0 : I/O interface	Actual value source of process controller
					1 : Fieldbus interface	
67-13	enum	Modulating behaviour	R/W	0	0: P controller	Modulating behaviour of PID controller
					1: PI controller	
					2: PID controller	

Table 57: Failure behaviour

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 12 bytes						
15-1	enum	Failure behaviour	R/W	1	0 : Good signal first	Activate failure behaviour
					1 : Immediately active	
15-2	enum	Failure operation	R/W	0	0 : STOP	Setting the actuator reaction for active failure behaviour
					1 : CLOSE	
					2 : OPEN	
					3 : Approach position	
					4 : Execute last CMD	
15-3	enum	Failure source	R/W	4	1 : Fieldbus interface	Failure source (failure reason) for failure behaviour
					2 : I/O interface	
					4 : Active interface	
15-4	Mmss01	Delay time	R/W	30	Min = 0 [0.1 s]	Failure operation is only executed after delay time has expired.
					Max = 1800 [0.1 s]	

No.	Type	Parameters	Access	Default	Setting value	Explanation
15-5	U16	Failure position	R/W	500	Min = 0 [0.1 %]	Failure position in percent
					Max = 1000 [0.1 %]	
15-6	U16	Failure position MPV	R/W	500	Min = 0 [0.1 %]	Failure position of multiport valve
					Max = 1000 [0.1 %]	

Table 58: EMERGENCY behaviour

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 26 bytes						
16-1	enum	Failure reaction EMCY	R/W	1	1 : Good signal first	Failure reaction EMERGENCY. The EMERGENCY failure reaction defines the actuator behaviour once the EMERGENCY signal is initiated.
					2 : Immediately active	
16-2	enum	EMCY operation mode	R/W	0	0 : Remote only	Determines the availability of EMERGENCY behaviour depending on the selector switch position Local or Remote
					1 : Remote and local	
16-3	enum	EMCY failure source	R/W	3	1 : I/O interface	Failure source for EMERGENCY behaviour
					2 : Fieldbus interface	
					3 : I/O or fieldbus	
					4 : Active interface	
16-4	enum	EMCY operation	R/W	0	0 : STOP	Actuator reaction in EMERGENCY operation mode
					1 : CLOSE	
					2 : OPEN	
					3 : Approach EMCY pos.	
16-5	U16	EMCY position	R/W	0	Min = 0 [0.1 %]	Setting the EMERGENCY position
					Max = 1000 [0.1 %]	
16-6	enum	By-pass torque	R/W	0	0 : Off	By-passing the torque monitoring in EMERGENCY operation mode
					1 : On	
16-7	enum	Thermal by-pass	R/W	0	0 : Off	By-passing the thermal monitoring in EMERGENCY operation mode
					1 : On	
16-8	enum	By-pass timer	R/W	0	0 : Off	By-passing the timer function in EMERGENCY operation mode
					1 : On	
16-9	enum	By-pass operat.profile	R/W	0	0 : Off	By-pass of operation profile in EMERGENCY operation mode
					1 : On	
16-10	enum	By-pass Interlock	R/W	0	0 : Off	By-pass of interlock function in operation mode EMERGENCY
					1 : On	
16-11	enum	By-pass Local STOP	R/W	0	0 : Off	By-pass of local STOP function in EMERGENCY operation mode
					1 : On	

No.	Type	Parameters	Access	Default	Setting value	Explanation
16-12	Mmss01	Delay time	R	10	Min = 0 [0.1 s] Max = 1800 [0.1 s]	Delay time for EMERGENCY behaviour (EMERGENCY behaviour is only executed after the delay time has expired).
16-13	U16	EMCY position MPV	R/W	10	Min = 0 [0.1 s] Max = 1800 [0.1 s]	EMERGENCY position of multi-port valve

Table 59: Timer function

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 20 bytes						
17-1	enum	Step mode CLOSE	R/W	0	0 : Off 1 : Remote 2 : Local 3 : Remote and local	Setting the operation mode: Stepping mode in direction CLOSE
17-2	Mmss01	On time CLOSE	R/W	50	Min = 10 [0.1 s] Max = 1800 [0.1 s]	Setting the on time in direction CLOSE
17-3	Mmss01	Off time CLOSE	R/W	50	Min = 10 [0.1 s] Max = 1800 [0.1 s]	Setting the off time in direction CLOSE
17-4	U16	Start stepping CLOSE	R/W	1000	Min = 1 [0.1 %] Max = 1000 [0.1 %]	Setting the start of stepping mode in direction CLOSE
17-5	U16	End stepping CLOSE	R/W	0	Min = 0 [0.1 %] Max = 999 [0.1 %]	Setting the end of stepping mode in direction CLOSE
17-6	enum	Step mode OPEN	R/W	0	0 : Off 1 : Remote 2 : Local 3 : Remote and local	Setting the operation mode: Stepping mode in direction OPEN
17-7	Mmss01	On time OPEN	R/W	50	Min = 10 [0.1 s] Max = 1000 [0.1 s]	Setting the on time in direction OPEN
17-8	Mmss01	Off time OPEN	R/W	50	Min = 10 [0.1 s] Max = 1000 [0.1 s]	Setting the off time in direction OPEN

No.	Type	Parameters	Access	Default	Setting value	Explanation
17-9	U16	Start stepping OPEN	R/W	0	Min = 0 [0.1 %]	Setting the start of stepping mode in direction OPEN
					Max = 999 [0.1 %]	
17-10	U16	End stepping OPEN	R/W	1000	Min = 1 [0.1 %]	Setting the end of stepping mode in direction OPEN
					Max = 1000 [0.1 %]	

Table 60: On time monitoring

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 6 bytes						
23-1	enum	On time monitoring	R/W	0	0 : Function not active	Enable/disable on time monitoring
					1 : Function active	
23-2	U16	Perm. running time/h	R/W	15	Min = 10 [min]	A warning is issued when exceeding the permissible running time/h.
					Max = 60 [min]	
23-3	U16	Permissible starts/h	R/W	1200	Min = 1	A warning is issued when exceeding the permissible starts/h.
					Max = 1800	

Table 61: Motion detector

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 12 bytes						
24-1	enum	Motion detector	R/W	1	0 : Function not active	With active motion detection the verification is made whether the actuator position changes due to the manual operation within the detection time dt by the travel difference dx. Consequently, a mechanical movement can be detected at output drive (signal: 'Handwheel operation')
					1 : Function active	
24-2	Mmss01	Detect. time dt	R/W	50	Min = 10 [0.1 s]	Setting the detection time dt
					Max = 1800 [0.1 s]	
24-3	U16	Travel diff. dx	R/W	10	Min = 10 [0.1 %]	Setting the travel difference dt
					Max = 100 [0.1 %]	
24-4	Mmss01	Detect. time dt (MWG)	R/W	5	Min = 1 [0.1 s]	Setting the detection time dt
					Max = 20 [0.1 s]	

No.	Type	Parameters	Access	Default	Setting value	Explanation
24-5	U16	Travel diff. dx (MWG)	R/W	3	Min = 2	Setting the travel difference dx
					Max = 20	
24-6	U16	Delay time	R/W	6000	Min = 1 [0.001 s]	The delay time defines the time interval after terminating manual operation until reset of the signal 'Handwheel operation'.
					Max = 65535 [0.001 s]	

Table 62: Operating time monitoring

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
25-1	enum	Operation mode	R/W	0	0 : Off	Operation mode of operating time monitoring. The actuator operating time can be made in 'Manual' operation mode.
					1 : Manual	
25-2	Mmss01	Perm.op. time, manual	R/W	9000	Min = 0 [0.1 s]	Perm.op. time, manual
					Max = 36000 [0.1 s]	

Table 63: Reaction monitoring

No.	Type	Parameters	Access	Default	Setting value	Erläuterung
Data length = 4 bytes						
26-1	enum	Operation mode	R/W	0	0 : Off	Operation mode of operating time monitoring. The actuator operating time can be made in 'Manual' operation mode.
					1 : Manual	
26-2	U16	Perm.op. time, manual	R/W	150	Min = 150 [0.1 s]	Perm.op. time, manual
					Max = 3000 [0.1 s]	

Table 64: Interlock

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 6 bytes						
27-1	enum	Oper. mode Interlock	R/W	3	1 : Remote	Operation mode of interlock function
					2 : Local	
					3 : Remote and Local	
27-2	enum	Running dir. Interlock	R/W	3	1 : OPEN	Running direction in which the interlock function is active
					2 : CLOSE	
					3 : OPEN and CLOSE	
27-3	enum	By-pass Interlock	R/W	0	0 : Off	By-pass of interlock function in operation mode EMERGENCY
					1 : On	

No.	Type	Parameters	Access	Default	Setting value	Explanation
27-4	enum	Interlock failure source	R/W	3	1 : Interface	Failure source of interlock function
					2 : Fieldbus	
					3 : Active comm. source	

Table 65: PVST

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 16 bytes						
66-1	enum	PVST operation mode	R/W	0	0 : Stroke	Setting the operation mode PVST: Stroke = stroke-controlled PVST; based on travel across a defined stroke (stroke PVST) within a given time (PVST monitoring time); can be started in any valve position (even outside the end position) End position test = PVST based on test when leaving the end position within a defined time (PVST travel time); Can only be started from an end position
					1 : End position test	
66-2	enum	PVST behaviour	R/W	1	0 : OPEN	PVST (Partial Valve Stroke Test) behaviour
					1 : CLOSE	
66-3	U16	PVST stroke	R/W	100	Min = 0 [0.1 %]	PVST (Partial Valve Stroke Test) stroke
					Max = 1000 [0.1 %]	
66-4	Mmss01	PVST monitoring	R/W	600	Min = 10 [0.1 s]	PVST (Partial Valve Stroke Test) monitoring time
					Max = 3000 [0.1 s]	
66-5	Mmss01	PVST operating time	R/W	20	Min = 1 [0.1 s]	PVST (Partial Valve Stroke Test) operating time
					Max = 600 [0.1 s]	
66-6	Mmss01	PVST reverse time	R/W	20	Min = 1 [0.1 s]	Waiting time during PVST prior to returning to initial position.
					Max = 600 [0.1 s]	
66-7	enum	PVST reminder	R/W	0	0 : Function not active	When function is active, a message is generated if no PVST can be executed during reminder period.
					1 : Function active	
66-8	U16	PVST reminder period	R/W	0	Min = 0	Reminder period of PVST function. Generates message if no PVST was executed during this reminder period.
					Max = 65535	

Table 66: Local controls

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 22 bytes						
28-1	enum	Indication light 1 (left)	R/W	370		Signal assignment for indication light 1 (left) on the local controls
28-2	enum	Indication light 2	R/W	269		Signal assignment for indication light 2 on the local controls
28-3	enum	Indication light 3	R/W	270		Signal assignment for indication light 3 on the local controls
28-4	enum	Indication light 4	R/W	268		Signal assignment for indication light 4 on the local controls
28-5	enum	Indicat. light 5 (right)	R/W	369		Signal assignment for indication light 5 (right) on the local controls
Setting values for parameter no.: 28-1/-2/-3/-4/-5						
					372 : Not assigned	
					259 : End position CLOSED	

No.	Type	Parameters	Access	Default	Setting value	Explanation
					258 : End position OPEN	
					370 : End p. CLOSED, blink	
					369 : End p. OPEN, blink	
					401 : Setpoint pos. reached	
					265 : Running CLOSE	
					264 : Running OPEN	
					113 : Selector sw. LOCAL	
					115 : Selector sw. REMOTE	
					116 : Selector sw. OFF	
					376 : Limit switch CLOSED	
					375 : Limit switch OPEN	
					460 : Torque sw. CLOSED	
					459 : Torque sw. OPEN	
					86 : Failure	
					84 : Function check	
					83 : Out of specification	
					85 : Maintenance required	
					79 : Fault	
					78 : Warning	
					80 : Not ready REMOTE	
					554 : Op. pause active	
					560 : Start stepping mode	
					603 : Actuator running	
					539 : Running LOCAL	
					540 : Running REMOTE	
					541 : Handwheel operation	
					549 : In intermed. position	
					392 : Intermed. pos. 1	
					399 : Intermed. pos. 2	
					398 : Intermed. pos. 3	
					397 : Intermed. pos. 4	
					396 : Intermed. pos. 5	
					395 : Intermed. pos. 6	
					394 : Intermed. pos. 7	
					393 : Intermed. pos. 8	
					500 : Input DIN 1	
					501 : Input DIN 2	
					505 : Input DIN 3	
					504 : Input DIN 4	
					503 : Input DIN 5	
					502 : Input DIN 6	
					285 : EMCY stop active	
					269 : Torque fault CLOSE	
					Torque fault OPEN	
					Torque fault	
					Thermal fault	

No.	Type	Parameters	Access	Default	Setting value	Explanation
					Phase fault	
					Fieldbus DOUT 1	
					Fieldbus DOUT 2	
					Fieldbus DOUT 3	
					Fieldbus DOUT 4	
					Fieldbus DOUT 5	
					Fieldbus DOUT 6	
					Fieldbus DOUT 7	
					Fieldbus DOUT 8	
					Fieldbus DOUT 9	
					Fieldbus DOUT 10	
					Fieldbus DOUT 11	
					Fieldbus DOUT 12	
					FailState fieldbus	
					Handwheel active	
					PVST active	
					PVST error	
					PVST abort	

Table 67: Profibus

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
35-1	enum	Redundancy	R/W	0	0 : None	Redundancy
					1 : DP-V2 (SR)	
					4 : DP-V2 (FR)	
					2 : AUMA redundancy I	
					3 : AUMA redundancy II	
35-2	enum	Behaviour Tx	R/W	0	0 : Tx active channel	Behaviour Tx
					1 : Tx both channels	

Table 68: FO connection

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 6 bytes						
68-1	enum	FO cable monitoring	R/W	0	0 : On (not final device)	FO cable monitoring
					1 : Off (final device)	
68-2	enum	FO cable topology	R	1	0 : Loop	FO cable topology
					1 : Star/line	
68-3	enum	FO cable baud rate	R	0	0 : Auto	FO cable baud rate
					1 : 9.6 kbit/s	
					2 : 19.2 kbit/s	
					3 : 38.4 kbit/s	
					4 : 45.45 kbit/s	
					5 : 57.6 kbit/s	
					6 : 93.75 kbit/s	
					7 : 115.2 kbit/s	
					8 : 187.5 kbit/s	
					9 : 500 kbit/s	
					10 : 1500 kbit/s	
					11 : 3000 kbit/s	
					12 : 6000 kbit/s	
					13 : 12000 kbit/s	

Table 69: Actuator

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 12 bytes						
36-1	enum	Motor prot. mode	R/W	0	0 : Auto 1 : Reset	Signal behaviour of motor protection (thermal monitoring). Auto: Automatic thermal fault reset after cooling down. Reset: requires manual thermal fault reset after colling down via a RESET command.
36-2	enum	Closing rotation	R	0	0 : Clockwise rotation 1 : Counterclockwise rot.	Setting the direction of rotation
36-3	enum	Handwheel switch	R	0	0 : Without 1 : NC 2 : NO	Handwheel switch
36-4	enum	Heater monitor	R	0	0 : Function not active 1 : Function active	Montitoring the heater in actuator
36-5	U32	Heater monitor. time	R	3000	Min = 600 [0.1 s] Max = 36000 [0.1 s]	Monitoring time of heater resp. of the heating system (warning "Wrn heater" is issued if a fault has continuously occurred during this period)

Table 70: MWG

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 44 bytes						
37-1	U16	Nom. torque CLOSE	R	100	Min = 0 [Nm] Max = 65535 [Nm]	Setting the nominal torque CLOSE in Nm
37-2	U16	Nom. torque OPEN	R	100	Min = 0 [Nm] Max = 65535 [Nm]	Setting the nominal torque OPEN in Nm
37-3	U16	CLOSE min. angle	R	120	Min = 65 Max = 125	Torque pivot point CLOSE (minimum angle value)
37-4	U16	CLOSE min. torque	R	50	Min = 20 [%] Max = 80 [%]	Torque pivot point CLOSE (minimum torque)
37-5	U16	CLOSE max. angle	R	105	Min = 8 Max = 122	Torque pivot point CLOSE (maximum angle value)
37-6	U16	CLOSE max. torque	R	100	Min = 80 [%] Max = 125 [%]	Torque pivot point CLOSE (maximum torque)
37-7	U16	OPEN min. angle	R	134	Min = 129 Max = 189	Torque pivot point OPEN (minimum angle value)
37-8	U16	OPEN min. torque	R	50	Min = 20 [%] Max = 80 [%]	Torque pivot point OPEN (minimum torque)
37-9	U16	OPEN max. angle	R	149	Min = 132 Max = 247	Torque pivot point OPEN (maximum angle value)
37-10	U16	OPEN max. torque	R	100	Min = 80 [%] Max = 125 [%]	Torque pivot point OPEN (maximum torque)
37-11	U16	Correction CLOSE	R	100	Min = 80 Max = 120	Correction factor for torque characteristic CLOSE
37-12	U16	Correction OPEN	R	100	Min = 80 Max = 120	Correction factor for torque characteristic OPEN
37-13	U16	Hysteresis torque	R	5	Min = 0 Max = 20	Hysteresis of torque switching
37-14	U16	Dead band torque	R	2	Min = 2 Max = 20	Dead band of torque switching

No.	Type	Parameters	Access	Default	Setting value	Explanation
37-15	U16	Hysteresis limit	R	3	Min = 0 Max = 100	Hysteresis of limit switching
37-16	U16	Torque adjust 0 point	R	0	Min = 20 Max = 20	Adjust zero point for torque
37-17	U16	Low limit T CLOSE	R	20	Min = 0 [Nm] Max = 65535 [Nm]	Low limit setting (initial value) for tripping torque CLOSE
37-18	U16	High limit T CLOSE	R	100	Min = 0 [Nm] Max = 65535 [Nm]	High limit setting (final value) for tripping torque CLOSE
37-19	U16	Low limit T OPEN	R	20	Min = 0 [Nm] Max = 65535 [Nm]	Low limit setting (initial value) for tripping torque OPEN
37-20	U16	High limit T OPEN	R	100	Min = 0 [Nm] Max = 65535 [Nm]	High limit setting (final value) for tripping torque OPEN

Table 71: Potentiometer

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 8 bytes						
38-1	U16	Low limit Uref	R	450	Min = 0 Max = 1023	Low limit setting for Uref (monitoring the 5 V reference voltage for potentiometer)
38-2	U16	Low limit Upoti	R	77	Min = 0 Max = 1023	Low limit setting for Upote (limit monitoring the potentiometer wiper voltage)
38-3	U16	Low limit Uspan	R/W	610	Min = 0 Max = 1023	Low limit setting of potentiometer signal range (monitoring the potentiometer span)
38-4	U16	Hysteresis	R	2	Min = 0 Max = 10	Hysteresis of potentiometer

Table 72: Phase failure monitoring

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
39-1	enum	Adapt rotary dir.	R	1	0 : Function not active 1 : Function active	Adapt rotary direction for counterclockwise rotating field
39-2	U16	Tripping time	R/W	100	Min = 20 [0.1 s] Max = 3000 [0.1 s]	Duration until phase monitoring trips

Table 73: Switchgear

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 2 bytes						
40-1	U16	Revers. prevent. time	R	3	Min = 1 [0.1 s] Max = 300 [0.1 s]	Setting the reversing prevention time

Table 74: Monitoring functions

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 18 bytes						
41-1	enum	Monitor heat. system	R	0	0 : Function not active 1 : Function active	Monitoring the heating system in the AC
41-2	enum	Monitor 24 V DC ext.	R	0	0 : Function not active 1 : Function active	Monitoring external 24 V DC (external supply)
41-3	enum	Monitor 24 V DC cust.	R/W	1	0 : Function not active 1 : Function active	Monitoring 24 V DC for customer (control voltage)
41-4	enum	Monitor 24 V AC	R	1	0 : Function not active 1 : Function active	Monitoring 24 V AC

No.	Type	Parameters	Access	Default	Setting value	Explanation
41-5	enum	Monitor 24 V DC intern	R	1	0 : Function not active	Monitoring internal 24 V DC
					1 : Function active	
41-6	enum	PTC trip. monit.	R	0	0 : Function not active	PTC tripping device monitoring
					1 : Function active	
41-7	enum	RTC test	R	1	0 : Function not active	RTC test
					1 : Function active	
41-8	U32	Heater monitor. time	R	3000	Min = 600 [0.1 s]	Monitoring time of heater resp. of the heating system (warning "Wrn heater" is issued if a fault has continuously occurred during this period)
					Max = 36000 [0.1 s]	

Table 75: Service interface

No.	Type	Parameters	Access	Default	Setting value	Erläuterung
Data length = 22 bytes						
42-1	S20	Device tag	R/W	_GERAETE-TAG_		Information for actuator identification within the plant (e.g. KKS designation - Power Plant Classification system)
42-2	enum	Service op. mode	R/W	0	0 : Control: LOCAL	Settings for service operation mode. Allows actuator control via remote operation of service interface depending on operation modes LOCAL or REMOTE.
					1 : Control: LOC+REM	

Table 76: Service functions

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
45-1	I16	Create factory settings	R	-1	Min = 32768	Creates new factory settings by adopting the current settings
					Max = 32767	
45-2	I16	Reset factory settings	R/W	-1	Min = 32768	Reset current settings to factory settings
					Max = 32767	

Table 77: General information

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 48 bytes						
44-1	BOOL	Torque fault OPEN	R		Min = 0	Torque fault OPEN active
					Max = 1	
44-2	BOOL	Torque fault CLOSE	R		Min = 0	Torque fault CLOSE active
					Max = 1	
44-3	enum	Selector switch	R		1 : Local	Selector switch
					2 : Off	
					3 : Remote	
44-4	U16	Actual position	R		Min = 0 [0.1 %]	Actual position
					Max = 1000 [0.1 %]	
44-5	U16	Torque	R		Min = 0 [0.1 %]	Torque
					Max = 1000 [0.1 %]	

No.	Type	Parameters	Access	Default	Setting value	Explanation
44-6	enum	Operation mode	R		0 : Power Off	Operation mode
					1 : EMCY stop	
					2 : Off	
					3 : Service	
					4 : Local	
					5 : Interlock	
					6 : EMERGENCY	
					7 : Remote	
					8 : Remote II	
					9 : Fieldbus	
					10 : Disabled	
44-7	DrvCmd4	Operation command	R		Min = 0	Operation command
					Max = 0xFFFFFFFF	
44-8	BOOL	Running OPEN	R		Min = 0	Running OPEN
					Max = 1	
44-9	BOOL	Running CLOSE	R		Min = 0	Running CLOSE
					Max = 1	
44-10	BOOL	Setpoint position reached	R		Min = 0	Setpoint position reached
					Max = 1	
44-11	BOOL	Limit switch OPEN	R		Min = 0	Limit switch OPEN
					Max = 1	
44-12	BOOL	Limit switch CLOSED	R		Min = 0	Limit switch CLOSED
					Max = 1	
44-13	BOOL	Torque sw. OPEN	R		Min = 0	Torque switch OPEN
					Max = 1	
44-14	BOOL	Torque sw. CLOSED	R		Min = 0	Torque switch CLOSED
					Max = 1	

Table 78: Positioner

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 18 bytes						
52-1	enum	Adaptive behaviour	R/W	0	0 : Off	Setting the adaptive behaviour of the positioner
					1 : Adaptive I	
52-2	U16	Setpoint position	R		Min = 0 [0.1 %]	Setpoint position
					Max = 1000 [0.1 %]	
52-3	U16	Actual position	R/W		Min = 0 [0.1 %]	Actual position
					Max = 1000 [0.1 %]	
52-4	U32	Outer dead band	R		Min = 0 [0.1 %]	Outer dead band
					Max = 1000 [0.1 %]	
52-5	U32	Outer dead b. OPEN	R		Min = 0 [0,1 %]	Outer dead b. OPEN
					Max = 1000 [0,1 %]	
52-6	U32	Outer dead b. CLOSE	R		Min = 0 [0,1 %]	Outer dead b. CLOSE
					Max = 1000 [0,1 %]	

No.	Type	Parameters	Access	Default	Setting value	Explanation
52-7	U32	Inner dead b. OPEN	R		Min = 0 [0,1 %]	Inner dead b. OPEN
					Max = 1000 [0,1 %]	
52-8	U32	Inner dead b. CLOSE	R		Min = 0 [0,1 %]	Inner dead b. CLOSE
					Max = 1000 [0,1 %]	

Table 79: On time monitoring

No.	Type	Parameters	Access	Default	Setting value	Erläuterung
Data length = 8 bytes						
53-1	U32	On time/h	R		Min = 0	Current on time/h
					Max = 3600	
53-2	U32	Starts/h	R		Min = 0	Current starts/h
					Max = 3600	

Table 80: Process controller

Nr.	Typ	Parameter	Zugriff	Default	Einstellwert	Erläuterung
Data lenght= 8 Bytes						
73-1	U16	Process setpoint	R		0 [0,0 %]	Process setpoint of PID controller
					1000 [0,0 %]	
73-2	U16	Actual process value	R		0 [0,0 %]	Actual process value of PID controller
					1000 [0,0 %]	
73-3	U32	Op. com. PID contr.	R		0	Op. com. PID contr.
					0	

Table 81: Bluetooth

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 62 bytes						
54-1	S20	Device tag	R/W	_GERAETE-TAG_		Information for actuator identification within the plant (e.g. KKS designation - Power Plant Classification system)
54-2	S20	Bluetooth address	R	XXXXXXXXXXX		Bluetooth address (BD_ADDR) of controls
54-3	S20	Bluetooth add.partner	R	XXXXXXXXXXX		Bluetooth address (BD_ADDR) of the Bluetooth partner
54-4	enum	Bluetooth	R/W	1	0 : Function not active	Activate/deactivate Buetooth interface
					1 : Function active	

Table 82: Position transmitter

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 10 bytes						
69-1	U16	Low limit Uspan	R/W	610	Min = 0	Low limit setting of potentiometer signal range (monitoring the potentiometer span)
					Max = 1023	
69-2	U16	Volt.level diff. potent.	R		Min = 0	Current voltage level difference of the potentiometer.
					Max = 1023	
69-3	U16	Raw val. pos. OPEN	R		0	Raw value end position OPEN
					65535	

No.	Type	Parameters	Access	Default	Setting value	Explanation
69-4	U16	Raw val. pos. CLOSED	R		0 65535	Raw value end position CLOSED
69-5	U16	Potent. raw value /mV	R		0 5000 [mV]	Potentiometer raw value /mV

Table 83: Profibus DP1

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 15 bytes						
56-1	U8	DP1 slave address	R		Min = 0 Max = 126	Profibus DP channel 1; current slave address
56-2	enum	DP1 baud rate	R		0 : 12 Mbit/s 1 : 6 Mbit/s 2 : 3 Mbit/s 3 : 1.5 Mbit/s 4 : 500 kbit/s 5 : 187.5 kbit/s 6 : 93.75 kbit/s 7 : 45.45 kbit/s 8 : 19.20 kbit/s 9 : 9.6 kbit/s 15 : Not available	Profibus DP channel 1; baud rate
55-3	enum	DP1 watchdog status	R		0 : Baud search 1 : Baud control 2 : DP control	Profibus DP channel 1; watch-dog status
55-4	enum	DP1 Profibus status	R		0 : Wait Prm 1 : Wait Cfg 2 : Data Ex	Profibus DP channel 1; Profibus status
55-5	enum	DP1 GC clear	R		0 : GC Clear inactive 1 : GC Clear active	Profibus DP channel 1; Global Control Clear
55-6	enum	DP1 data length 0	R		0 : Data length 0 inactive 1 : Data length 0 active	Profibus DP channel 1; data length 0
55-7	enum	DP1 GC freeze	R		0 : GC Freeze inactive 1 : GC Freeze active	Profibus DP channel 1; Global Control Freeze
55-8	enum	DP1 GC sync	R		0 : GC Sync inactive 1 : GC Sync active	Profibus DP channel 1; Global Control Sync

Table 84: Profibus DP2

No.	Type	Parameters	Access	Default	Setting value	Erläuterung
Data length = 15 bytes						
56-1	U8	DP2 slave address	R		Min = 0 Max = 126	Profibus DP channel 2; current slave address
56-2	enum	DP2 baud rate	R		0 : 12 Mbit/s 1 : 6 Mbit/s 2 : 3 Mbit/s 3 : 1.5 Mbit/s 4 : 500 kbit/s 5 : 187.5 kbit/s 6 : 93.75 kbit/s 7 : 45.45 kbit/s 8 : 19.20 kbit/s 9 : 9.6 kbit/s 15 : Not available	Profibus DP channel 2: baud rate

No.	Type	Parameters	Access	Default	Setting value	Erläuterung
56-3	enum	DP2 watchdog status	R		0 : Baud search	Profibus DP channel 2; watchdog status
					1 : Baud control	
					2 : DP control	
56-4	enum	DP2 Profibus status	R		0 : Wait Prm	Profibus DP channel 2: Profibus status
					1 : Wait Cfg	
					2 : Data Ex	
56-5	enum	DP2 GC clear	R		0 : GC Clear inactive	Profibus DP channel 2: Global Control Clear
					1 : GC Clear active	
56-6	enum	DP2 data length 0	R		0 : Data length 0 inactive	Profibus DP channel 2; data length 0
					1 : Data length 0 active	
56-7	enum	DP2 GC freeze	R		0 : GC Freeze inactive	Profibus DP channel 2: Global Control Freeze
					1 : GC Freeze active	
56-8	enum	DP2 GC sync	R		0 : GC Sync inactive	Profibus DP channel 2; Global Control Sync
					1 : GC Sync active	

Table 85: Profibus details

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 16 bytes						
57-1	BOOL	DP-V1 control	R		Min = 0	DP-V1 control active
					Max = 1	
57-2	BOOL	DP-V1 active	R		Min = 0	DP-V1 connection active
					Max = 1	
57-3	BOOL	Channel 1 active	R		Min = 0	Channel 1 is the active operation command channel
					Max = 1	
57-4	BOOL	Channel 2 active	R		Min = 0	Channel 2 is active operation command channel
					Max = 1	
57-5	enum	Primary	R		0 : None	Primary
					1 : Channel 1	
					2 : Channel 2	
57-6	enum	Backup	R		0 : None	Backup
					1 : Channel 1	
					2 : Channel 2	
57-7	enum	Profibus ID no.	R	3151	3151 : 0x0C4F	Profibus ID no.
					3261 : 0x0CBD	
					3191 : 0x0C77	
57-8	enum	Redundancy	R/W	0	0 : None	Redundancy
					1 : DP-V2 (SR)	
					4 : DP-V2 (FR)	
					2 : AUMA redundancy I	
					3 : AUMA redundancy II	
57-9	enum	DP-V1 (SetPrm)	R		0 : Deactivated	DP-V1 function in the parameter telegram (SetPrm)
					1 : Activated	
57-10	enum	Alarms (SetPrm)	R		0 : Deactivated	Signalling alarms in the parameter telegram (SetPrm)
					1 : Activated	

No.	Type	Parameters	Access	Default	Setting value	Explanation
57-11	enum	Redundancy (SetPrm)	R		0 : Deactivated	Activation of the redundancy function in the parameter telegram (SetPrm)
					1 : Activated	
57-12	enum	Behaviour Tx	R	0	0 : Tx active channel	Behaviour Tx
					1 : Tx both channels	

Table 86: FO

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 28 bytes						
58-1	enum	FOC level channel 1	R		0 : Chanel deactivated	FO cable receive level channel 1
					1 : Level bad!	
					2 : Level critical, no Rx	
					3 : Level critical, Rx	
					4 : Level good, no Rx	
					5 : Level good, Rx	
58-2	enum	FOC level channel 2	R		0 : Chanel deactivated	FO cable receive level channel 2
					1 : Level bad!	
					2 : Level critical, no Rx	
					3 : Level critical, Rx	
					4 : Level good, no Rx	
					5 : Level good, Rx	
58-3	U16	FOC RS-485 error	R		Min = 0	RS-485 format error of FOC sub-assembly
					Max = 1	
58-4	enum	FO cable baud rate	R		0: Invalid	FO cable baud rate
					1: 9.6 kbit/s	
					2: 19.2 kbit/s	
					3: 38.4 kbit/s	
					4: 45.45 kbit/s	
					5: 57.6 kbit/s	
					6: 93.75 kbit/s	
					7: 115.2 kbit/s	
					8: 187.5 kbit/s	
					9: 500.0 kbit/s	
					10: 1500 kbit/s	
					11: 3000 kbit/s	
					12: 6000 kbit/s	
					13: 12000 kbit/s	
58-5	S20	FOC FPGA version	R	0		FO cables FPGA version

Table 87: Operational info total

No.	Type	Parameter	Access	Default	Setting value	Explanation
Data length = 80 bytes						
59-1	U32	Motor running time	R		Min = 0 [s]	Motor running time throughout the lifetime
					Max = 4294967295 [s]	
59-2	U32	Motor starts	R		Min = 0 [s]	Number of motor starts throughout the lifetime
					Max = 4294967295 [s]	
59-3	U32	Thermal fault	R		Min = 0 [s]	Number of thermal faults throughout the lifetime
					Max = 4294967295 [s]	
59-4	U32	Torque fault CLOSE	R		Min = 0 [s]	Number torque faults CLOSE throughout the lifetime
					Max = 4294967295 [s]	
59-5	U32	Torque fault OPEN	R		Min = 0 [s]	Number of torque faults OPEN throughout the lifetime
					Max = 4294967295 [s]	

No.	Type	Parameter	Access	Default	Setting value	Explanation
59-6	U32	Limit trip CLOSE	R		Min = 0 [s] Max = 4294967295 [s]	Number of limit switch CLOSE trippings throughout the lifetime
59-7	U32	Limit trip OPEN	R		Min = 0 [s] Max = 4294967295 [s]	Number of limit switch OPEN trippings throughout the lifetime
59-8	U32	Torque trip CLOSE	R		Min = 0 [s] Max = 4294967295 [s]	Number of torque switch CLOSE trippings throughout the lifetime
59-9	U32	Torque trip OPEN	R		Min = 0 [s] Max = 4294967295 [s]	Number of torque switch OPEN trippings throughout the lifetime
59-10	U32	On time warning 1	R		Min = 0 [s] Max = 4294967295 [s]	Total number of all time intervals throughout the lifetime during which an on time warning was indicated.
59-11	U32	On time warning 2	R		Min = 0 [s] Max = 4294967295 [s]	Max. time span during which an on time warning was indicated.
59-12	U32	System starts	R		Min = 0 [s] Max = 4294967295 [s]	Number of AUMATIC system starts throughout the lifetime
59-13	I32	Max. temp. controls	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of controls
59-14	I32	Min. temp. controls	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of controls
59-15	I32	Max. temp. motor	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of motor
59-16	I32	Min. temp. motor	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of motors
59-17	I32	Max. temp. gearbox	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of gearbox
59-18	I32	Min. temp. gearbox	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of gearbox
59-19	I32	Max. temp. MWG	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of MWG
59-20	I32	Min. temp. MWG	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of MWG

Table 88: Operational info

No.	Type	Parameter	Access	Default	Setting value	Explanation
Data length = 82 bytes						
60-1	U32	Motor running time	R		Min = 0 [s] Max = 4294967295 [s]	Motor running time
60-2	U32	Motor starts	R		Min = 0 [s] Max = 4294967295 [s]	Number of motor starts
60-3	U32	Thermal fault	R		Min = 0 [s] Max = 4294967295 [s]	Number of thermal faults
60-4	U32	Torque fault CLOSE	R		Min = 0 [s] Max = 4294967295 [s]	Number torque faults CLOSE
60-5	U32	Torque fault OPEN	R		Min = 0 [s] Max = 4294967295 [s]	Number of torque faults OPEN
60-6	U32	Limit trip CLOSED	R		Min = 0 [s] Max = 4294967295 [s]	Number of limit switch CLOSED trippings
60-7	U32	Limit trip OPEN	R		Min = 0 [s] Max = 4294967295 [s]	Number of limit switch OPEN trippings
60-8	U32	Torque trip CLOSE	R		Min = 0 [s] Max = 4294967295 [s]	Number of torque switch CLOSE trippings

No.	Type	Parameter	Access	Default	Setting value	Explanation
60-9	U32	Torque trip OPEN	R		Min = 0 [s] Max = 4294967295 [s]	Number of torque switch OPEN trippings
60-10	U32	On time warning 1	R		Min = 0 [s] Max = 4294967295 [s]	Total number of all time intervals during which an on time warning was indicated.
60-11	U32	On time warning 2	R		Min = 0 [s] Max = 4294967295 [s]	Max. time span during which an on time warning was indicated.
60-12	U32	System starts	R		Min = 0 [s] Max = 4294967295 [s]	Number of AUMATIC system starts
60-13	I32	Max. tem. controls	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of controls
60-14	I32	Min. temp. controls	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of controls
60-15	I32	Max. temp. motor	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of motor
60-16	I32	Min. temp. motor	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of motor
60-17	I32	Max. temp. gearbox	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of gearbox
60-18	I32	Min. temp. gearbox	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of gearbox
60-19	I32	Max. temp. MWG	R		Min = –100 [°C] Max = +150 [°C]	Maximum temperature of MWG
60-20	I32	Min. temp. MWG	R		Min = –100 [°C] Max = +150 [°C]	Minimum temperature of MWG
60-21	I16	Reset operating data	R/W			Value = 1:Deleting operating data

Table 89: Event report

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 10 bytes						
61-1	U16	File size	R	548	Min = 0 Max = 1024	File size of event report
61-2	U16	Save interval	R	50000	Min = 1000 Max = 65535	Save interval for event data from buffer
61-3	U16	Buffer size	R	50	Min = 10 Max = 100	Max. number of events in the buffer
61-4	enum	System event filter	R	31	0 : Commands 1 : Parameterization 2 : Enable processes 3 : System events 4 : Simulation	The event filter for System defines which system events are to be recorded into the event report.

No.	Type	Parameters	Access	Default	Setting value	Explanation
61-5	enum	Event filter for Events	R	93223	0 : PVST status	The event filter for Events is used to define which collective signals are to be recorded into the event report. As soon as the memory is full, the oldest events are overwritten.
					1 : Warnings	
					2 : Fault	
					3 : Not ready REMOTE	
					4 : Device status	
					5 : Configuration warning	
					6 : Out of specification	
					7 : Function check	
					8 : Maintenance required	
					9 : Failure	
					10 : Configuration error	
					11 : Hydraulics error	
					12 : Wrong oper. command	
					13 : Internal error	
					14 : Internal warning	
					15 : Fieldbus status	
					16 : Hydraulics warning	
					17 : Failure (Cfg)	
					18 : Fault (Cfg)	
					19 : Warnings (Cfg)	
					20 : Not ready REMOTE (Cfg)	
					21 : Config. error REMOTE	
					22 : Collective signal 23	
					23 : SIL status	
					24 : Collective signal 25	
					25 : Collective signal 26	
					26 : Collective signal 27	
					27 : Collective signal 28	
					28 : FOC status	
					29 : Service 1	
					30 : Service 2	
					31 : Service 3	

Table 90: Characteristics

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 62 bytes						
65-1	S20	Tag torque-position 1	R/W	_ REF 1 _		Tag for torque-position characteristic 1
65-2	S20	Tag torque-position 2	R/W	_ REF 2 _		Tag for torque-position characteristic 2
65-3	S20	Tag torque-position 3	R/W	_ REF 3 _		Tag for torque-position characteristic 3
65-4	U16	Interval position-time	R/W	10	Min = 1 [s] Max = 3600 [s]	Interval position-time

Table 91: Device temperatures

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 8 bytes						
62-1	I16	Temp. controls	R		Min = -60 [C°] Max = 150 [C°]	Temperature of the controls
62-2	I16	Temp. control unit	R		Min = -60 [C°] Max = 150 [C°]	Temperature of the control unit
62-3	I16	Temp. motor	R		Min = -60 [C°] Max = 150 [C°]	Temp. motor
62-4	I16	Temp. gearbox	R		Min = -60 [C°] Max = 150 [C°]	Temperature of the gearbox

Table 92: Controls version

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 4 bytes						
63-1	enum	Ex version	R	0	0 : Off 1 : On	Version for explosion-proof applications
63-2	enum	Hydraulic version	R	0	0 : Off 1 : On	Version for applications with hydraulic actuators
63-3	enum	SIL version	R	0	0: Off 1: On	

Table 93: Hardware equipment

No.	Type	Parameters	Access	Default	Setting value	Explanation
Data length = 44 bytes						
64-1	enum	LC (target)	R	1	0 : Not available 1 : Available	Target configuration of 'LC' (Local Controls/ A9) electronics sub-assembly
64-2	enum	LC	R	0	0 : Not available 1 : Available	'LC' (Local Controls) electronics sub-assembly (A9)
64-3	enum	Logic (target)	R	1	0 : Not available 1 : Available	'Logic' (target configuration) electronics sub-assembly (A2)
64-4	enum	Logic	R	0	0 : Not available 1 : Available	'Logic' electronics sub-assembly (A2)
64-5	enum	Pos. transm. (target)	R	1	0 : None 1 : Potentiometer 2 : RWG 4 : MWG	Target configuration of position transmitter
64-6	enum	Position transmitter	R	0	0 : None 1 : Potentiometer 2 : RWG 4 : MWG	Type of position transmitter used

No.	Type	Parameters	Access	Default	Setting value	Explanation
64-7	enum	MCM (target)	R	1	0 : Not available 1 : Available	Target configuration of 'MCM' (Motor Control and Monitoring / A52) electronics sub-assembly
64-8	enum	MCM	R	0	0 : Not available 1 : Available	'MCM' (Motor Control and Monitoring / A52) electronics sub-assembly
64-9	enum	PSO (target)	R	0	0 : Not available 1 : Available	Target configuration of 'PSO' (Power Supply Options (A52.1) electronics sub-assembly
64-10	enum	PSO	R	0	0 : Not available 1 : Available	'PSO' (Power Supply Options / A52.1) electronics sub-assembly
64-11	enum	I/O interface (target)	R	1	0 : Not available 1 : Available	Target configuration of 'I/O interface' electronics sub-assembly (A1.0)
64-12	enum	Logic	R	0	0 : Not available 1 : Available	'Logic' electronics sub-assembly (A2)
64-13	enum	I/O interface 2 (target)	R	0	0 : Not available 1 : Available	Target configuration of 'I/O interface 2' electronics sub-assembly (A1.1)
64-14	enum	I/O interface 2	R	0	0 : Not available 1 : Available	'I/O interface 2' electronics sub-assembly (A1.1)
64-15	enum	Fieldbus (target)	R	0	0 : No fieldbus 1 : Profibus 2 : Available	Target configuration of 'Fieldbus' electronics sub-assembly (A1.8)
64-16	enum	Ex version	R	0	0 : No fieldbus 1 : Profibus 2 : Available	Version for explosion-proof applications
64-17	enum	MWG (target)	R	0	0 : Not available 1 : Available	Target configuration of 'MWG' (magnetic limit and torque transmitter / B6) electronics sub-assembly
64-18	enum	MWG	R	0	0 : Not available 1 : Available	'MWG' (magnetic limit and torque transmitter / B6) electronics sub-assembly
64-19	enum	FO cables (target)	R	0	0 : Not available 1 : Available	Default configuration of 'FO cables' electronics sub-assembly
64-20	enum	Redundancy (target)	R	0	0 : Not available 1 : Red. for line and loop 2 : Red. for line and loop	Redundancy arrangement of fieldbus interface (hardware)
64-21	enum	Redundancy	R	0	0 : Not available 1 : Red. for line and loop 2 : Red. for line and loop	Redundancy arrangement of fieldbus interface (hardware)
64-22	enum	FO cables	R	0	0 : Not available 1 : Available	Electronics sub-assembly 'FOC'
64-23	enum	FOC Ex (target)	R	0	0 : Without FOC Ex 1 : FOC Ex for line/star 2 : FOC Ex for ring	Target configuration of Ex electrical connection

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