AUMA EPAC SA (R) /SACEX (R) with 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

Reference documents can be downloaded from the Internet (www.auma.co.in).

Table of Content

1 Safety Instructions

1.1 Basic information on safety

Safety instructions / warnings
All personnel working with this device must be well-versed with the safety and warning instructions in this manual and observe the instructions given. In order to avoid personal injury or property damage, the safety instructions and warning signs must be observed carefully. Kindly follow Common Electrical and Electronic related safety instructions according to industrial standards.

Qualification of staff
Assembly, electrical connection, commissioning, operation and maintenance must be carried out exclusively by suitably qualified personnel having been authorized 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 recognized rules regarding occupational health and safety.

Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant is responsible for respect and control of these regulations, standards and laws.

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 recognized rules for occupational health and safety.
- Observe the national regulations.

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

Maintenance
AUMA India multi-turn actuators require very little maintenance but they need to be tested regularly for its correct functioning. After commissioning, check the actuator for damage to paint finish. Do a thorough touch-up to prevent corrosion. Correct commissioning is a pre-requisite for reliable service. Seals made of elastomers are subject to aging and must therefore regularly be checked and, if necessary, exchanged. It is also very important that the O-rings at the covers are placed correctly and cable glands fastened firmly to prevent ingress of dust or water.

We recommend additionally:

- If operated seldom, perform a test run about every 6 months. This ensures that the actuator is always ready to operate. The version of actuators discussed in this manual have an option for Partial Valve Stroke Test (PVST) to check if the actuator is healthy.
- Approximately six months after commissioning and then every year check bolts between actuator and valve for tightness. If required, tighten by applying appropriate torques.

Maintenance
- The gear housing is filled with lubricant in the factory. This filling lasts for several years of service.
- Corrosion of paint damage parts must be prevented through touch up.

Any device modification requires the consent of the manufacturer.

1.2 Range of application

AUMA India actuator controls are exclusively designed for the operation of AUMA India actuators. Other applications require explicit (written) confirmation by the manufacturer. The following applications are not permitted.

- 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.

1.4 References and symbols

The following references and symbols are used to provide information of the basic actuator commands to the customer. They are:

Symbol for CLOSED (valve closed)

Symbol for OPEN (valve open)

Symbol for STOP (valve stop)

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 devices Slave devices such as AUMA Profibus DP actuators are peripheral devices. Typical slave devices are input/output devices, valves, actuators.

2.2 Basic functions of Profibus DP

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

2.3 Transfer mode

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

2.4	BUS access

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

2.5	Functionality

- Peer-to-peer (process data exchange [DATA EX]) or Multicast (control commands to all slaves).
- Cyclic process data exchange between DP master and DP slaves.
- Additional acyclic data exchange between DP master and DP slaves for Profibus DP with V1 services.
- Checking the configuration of the DP slaves.

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.

2.7	Device types

- 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 (General Station Data) 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.

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 3.XMP NI with data logging are listed under the following ID numbers at the PNO:

ID number of the standard version: 0x1161 with functions for:

• Single channel Profibus DP interface

• Redundant Profibus DP interface

• Profibus DP V1 services

Master 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 standardized. They enable comfortable configuration of any DP slaves with configuration devices by different manufacturers.

For AUMA actuators AUMA EPAC SA (R) /SACEX (R) PROFIBUS, the following GSD files are available:

Standard version: AUMA1161.GSD with functions for:

• Single channel Profibus DP interface

• Redundant Profibus DP interface

• Profibus DP V1 services

Information   GSD files can be downloaded from our website: www.auma.co.in

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.

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									
10									

Table: Structure of the parameter telegram

3.2.1 Settings for basic functionality for Profibus DP-V1

WD_Base   WD_Base = 0 (time base 10 ms) WD_Base = 1 (time base 1 ms)

Connection monitoring time of the Profibus DP communication:

TWD = (1 or 10ms, depending on WD_Base) x (WD factor 1) x (WD factor 2)

MinTSDR   Minimum response time of the actuator (in TBit)

ID no.   ID number of the actuator

Group ID   Group assignment by the master

3.2.2 Settings for Profibus DP-V1 services

DP-V1 Enable   DP-V1 service is always set

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) Profibus DP.

•   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 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 actuator.

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

Table: Structure of the parameter telegram

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

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.

GSD files are available for AUMA EPAC SA/SACEx. A standard version AUMA 1161.gsd for ident-no. 0x1161.

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).

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

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

Byte2: Actuator Signals

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

Byte3: Actual position value (H)

Actual position High Byte
(Positioner)

Byte 4: Actual position value (L)

Actual position Low Byte
(Positioner)

Byte5: Device Status

Device ok	'	'	'	'	Fault	Warnings	Not ready REMOTE
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte6: Operation status

Running LOCAL	Running REMOTE	'	Actuator running	'	'	'	'
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte7: Intermediate positions

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

Byte8: Discrete Inputs

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

Byte9: Reserve

Byte10: Reserve

Byte11: Torque (H)

Torque
High byte

Byte12: Torque (L)

Torque
Low byte

Byte13: Not ready REMOTE 1

I/O Interface	.	EMCY behave. active	.	Local STOP	Inter local active	Sel.sw. not REMOTE	Wrong oper. cmd
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte14: Not ready REMOTE 2

Handwheel acive	.	PVST active	.	.	SIL function active	.	.
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte15: Fault 1

No reaction	Internal fault	Torque fault CLOSE	Torque fault OPEN	Phase failure	Thermal fault	.	.
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte16: Fault 2

.	Conf. error REMOTE	.	.	.	.	.	.
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte17: Warning 1

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

Byte18: Warning 2

Config. Warning	RTC not set	,	,	,	,	,	,
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte19: Warning 3

,	,	,	Internal warning	,	,	,	,
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte20: Warning 4

PVST fault	PVST abort	,	,	,	Wrn. Set point pos	,	,
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte21: Reserve

Byte22: Reserve

Byte23: Failure

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

Byte24: Maintenance required

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

Byte25: Out of specification1

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

Byte26: Out of specification 2

Config. warning	RTC not set	·	·	·	·	·	Wrn. Controls temp
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte27: Out of specification 3

·	·	·	Internal warning	·	·	·	·
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte28: Out of specification 4

PVST fault	PVST abort	·	·	Wrn. Set point pos	·	·	·
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte29: Function check1

·	·	PVST active	EMCY stop active	·	·	Sel.Sw. not REMOTE	Local STOP
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte30: Function check 2

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

Byte31: Status field bus

Channel 2 activity	Channel 1 activity	·	·	Channel 2 Data Ex	Channel 1 Data Ex	Channel 2 active	Channel 1 active
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte32: SIL signals

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

Byte33: Reserve

Byte34: Reserve

15

Byte35: Reserve

Byte36: Reserve

Byte37: Reserve

Byte38: Reserve

Byte39: Reserve

Byte40: 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).

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: Set point reached	(5) = "Bit: Set point reached"	1	The set point is within max. error variable (outer dead band). Is only signaled if Profi bus DP master has set the Field bus 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 field bus: Field bus OPEN or Field bus 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.

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
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 ex- ecuted.
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 Warning4).
			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).

Table: Byte 1: Logical signals

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

Table: Byte 2: Actuator signals

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

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).
3	Reserved			No signal (reserved)
4	Reserved			No signal (reserved)
5	Reserved			No signal (reserved)
6	Reserved			No signal (reserved)
7	Bit: Device ok	(15) = "Bit: Device ok"	1	Collective signal 05: The device is ready for remote control. No AUMA warnings, AUMA faults or signals according to NAMUR are present. Bit 7 is set if bits 0 to 6 are deleted.
			0	Contains the result of a disjunction (OR-operation) of bits 0 to 6 (device status).

Table: Byte 5: Device status

Byte 6: Operation status   This byte stores information about actuator movement.

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Reserved			No signal (reserved)
1	Reserved			No signal (reserved)
2	Reserved			No signal (reserved)
3	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	Reserved			No signal (reserved)
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

Table: Byte 6: Operation status

Byte 7: Intermediate positions

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Reserved			No signal (reserved)
1	Reserved			No signal (reserved)
2	Reserved			No signal (reserved)
3	Reserved			No signal (reserved)
4	Reserved			No signal (reserved)
5	Reserved			No signal (reserved)
6	Reserved			No signal (reserved)
7	Reserved			No signal (reserved)

Table: Byte 7: Intermediate positions

Byte 8: Discrete inputs

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Reserved			No signal (reserved)
1	Reserved			No signal (reserved)
2	Reserved			No signal (reserved)
3	Reserved			No signal (reserved)
4	Reserved			No signal (reserved)
5	Reserved			No signal (reserved)
6	Reserved			No signal (reserved)
7	Reserved			No signal (reserved)

Table: Byte 8: Discrete inputs

Byte 9 and byte 10: Input AIN 1

Byte 9 = high byte, byte 10 = low byte is reserved

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).

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 simultan- eously) 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	Reserved			No signal (reserved)
5	Bit: EMCY behav. act.	(49) = "Bit: EMCY be- hav.act."	1	Operation mode EMERGENCY behaviour is active (EMERGENCY signal was sent).
			0	No signal
6	Reserved			No signal (reserved)
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.

Table: Byte 13: Not ready REMOTE 1

Byte 14: Not ready REMOTE 2

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Reserved			No signal (reserved)
1	Reserved			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	Reserved			No signal (reserved)
4	Reserved			No signal (reserved)
5	Bit: PVST active	(116) = "Bit: PVST active"	1	Partial Valve Stroke Test (PVST) is active.
			0	No signal
6	Reserved			No signal (reserved)
7	Bit: Handwheel active	(54) = "Bit: Hand wheel active"	1	Manual operation is active (hand wheel is engaged); optional signal
			0	No signal

Table: Byte 14: Not ready REMOTE 2

Byte 15: Fault 1　The fault signals contain the causes why the actuator cannot be operated.

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Reserved			No signal (reserved)
1	Reserved			No signal (reserved)
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 intern- al 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

Table: Byte 15: Fault 1

Byte 16: Fault 2　The fault signals contain the causes why the actuator cannot be operated.

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	Reserved			

Table: Byte 16: Fault 2

Byte 17: Warnings 1　The warning signals are for information only and do not interrupt or disable an operation (as opposed to faults).

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

Table: Byte 17: Warnings 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

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: 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

Table: Byte 18: Warnings 2

Byte 19: Warnings 3

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: Internal warning	(70) = "Bit: Internal warning"	1	Collective signal 15: Internal warning
			0	No internal warning
5				No signal (reserved)
6				No signal (reserved)
7				No signal (reserved)

Table: Byte 19: Warnings 3

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: WrnSetpoint- Pos"	1	Warning: Loss of signal of actuator setpoint position
			0	No signal
3				No signal (reserved)
4				No signal (reserved)
5				No signal (reserved)
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

Table: Byte 20: Warnings 4

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).

Byte 23: Failure

in per mil (value: 0 – 1,000).

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

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).

Table: Byte 23: Failure

Byte 24: Maintenance required

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

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	—	—		No signal (reserved)

Table: Byte 24: Maintenance required

Byte 25: Out of specification 1

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

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

Table: Byte 25: Out of specification 1

Byte 26: Out of specification 2

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0	Bit: Wrn controls temp	(88) = "Bit: WrnControl- sTemp"	1	Warning: Temperature within controls housing too high
			0	No signal
1	—	—		No signal (reserved)
2	—	—		No signal (reserved)
3				
4	—	—		No signal (reserved)
5				
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

Table: Byte 26: Out of specification 2

Byte 27: Out of specification 3

Bit	Designation (process representation)	Prm-Text-Def GSD file	Value	Description
0				No signal (reserved)
1				No signal (reserved)
2				No signal (reserved)
3				No signal (reserved)
4	Bit: Internal warning	(70) = "Bit: Internal warning"	1	Collective signal 15: Internal warning
			0	No internal warning
5				No signal (reserved)
6				No signal (reserved)
7				No signal (reserved)

Table: Byte 27: Out of specification 3

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: WrnSetpoint- Pos"	1	Warning: Loss of signal of actuator setpoint position
			0	No signal
3				No signal (reserved)
4				No signal (reserved)
5				No signal (reserved)
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

Table: Byte 28: Out of specification 4

Byte 29: Function check 1 Causes of the Function check signal in accordance with NAMUR recommendation NE 107.

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				No signal (reserved)
3				No signal (reserved)
4				No signal (reserved)
5				No signal (reserved)
6	—	—		No signal (reserved)
7	—	—		No signal (reserved)

Table: Byte 29: Function check 1

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.

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	-			No signal (reserved)
5	-			No signal (reserved)
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

Table: Byte 31: Status fieldbus

Byte 32: SIL indications   Causes of the Maintenance required signal in accordance with NAMUR recommendation NE 107.

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				No signal (reserved)
4	—	—		No signal (reserved)
5	—	—		No signal (reserved)
6	—	—		No signal (reserved)
7	—	—		No signal (reserved)

Table: Byte 32: Status fieldbus

1) The safety function indications via field bus 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).

Byte1: Commands

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

Byte2: Reserve1

Reserved for future extension

Byte3: Position setpoint (H)

Fieldbus SETPOINT/ (process setpoint) High byte

Byte4: Position setpoint(L)

Fieldbus SETPOINT/ (process setpoint) Low byte

Byte5: Additional commands

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PVST	'	Fieldbus channel 2	Fieldbus channel 1	'	Fb. Enable CLOSE	Fb. Enable OPEN	Fb. Enable LOCAL

Byte6: Intermediate positions

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

Byte7: Digital outputs1

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

Byte8: Digital outputs2

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

Byte9: Actual process value (H)

Option (Only for use with process controller)

Byte10: Actual process value (L)

Option (Only for use with process controller)

Byte11: Reserve

Reserved for future extension

Byte12: Reserve

Reserved for future extension

Byte13: Reserve

Reserved for future extension

Byte14: Reserve

Reserved for future extension

Byte15: Reserve

Reserved for future extension

Byte16: Reserve

Reserved for future extension

Byte17: Reserve

Reserved for future extension

Byte18: Reserve

Reserved for future extension

Byte19: Reserve

Reserved for future extension

Byte20: Reserve

Reserved for future extension

Byte21: Reserve

Reserved for future extension

Byte22: Reserve

Reserved for future extension

Byte23: Reserve

Reserved for future extension

Byte24: Reserve

Reserved for future extension

Byte25: Reserve

Reserved for future extension

Byte26: Reserve

Reserved for future extension
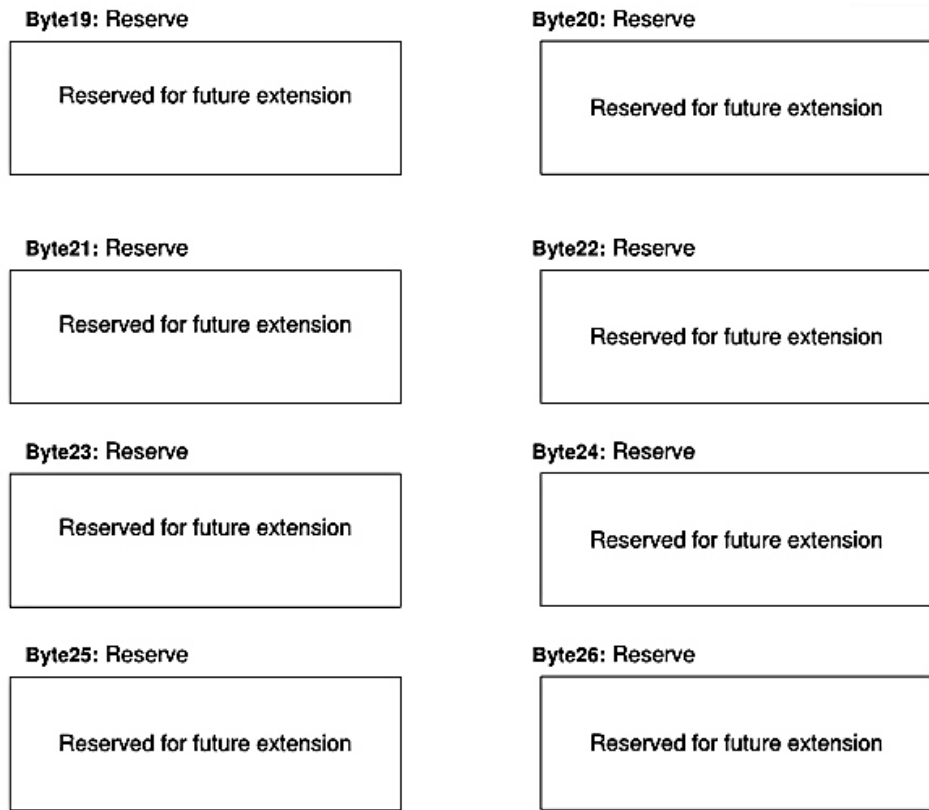
4.2.2   Description of the output data

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 pos- ition **Remote control** (REMOTE) via fieldbus (e.g. PTC tripping device and torque fault). The function of this bit corresponds to the push but- ton **RESET** at the local controls.
		0	No command
4	—		No command (reserved)

Table: Byte 1: Commands

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 300ms.

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.

Byte 5: Additional commands Process controller (option). Value 1,000 corresponds to the maximum process setpoint, value 0 to the minimum process setpoint.

Bit	Designation (process representation)	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			No signal (reserved)

Table: Byte 5: Additional commands

Byte 6: Intermediate positions

Bit	Designation (process representation)	Value	Description
0	Reserved		No signal
1	Reserved		No signal
2	Reserved		No signal
3	Reserved		No signal
4	Reserved		No signal
5	Reserved		No signal
6	Reserved		No signal
7	Reserved		No signal

Table: Byte 6: Intermediate positions

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.

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)

Table: Byte 6: Digital outputs 1

Byte 8: Digital outputs 2

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	—		

Table: Byte 6: Digital outputs 2

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 & Byte 12 are reserved

Bytes 13 and 14: Fieldbus output AOUT 2

Byte 13 & Byte 14 are reserved

Bytes 15 to 26: Reserve

The contents are reserved for future extensions.

4.3 Profibus DPV1 services

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.

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.

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:

 (use of AUMA1161.GSD in combination with the indent. no. of the standard version: 0x1161)

5   Description of the Profibus DP board

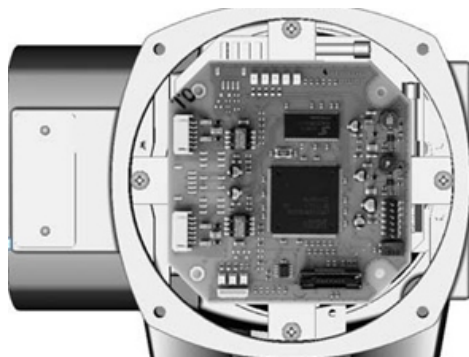The Profibus DP boards is directly located below the local controls.
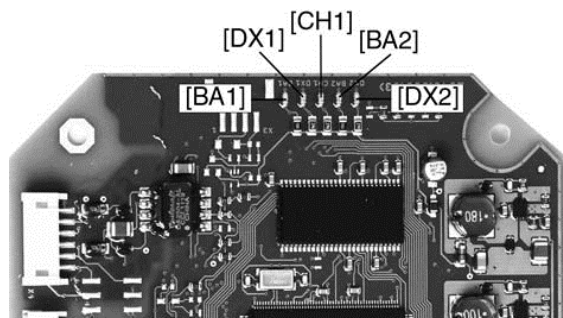

Fig 6: Profibus DP board

⚠ DANGER	**Hazardous voltage!**
	Risk of electric shock.
	When connected to the mains, the local controls may only be removed by suitably qualified personnel.

5.1   Indications (indication and diagnostic LEDs)

Fig 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.

Fig 8: Status LEDs

[RES] RESET (green)
[DBG] DEBUG (green)
[CAN] CAN (red)
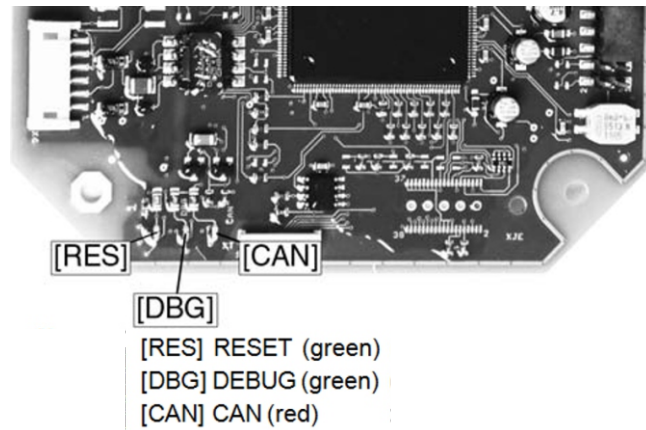
[RES] Illuminated in green after Reset phase: 3.3 V voltage supply is ok.

[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	Troubleshooting

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

The RED LED in the LED card indicates the FAULT. To identify the fault, check the status displayed on the LCD/relay status. Following are the typical displays of the FAULT condition and the trouble shooting methods to resolve those issues.

DISPLAY-"24V supply fail"

TROUBLESHOOTING:

a.   Check whether FRC cable is properly connected between CPU card and Power Supply card.

b.   Measure the DC voltage between '+' and '-' terminals in Customer Terminal Compartment using a multimeter. Here we are supposed to get 24VDC. If no voltage is coming, then measure the resistance between those terminals using a multimeter by disconnecting the MAINS. If there is a dead short, then replace Power Supply Card.

DISPLAY- "Single Phase"

TROUBLESHOOTING:

a.   Ensure that the MAINS 3 phase input supply voltage and frequency of operation is matching the ratings mentioned on the name plate.

b.   This module indicates Single Phase fault when only Y-phase is missing.

c.   Check if there is any discontinuity between the power terminal and transformer card J1 – Y Terminal.

d.   Check for any loose contact/discontinuity in the 8-pin Mini-Fit MOLEX connectors between the fuse and the transformer.

e.   Check whether FRC cable is properly connected between CPU card and Power Supply card.

DISPLAY- "TH Switch Trip"

TROUBLESHOOTING:

a.   Check the motor Thermoswitch continuity; if continuity is not there then we have to replace the motor.

b.   If the motor thermoswitch continuity is there then, check the continuity between wires with ferrule TH and F1 of the J6 on CPU card; If there is no continuity then check the wiring error.

c.   After the above two corrections, if the same error message display continues, then replace the CPU card.

DISPLAY- "Space Heater fault"

TROUBLESHOOTING:

a.   Check whether Fuse -F4 is blown; If yes, replace with good slow blowing fuse of 150mA, 250V rating.

b.   With the help of multi-meter measure the Space heater voltage (ACV) voltage between black and brown wires of J2 on Power Supply Card (This value will be 220VAC / 110VAC /24VAC depending on the customer requirement). If the appropriate required voltage is not measured then check the Molex connector between fuse plate and transformer.

c.   If the required voltage is measured but display continues to show the same error message then, replace the Power Supply Card. But if the requisite voltage is not measured then, the fault could be with transformer. Replace with new transformer and check again.

DISPLAY-" Control supply fail"	TROUBLESHOOTING: a. Check whether Fuse-F3 is blown; If yes, replace with good fuse of 150mA, 250V rating. b. With the help of multimeter measure the Control Supply Voltage (AC voltage between Orange and Black wires of J2 on Power Supply card), which is to be 220VAC/110VAC as per the customer requirement. If voltage is still not coming then, check the MOLEX connector between fuse plate and transformer. c. If the requisite voltage is measured; but display continue to show the same error message then replace the Power Supply Card. But if the requisite voltage is not measured then, the fault could be with transformer. Replace with new transformer and check again.
DISPLAY- "Jammed Valve"	TROUBLESHOOTING: a. The Jammed valve condition has to be released manually.
Motor running in wrong direction	TROUBLESHOOTING: a. Whenever there is a replacement of Motor then there is a possibility of occurrence of this error i.e. the actuator will run in wrong direction for the respective command inputs (actuator runs in open direction for close command and vice versa). To troubleshoot this, interchange any 2 wires of the motor when the Motor is replaced.
Mode selection option not working from REMOTE	In case if Remote-Local mode selection option from REMOTE is not happening (optional feature); check for the wiring at the customer end according to the WD.
Actuator running inadvertently (with 'ESD' message on LCD)	In case of actuator running inadvertently (with 'ESD' message on LCD) either in OPEN or CLOSE direction depending on the software configuration, check if ESD is activated (wiring mistake) using the WD provided.
Actuator not taking command in any direction	In case the actuator is not taking command in any particular direction check if INHIBIT feature is enabled (wiring mistake) using the WD provided.
Motor is not responding to OPEN & CLOSE command and OPENING / CLOSING is indicated on LCD	In case the motor is not responding to the OPEN & CLOSE command and OPENING / CLOSING is indicated on LCD: Check if J3 of Power Supply card is plugged properly. Check the requisite voltages (110/230V) at the contactor terminals (K, K1 & K, K2 –refer Fig. E below). a. If the voltages are proper then, it could be the failure of the contactor; Replace the contactor. b. If the voltages are not proper, it means relay failure on the PS card. Replace the PS card.

Fig: Contactor

LCD Display is blank with back light ON:	Check whether all respective connectors are plugged properly and ensure that the shorting link is connected properly on J2, J3 of CPU card as shown below.

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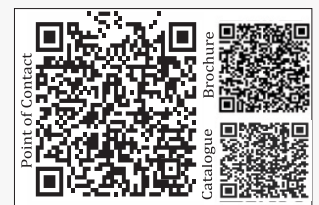
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