auma®

Actuator controls

AUMATIC
AC 01.1
ACExC 01.1
Profibus DP

TÜV CERT
ISO 9001
ISO 14001
Certificate Registration No.
12 100 4269
12 104 4269

Operation instructions

Scope of these instructions:	These instructions are valid for multi-turn actuators of the type ranges SA(R) 07.1 – SA(R) 16.1 and SA(R)ExC 07.1 – SA(R)ExC 16.1 as well as for part-turn actuators of the type ranges SG 05.1 – SG 12.1 and SGExC 05.1 – SGExC 12.1 with the controls AUMATIC AC 01.1 or ACExC 01.1 with Profibus DP interface.

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1. Safety instructions

1.1 Range of application

AUMA actuators are designed for the operation of industrial valves, e.g. globe valves, gate valves, butterfly valves and ball valves. For other applications, please consult us. The manufacturer is not liable for any possible damage resulting from use in other than the designated applications. Such risk lies entirely with the user.
Observance of these operation instructions is considered as part of the controls'/ actuator's designated use.

1.2 Commissioning (electrical connection)

During electrical operation certain parts inevitably carry lethal voltages. Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

1.3 Maintenance

The maintenance instructions must be strictly observed, otherwise a safe operation of the multi-turn actuator/ controls is no longer guaranteed.

1.4 Warnings and notes

Non-observance of the warnings and notes may lead to serious injuries or damage. Qualified personnel must be thoroughly familiar with all warnings and notes in these operation instructions.
Correct transport, proper storage, mounting and installation, as well as careful commissioning are essential to ensure a trouble-free and safe operation.
The following references draw special attention to safety-relevant procedures in these operation instructions. Each is marked by the appropriate pictograph.

This pictograph means: Note!
"Note" marks activities or procedures which have major influence on the correct operation. Non-observance of these notes may lead to consequential damage.

This pictograph means: Electrostatically endangered parts!
If this pictograph is attached to a printed circuit board, it contains parts which may be damaged or destroyed by electrostatic discharges. If the boards need to be touched during setting, measurement or for exchange, it must be assured that immediately before a discharge through contact with an earthed metallic surface (e.g. the housing) has taken place.

This pictograph means: Warning!
"Warning" marks activities or procedures which, if not carried out correctly, can affect the safety of persons or material.

2. Short description

AUMA actuators have a modular design. Motor and gearing are mounted in a common housing.
The actuators are driven by an electric motor and controlled with the electronic controls AUMATIC. The electronic controls are included in the scope of delivery.

3. Transport and storage

- Transport to place of installation in sturdy packing.
- Do not attach ropes or hooks to the handwheel for the purpose of lifting by hoist.
- Store in well-ventilated, dry room.
- Protect against floor dampness by storage on a shelf or on a wooden pallet.
- Cover to protect against dust and dirt.
- Apply suitable corrosion protection agent to bright surfaces.

4. General information about Profibus DP

For the exchange of information among automation systems and between automation systems and the connected decentral field devices, serial fieldbuses are mainly used today as the communication system. Thousands of applications have proved impressively that cost savings of up to 40 % in wiring, commissioning and maintenance are achieved by using field bus technology. While in the past the fieldbuses 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 is independent of individual suppliers and can choose the best product at the most competitive price.
Profibus DP is the leading open fieldbus system in Europe, which 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 which has been standardized in the fieldbus standard EN 50 170. This standardization ensures that the investments of manufacturers and users are protected to the best possible degree and the independence of the manufacturer is guaranteed.
These operation instructions cannot provide a general introduction into Profibus DP. For more information please refer to the literature references in appendix D.

4.1 Basic characteristics

Profibus DP defines the technical and functional features of a serial fieldbus system with which distributed digital automation devices can be interconnected. Profibus DP distinguishes between master and slave devices.
Profibus DP is designed for fast data transmission in the field level. Here central control devices, such as a PLC or PC, communicate via a fast serial connection with peripheral field stations such as input/output devices, valves and actuators.
The interchange of data among the field devices takes place cyclically. The necessary communication functions are established by the Profibus DP basic functions according to EN 50 170.

Master devices control the data traffic on the Bus. A master is allowed to send messages without an external request. Masters are also called ‘active stations’ in the Profibus protocol.

Slave devices such as AUMA Profibus DP actuators are peripheral devices. Typical slave devices are input/output devices, valves, actuators and measuring sensors. They do not have bus access, 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 stations’.

4.2 Basic functions of Profibus DP

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

4.3 Transfer mode

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

4.4 Bus access

- Token-passing between the masters and polling between master and slave.
- Mono-master or multi-master systems are possible.
- Master and slave stations: max. 126 stations connected to one bus.

4.5 Communication

- Peer-to-peer (net data transfer) or Multicast (control commands to all slaves).
- Cyclic master-slave net data transfer or acyclic master-master data transfer.

4.6 Functionality

- Cyclic net data transfer between DP master and DP slaves
- Dynamic activation or de-activation of individual DP slaves.
- Checking of the configuration of the DP slaves
- Synchronisation of inputs and/or outputs.

4.7 Protection functions

- All messages are transmitted with Hamming Distance HD=4.
- Watch-dog timer at DP slaves.
- Access protection for the inputs/outputs of the DP slaves
- Net data transfer monitoring with configurable timer interval at the master.
- Adjustable safety behaviour.

4.8 Device types

- DP Master class 2 (DPM2), e.g. programming / configuration devices.
- 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, valves.

5. Technical data

Table 1: Profibus DP interface for actuator controls AC 01.1

Features and functions

Supply voltage

Standard voltages:

3-ph AC voltages/ frequencies											**1-ph AC** voltages/ frequencies		
Volt	220	230	240	380	400	415	440	460	480	500	Volt	110,115,120	220,230,240
Hz	50	50	50	50	50	50	60	60	60	50	Hz	50/60	50/60

Special voltages:

3-ph AC voltages/ frequencies					**1-ph AC** voltages/ frequencies
Volt	525	575	660	690	208
Hz	50	50	50	50	60

External supply of the electronics (option)

24 V DC + 20 % / – 15 %,
current consumption: basic version approx. 200 mA, with options up to 500 mA

Switchgear

Standard: Reversing contactors[1] (mechanically and electrically interlocked) for motor power up to 1.5 kW

Options: Reversing contactors[1] (mechanically and electrically interlocked) for motor power up to 7.5 kW

Thyristor unit (recommended for modulating actuators) for motor power up to 1.5 kW, 500 V AC with internal fuses for motor power up to 5.5 kW, 500 V AC, external fuses required

Control and output signals

Via Profibus DP interface.

Profibus DP interface with additional inputs (options)

Profibus DP interface with 4 free 24 V DC inputs and 2 free 0/4 – 20 mA inputs. Signal transmission via fieldbus interface.

Profibus DP interface with 24 V DC control inputs OPEN – CLOSE – EMERGENCY.
Selection of control mode via 24 V DC input BUS/REMOTE.

Profibus DP interface with 24 V DC control inputs OPEN – CLOSE and 0/4 – 20 mA input for nominal position value[2] (positioner).
Selection of control mode via 24 V DC inputs BUS/REMOTE and MODE.

Profibus DP interface with 24 V DC (optional 115 V AC) control inputs OPEN – STOP - CLOSE – EMERGENCY and 0/4 – 20 mA input for nominal position value[2] (positioner).
Selection of control mode via 24 V DC (optional 115 V AC) inputs BUS/REMOTE and MODE.
Output signals via 6 programmable signal relays, position feedback 0/4 – 20 mA.

Voltage output

Standard: Auxiliary voltage 24 V DC, max. 100 mA for supply of the control inputs, galvanically isolated from internal voltage supply

Option: Auxiliary voltage 115 V AC, max. 30 mA for supply of the control inputs,[3], galvanically isolated from internal voltage supply

Profibus DP V1 (option)

Access to parameters, the electronic name plate and the operating data with acyclic write/read services

Component redundancy (option)

AUMATIC is equipped with an additional redundant Profibus DP interface.

Fibre optic connection (option)

F-ST (bayonet type connection) = BFOC connection

Channels: (optical)
for line topology: IN1 + OUT1 / IN2 + OUT2
for star topology: IN1 + OUT1
for ring topology: IN1 + OUT1 / IN2 + OUT2

Data rate up to 1.5 Mbit/s (for ring topology 93.75 kBit/s)

Glass fibre, 62.5 (50)/125 µm, multi-mode

Optical budget: 6 dB for 62.5 µm, 4 dB for 50 µm fibre

Network range: with 62.5 µm glass fibre: max. 2 000 m
with 50 µm glass fibre: max. 1,300 m
Damping of the FO cable max. 3.0 dB/km, without additional damping

Wave length: 850 nm

1) The lifetime guaranteed by the manufacturer amounts to 2 million cycles. In case a higher number of cycles is to be expected, the use of thyristor units with nearly unlimited lifetime is recommended
2) Only partly possible in connection with process controller PID, please contact AUMA
3) Not possible in combination with PTC tripping device

Local controls	Standard:	Selector switch LOCAL – OFF – REMOTE (lockable in all three positions)
		Push-buttons OPEN – STOP – CLOSE - RESET
		5 indication lights: End position CLOSED and running indication CLOSE (yellow), torque fault CLOSE (red) , motor protection tripped (red), torque fault OPEN (red),end position and running indication OPEN (green)
		LC display, illuminated
		Programming interface
	Options:	Release of the local controls: with or without selector switch LOCAL – OFF – REMOTE
		Operation of the actuator with the push-buttons OPEN – STOP – CLOSE – RESET of the local controls can be disabled or released via Profibus DP.
		Special colours for the 5 indication lights: End position and running indication CLOSED (green), torque fault CLOSE (blue), torque fault OPEN (yellow), motor protection tripped (white), end position OPEN (red)
		Protection cover, lockable
		Protection cover with indicator glass, lockable
Functions	Standard:	Seating programmable limit or torque seating for end position OPEN and end position CLOSED
		Torque monitoring over the whole travel
		Torque by-pass, adjustable to up to 5 seconds (no torque monitoring during this time)
		Phase failure monitoring with automatic phase correction
		Programmable behaviour in case of loss of bus communication
		Running indication via indication lights
		Positioner[4]: Nominal position value via Profibus DP interface Programmable behaviour on loss of signal Automatic adaptation of the dead band (adaptive behaviour selectable) Change over between OPEN – CLOSE duty and modulating duty via Profibus DP
	Options:	Process controller, PID[4]: Nominal process value via Profibus DP interface Actual process value via 0/4 – 20 mA additional input Programmable behaviour on loss of signal Limitation of the control range Change over between OPEN – CLOSE duty and modulating duty via Profibus DP
		Multiport valve function[4] Approaching of up to 8 intermediate positions via Profibus DP and the local controls
Monitoring functions	Programmable monitoring of the max. number of cycles generates warning signal	
	Reaction monitoring for operation command (programmable from 1 to 15 seconds), generates fault signal – results in switching off	
	Operating time monitoring (programmable from 4 to 1,800 seconds), generates warning signal	
Electronic name plate	Ordering data:	Commission number AUMATIC, commission number actuator, KKS number (definition system for power plants), valve number, Plant number
	Product data:	Product name, works number actuator, works number AUMATIC Software version logic, hardware version logic, date of final test, Wiring diagram, terminal plan
	Project data:	Project name, 2 freely definable customer fields with a max. of 19 digits each
	Service data:	Service telephone, internet address, service text 1, service text 2
Logging of operating data	A resettable counter and a lifetime counter for: Motor running time, number of starts, torque switch trippings in end position CLOSED, limit switch trippings in end position CLOSED, torque switch trippings in end position OPEN, limit switch trippings in end position OPEN, torque faults CLOSED, torque faults OPEN, motor protection trippings	
Motor protection evaluation	Standard:	Monitoring of the motor temperature in combination with thermoswitches in the actuator motor
	Options:	Additional thermal overload relay in the controls
		PTC tripping device in combination with PTC thermistors in the actuator motor

4) Requires position transmitter in the actuator

Electrical connections	Standard:	AUMA plug/socket connector with screw type connection Threads for cable glands: M-threads: 2 x M 25 x 1.5 / 4 x M 20 x 1.5 Pg-threads: 2 x Pg 21 / 4 x Pg 13,5 NPT-threads: 1 x 1" NPT / 3 x ¾" NPT
	Options:	G-threads: 1 x G ¾" / 4 x G ½ Special threads, other than standard mentioned above, possible Gold-plated control plug (pins and sockets) Parking frame for wall mounting of the disconnected plug Protection cover for plug compartment (when plug is removed)
Overvoltage protection (option)	Protection of the actuator and control electronics against overvoltages of up to 4 kV (not available for component redundancy)	
Wiring diagram (basic version)	ACP 11F1-2P0—S000 KMS TP102/001	
Further options for Non-intrusive version with MWG in the actuator		
Setting of limit and torque switching via local controls		
Electronic timer	Start and end of stepping mode as well as ON and OFF time (1 up to 300 seconds) can be programmed individually for the directions OPEN and CLOSE.	
Intermediate positions	Any 8 intermediate positions between 0 and 100 % Reaction and signal behaviour programmable	
Further options for version with potentiometer or RWG in the actuator		
Electronic timer	Start and end of stepping mode as well as ON and OFF time (1 up to 300 seconds) can be programmed individually for the directions OPEN and CLOSE.	
Intermediate positions	Any 8 intermediate positions between 0 and 100 % Reaction and signal behaviour programmable	
Settings/programming of the Profibus DP interface		
Setting of the baud rate	Automatic baud rate recognition	
Setting of 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 optimal adaptation to the process control system, 4 different process representations are available. Additionally the contents of four signal bytes are freely programmable.	
Commands and signals of the Profibus DP interface		
Process representation output (command signals)	OPEN, STOP, CLOSE, nominal position value [4], RESET	
Process representation input (feedback)	End position OPEN, CLOSED Actual position value [4] Actual torque value [5] Selector switch in position LOCAL/ REMOTE Running indication [4] (directional) Torque switch OPEN, CLOSED Limit switch OPEN, CLOSED Manual operation by handwheel [4] or local controls Analogue (2) and digital (4) customer inputs Communication channel A or B (redundant channel) active	
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 - move to end position OPEN or CLOSED - move to any intermediate position[4]	
General data Profibus DP		
Communication protocol	Profibus DP according to EN 50 170-2, DIN 19 245	
Network topology	Linear (BUS) structure. With repeaters tree structures can also be realised. Coupling and uncoupling of devices during operation without affecting other devices is possible.	
Transmission medium	twisted, screened copper cable according to EN 50 170	
Profibus DP interface	EIA-485 (RS485)	

4) Requires position transmitter in the actuator
5) Requires magnetic limit and torque transmitter (MWG) in actuator

<table>
<tr><td>Transmission speed/
cable length</td><td colspan="3">
<table>
<tr><th>Baud rate (kbit/s)</th><th>Max. cable length
(segment length)
without repeater</th><th>Possible cable length
with repeater
(total network cable length)</th></tr>
<tr><td>9,6</td><td>1.200 m</td><td>approx. 10 km</td></tr>
<tr><td>19,2</td><td>1.200 m</td><td>approx. 10 km</td></tr>
<tr><td>45,45</td><td>1.200 m</td><td>approx. 10 km</td></tr>
<tr><td>93,75</td><td>1.200 m</td><td>approx. 10 km</td></tr>
<tr><td>187,5</td><td>1.000 m</td><td>approx. 10 km</td></tr>
<tr><td>500</td><td>400 m</td><td>approx. 4 km</td></tr>
<tr><td>1.500</td><td>200 m</td><td>approx. 2 km</td></tr>
</table>
</td></tr>
<tr><td>Device types</td><td colspan="3">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</td></tr>
<tr><td>Number of devices</td><td colspan="3">32 devices without repeater, with repeater expandable to 126</td></tr>
<tr><td>Bus access</td><td colspan="3">Token-passing between the masters and polling for slaves.
Mono-master or multi-master systems are possible.</td></tr>
<tr><td>Supported Profibus DP functions</td><td colspan="3">Cyclic data exchange, sync mode, freeze mode, fail-safe mode</td></tr>
<tr><td colspan="4">Service conditions</td></tr>
<tr><td rowspan="2">Enclosure protection according to EN 60 529</td><td>Standard:</td><td colspan="2">IP 67 (when mounted)</td></tr>
<tr><td>Options:</td><td colspan="2">IP 68[6)]
Terminal compartment additionally sealed against interior (double sealed)</td></tr>
<tr><td rowspan="3">Corrosion protection</td><td>Standard:</td><td colspan="2">KN suitable for installation in industrial units, in water or power plants with a low pollutant concentration</td></tr>
<tr><td rowspan="2">Options:</td><td colspan="2">KS suitable for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. wastewater treatment plants, chemical industry).</td></tr>
<tr><td colspan="2">KX suitable for installation in extremely aggressive atmosphere with high humidity and high pollutant concentration</td></tr>
<tr><td rowspan="2">Finish coating</td><td>Standard:</td><td colspan="2">two-component iron-mica combination.</td></tr>
<tr><td>Option:</td><td colspan="2">Special primer / special finish coat (customer’s choice)</td></tr>
<tr><td rowspan="2">Colour</td><td>Standard:</td><td colspan="2">silver-grey (DB 701, similar to RAL 9007)</td></tr>
<tr><td>Option:</td><td colspan="2">Other colours as standard colour are possible on request</td></tr>
<tr><td>Ambient temperature</td><td colspan="3">– 25 °C to + 70 °C</td></tr>
<tr><td>Vibration resistance according to IEC 60 068</td><td colspan="3">1 g, from 10 Hz to 200 Hz</td></tr>
<tr><td>Weight</td><td colspan="3">approx. 7 kg (with AUMA plug/ socket connector)</td></tr>
<tr><td colspan="4">Accessories</td></tr>
<tr><td>Wall bracket[7)]</td><td colspan="3">AUMATIC mounted separately from the actuator, including plug/ socket connector. Connecting cables on request.
Recommended for high ambient temperatures, difficult access or in case of heavy vibrations during service.</td></tr>
<tr><td>EMERGENCY STOP button[8)]</td><td colspan="3">The control voltage of the reversing contactors is interrupted by operating the EMERGENCY STOP button</td></tr>
<tr><td>Programming software</td><td colspan="3">COM-AC incl. interface cable</td></tr>
<tr><td colspan="4">Other information</td></tr>
<tr><td>EU Directives</td><td colspan="3">Electromagnetic Compatibility (EMC): (89/336/EEC)
Low Voltage Directive: (73/23/EEC)
Machinery Directive: (98/37/EC)</td></tr>
<tr><td>Reference documents:</td><td colspan="3">Product description “Actuator controls AUMATIC AC”
Dimension sheets Multi-turn actuators/ part-turn actuators “with integral controls AUMATIC AC”</td></tr>
</table>

4) Requires position transmitter in the actuator

6) For version in enclosure protection IP 68 higher corrosion protection KS or KX is strongly recommended

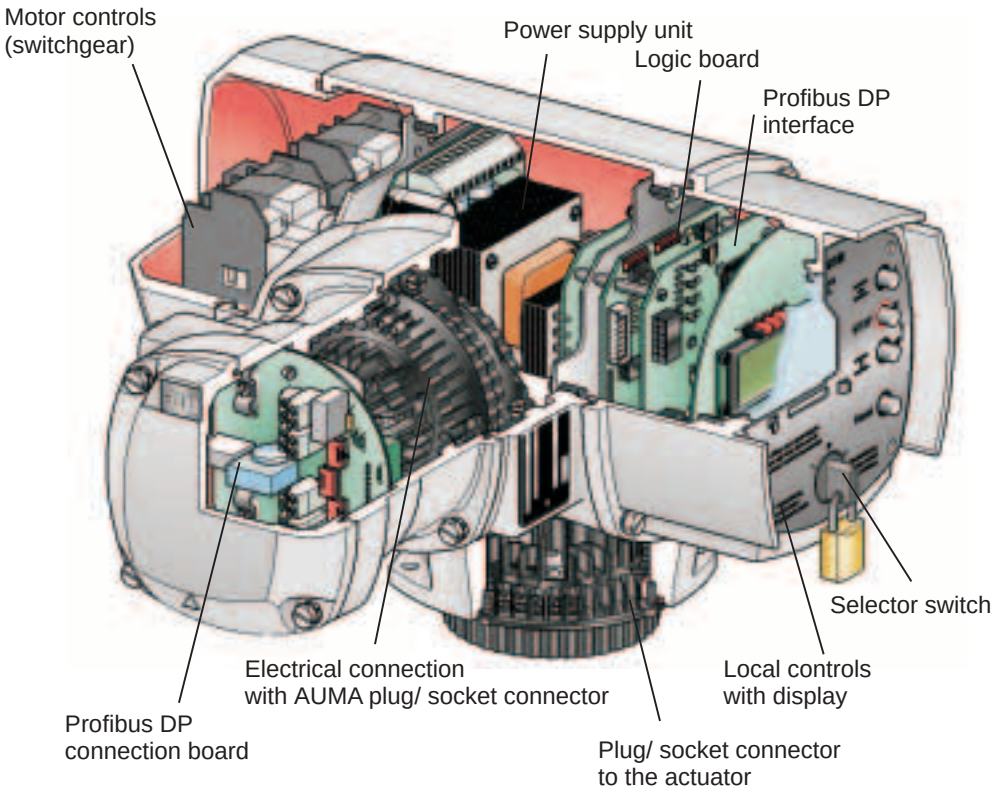
7) Distance between actuator and AUMATIC max. 100 m. Not suitable for version with potentiometer in the actuator. Instead of the potentiometer, a RWG has to be used. Cable length for Non-intrusive version with MWG in the actuator max. 100 m. Requires separate data cable for MWG. If actuator and AUMATIC are separated at a later date the max. cable length is 10 m.

8) Only in combination with reversing contactors and AUMATIC AC 01.1 in enclosure protection IP 67 or IP 68

6. Design AUMATIC Profibus DP

With the AUMATIC Profibus DP, AUMA provides the ideal controls for the connection of multi-turn actuators of the type range SA and part-turn actuators of the type range SG to Profibus DP.

Figure A: AUMATIC Profibus DP



The integral controls AUMATIC Profibus DP consist of the following modules:

- Profibus DP interface. This links the Profibus DP data with the internal electronics.
- The logic board links the signals of the actuator with the local controls and the Profibus DP interface and controls the reversing contactors or the thyristors.
- Local controls with selector switch and push-buttons, indication lights and display. With the selector switch the control stations for local control **LOCAL** – **0** – **REMOTE** for remote control are selected. The push-buttons (OPEN) – **Stop** – (CLOSE) are used for the electric operation of the actuator on site.
- Plug/ socket connectors for easy mounting of the AUMATIC Profibus DP on the actuators.
- Motor controls: Reversing contactors or thyristors for motor controls.
- Profibus DP connection board with terminals for the Profibus DP cable and the termination resistor for the bus termination.

Actuators which have already been installed can be retrofitted for Profibus DP by exchanging controls AUMATIC for controls AUMATIC Profibus DP.

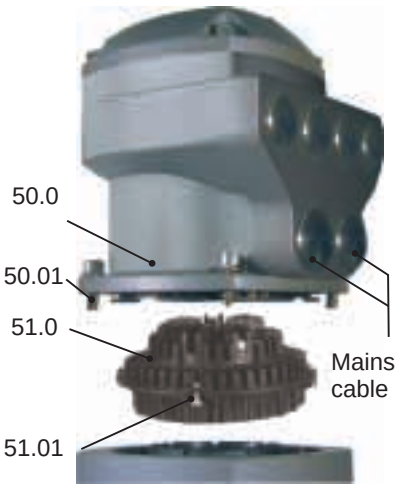
7. Electrical connection

- **Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.**
- **Installation regulations for Profibus DP must be observed for the wiring (For literature references refer to appendix D).**

7.1 Power supply (standard)

For explosion-proof version (type designation: ACExC) see page 15.

Figure B-1: Mains connection



- Check whether type of current, supply voltage and frequency correspond to motor data (refer to name plate at motor).
- Loosen bolts (50.01) (figure B-1) and remove connection housing.
- Loosen screws (51.01) and remove socket carrier (51.0) from connection housing (50.0).
- Insert cable glands suitable for connecting cables.
  (The enclosure protection stated on the name plate is only ensured if suitable cable glands are used).
- Seal cable entries which are not used with suitable plugs.
- Connect cables according to order-related wiring diagram.
  The wiring diagram applicable to the actuator is attached to the handwheel in a weather-proof bag, together with the operation instructions. In case the wiring diagram is not available, it can be obtained from AUMA (state commission no. refer to name plate) or downloaded directly from the Internet (www.auma.com).

Table 2: Technical data AUMA plug/ socket connector for bus connection

Technical data	Motor power connections[1)]	Protective earth	Control pins
No. of contacts max.	6 (3 are used)	1 (leading contact)	50 pins / sockets
Marking	U1, V1, W1, U2, V2, W2	according to VDE	1 to 50
Voltage max.	750 V	–	250 V
Current max.	25 A	–	16 A
Type of customer connection	Screws	Screw for ring lug	Screws
Cross section max.	6 mm²	6 mm²	2.5 mm²
Material: Pin / socket carrier	Polyamide	Polyamide	Polyamide
Contacts	Brass (Ms)	Brass (Ms)	Brass, tin plated or gold plated (option)

1) Suitable for copper wires. For aluminium wires contact AUMA.

7.2 Remote position transmitter

For the connection of remote position transmitters (potentiometer, RWG) screened cables must be used.

7.3 AUMATIC on wall bracket

The AUMATIC can also be mounted separately from the actuator on a wall bracket.

- For the connection of actuator and AUMATIC on wall bracket, use suitable flexible and screened connecting cables.
  (Preconfectioned cables can be obtained from AUMA on request)
- The permissible cable length between actuator and AUMATIC amounts to max. 100 m.
- Versions with potentiometer in the actuator are not suitable. Instead of the potentiometer, a RWG has to be used in the actuator.
- Connect the wires in correct phase sequence.
  Check direction of rotation before switching on.

Figure B-2: AUMATIC on wall bracket

Connecting cable to the actuator

7.4 Fitting of the connection housing

After mains connection:

- Insert the socket carrier (51.0) into the plug cover (50.0) and fasten it with screws (51.01).
- Clean sealing faces at the connection housing and the actuator housing.
- Check whether O-ring is in good condition.
- Apply a thin film of non-acidic grease (e.g. Vaseline) to the sealing faces.
- Replace connection housing (50.0) and fasten bolts (50.01) evenly cross-wise.
- Fasten cable glands with the specified torque to ensure the required enclosure protection.

7.5 Test run

Perform test run. Refer to the operation instructions for the actuator (multi-turn actuator SA(R) … / part-turn actuator SG ...).

Check limit and torque switching:
Check limit and torque switching, electronic position transmitter RWG or potentiometer (option) and, where necessary, re-set.
The settings are described in the operation instructions to the actuator (multi-turn actuator SA(R) … part-turn actuator SG …).

For actuators with feedback signal (RWG, potentiometer), a reference operation has to be performed after the setting has been changed.

Perform reference operation:

- Run actuator electrically (via the push-buttons OPEN and CLOSE) of the local controls once to the end position OPEN and once to the end position CLOSED.
- If no reference operation is performed after changing the limit switching, the feedback signal via the bus is not correct. The bus signals the missing reference operation as warning (see page 31).

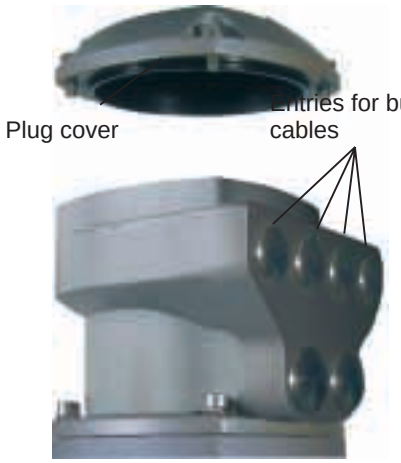
7.5.1 Bus connection (standard)

For explosion-proof version (type designation: ACExC) see page 15.
For version with FO (fibre optics) refer to separate operation instructions “AUMATIC AC 01.1 FO connection”.

Disconnect power before removing the plug cover.

- Loosen and remove plug cover (figure B-3). The connection board (figures C-1, C-2 and C5) is located behind the plug cover.
- Insert cable glands suitable for bus cables.
  (The enclosure protection stated on the name plate is only ensured if suitable cable glands are used).
- Seal cable entries which are not used with suitable plugs.
- Connect bus cable. Refer to figures C-1 to C-6.

Figure B-3: AUMATIC bus connection



The termination resistors for channel 1 and channel 2 are switched in via switches (S1) and (S2). Both switches are supplied in position ‘OFF’. Only connect the termination resistors (position ’ON’) if the actuator is the final station in the Profibus segment.

As soon as the termination resistors are switched on, the connection to the next Profibus DP device is automatically interrupted to avoid multiple terminations.

Table 3: Switch positions from S1 – S3

S1	ON	Bus termination channel 1 ON
	OFF	Bus termination channel 1 OFF
S2	ON	Bus termination channel 2 ON (option)
	OFF	Bus termination channel 2 OFF (option)
S3	1SPC	one Profibus board
	2SPC	two Profibus boards (component redundancy, option)

Figure C-1: Connection board (standard)

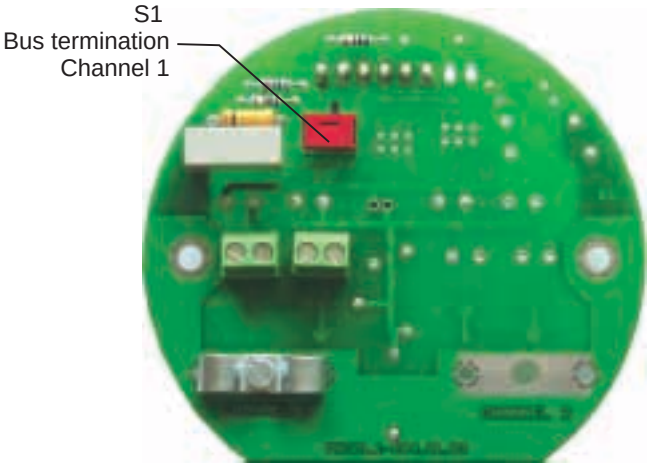


Figure C-2: Connection board (for overvoltage protection)[1)]

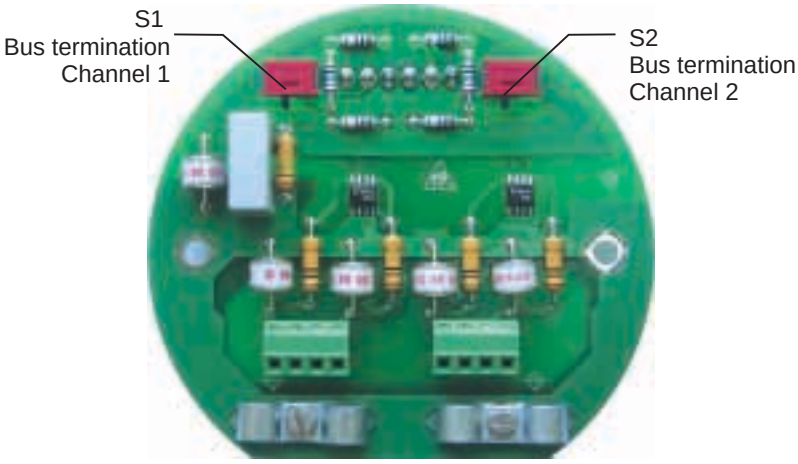


Figure C-3: Connection (standard)

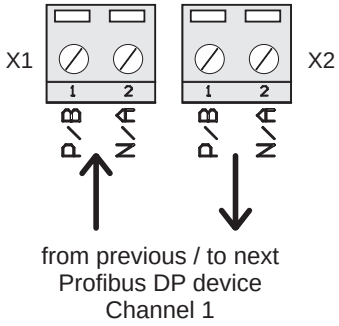
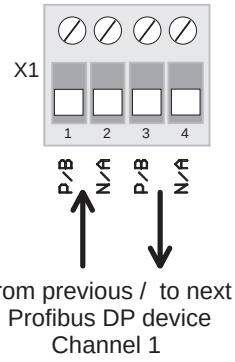


Figure C-4: Connection for overvoltage protection[1)]



1) The connection board for overvoltage is not suitable for component redundancy (page 50).

Figure C-5: Connection board (for component redundancy)

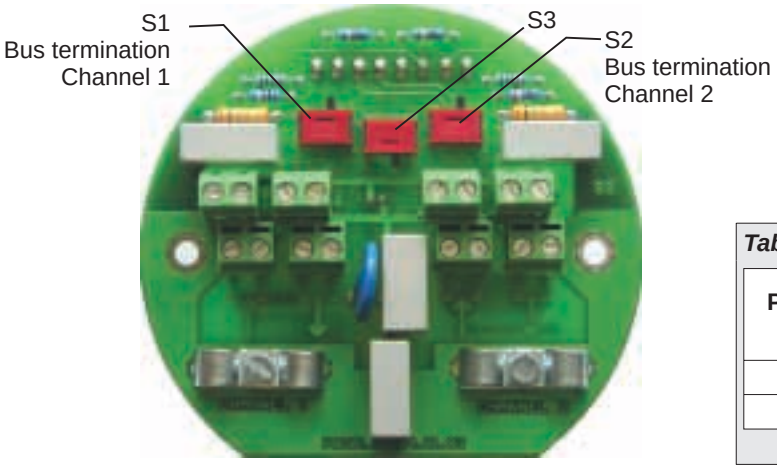
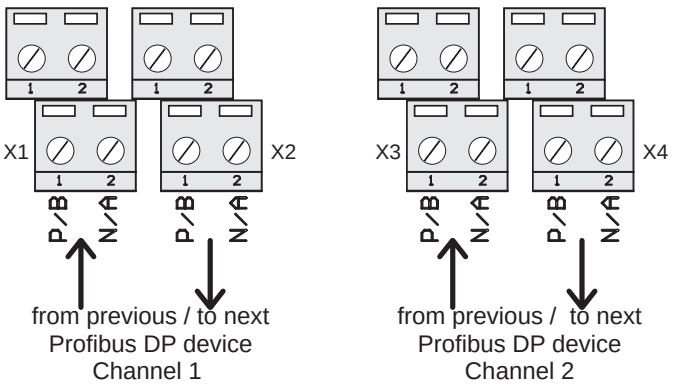


Table 4: Assignment of the Profibus cable

Profibus cable	AUMA labelling at connection	SUB-D 9 connector (for other Profibus devices)	Colour
A	N/A	8	green
B	P/B	3	red

Figure C-6: Connection for component redundancy (option)

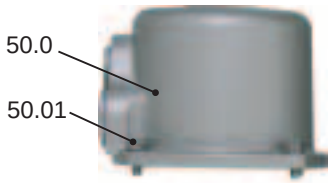


7.5.2 Mains and bus connection for explosion-proof version

For version with FO (fibre optics) refer to separate operation instructions “AUMATIC ACExC 01.1 FO connection”.

When working in potentially explosive areas, observe the European Standards EN 60079-14 “Electrical Installations in Hazardous Areas” and EN 60079-17 “Inspection and Maintenance of Electrical Installations in Hazardous Areas”. Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

Figure D-1: Connection



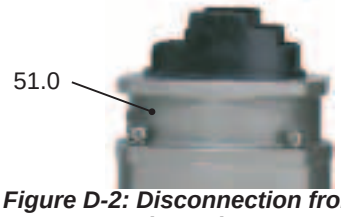


Figure D-2: Disconnection from the mains

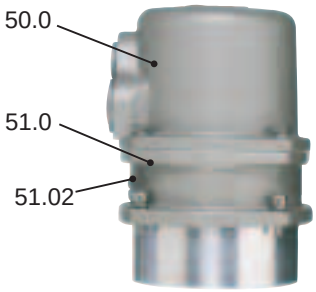
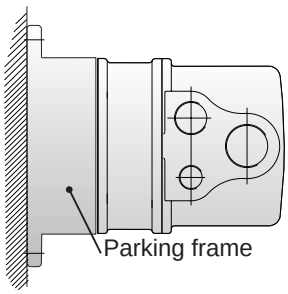


Figure D-3: Parking frame accessory)



For the Ex-plug/socket connector (figure D-1), the electrical mains connection is made after removing the plug cover (50.0) at the EEx e terminals of the terminal board (51.0). The flameproof compartment (type of protection EEx d) remains hereby closed.

- Check whether type of current, supply voltage and frequency correspond to motor data (refer to name plate at motor).
- Loosen bolts (50.01) (figure D-1) and remove plug cover.

- **Insert cable glands with “EEx e” approval and of size suitable for connecting cables. For the recommended cable glands refer to appendix E, page 69. (The enclosure protection stated on the name plate is only ensured if suitable cable glands are used).**
- **Seal cable entries which are not used with suitable plugs.**
- **No more than max. 2 wires with the same cross section may be connected to one terminal.**

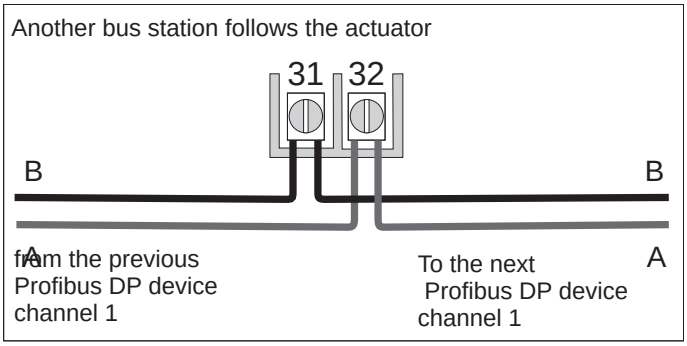
- Remove cable sheathing in a length of 120 – 140 mm. Strip wires: Controls max. 8 mm, motor max. 12 mm. For stranded wires use end-sleeves according to DIN 46228.
- Connect bus cable. Refer to figures (D-4 or D-5). The termination resistor for channel 1 is connected through linking the terminals 31 – 33 and 32 – 34 (standard). The termination resistor for channel 2 is connected through linking the terminals 35 – 37 and 36 – 38 (component redundancy only).
- Only connect the termination resistors if the actuator is the final station in the Profibus segment.
- Connect screen extensively to the cable glands. For the recommended cable glands refer to appendix D, page 69.

If the actuator must be taken from the valve, e.g. for service purposes, it can be separated from the mains without having to remove the wiring (figure D-2). For that the screws (51.02) are removed and the plug/ socket connector is pulled off. Plug cover (50.0) and terminal board (51.0) remain together.

Flameproof enclosure! Before opening, ensure that there is no explosive gas and no voltage.

A special parking frame (figure D-3) for protection against touching the bare contacts and against environmental influences is available.

Figure D-4: Bus connection for channel 1 (Standard)



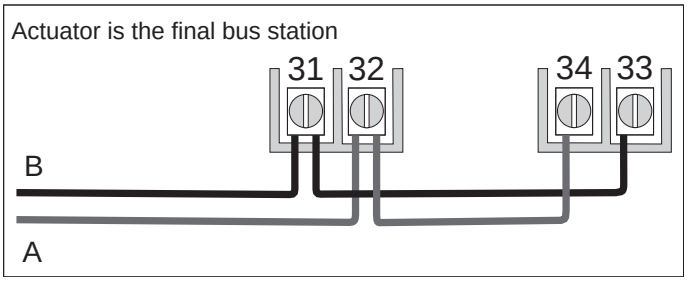
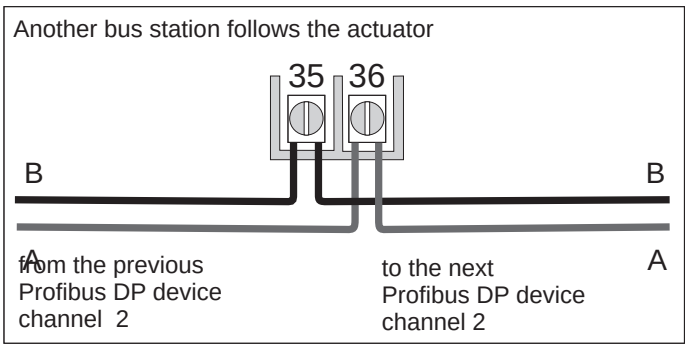


Figure D-5: Bus connection for channel 2 (component redundancy only)



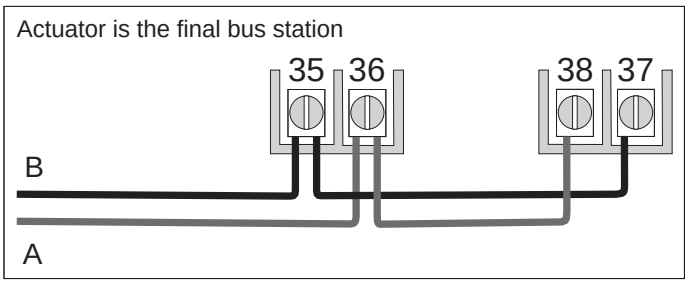


Table 5: Technical data Ex-plug/ socket connector with terminal board for explosion-proof actuators

Technical data	Motor power connections[1)]	Protective earth	Control pins
No. of contacts max.	3	1 (leading contact)	38 pins / sockets
Marking	U1, V1, W1	according to VDE	1 to 24, 31 to 50
Voltage max.	550 V	–	250 V
Current max.	25 A	–	10 A
Type of customer connection	Screws	Screws	Screws
Cross section max.	6 mm²	6 mm²	1.5 mm²
Material: Pin / socket carrier	Araldite / Polyamide	Araldite / Polyamide	Araldite / Polyamide
Contacts	Brass (Ms)	Brass (Ms)	Brass (Ms) tin-plated

1) Suitable for copper wires. For aluminium wires contact AUMA.

7.5.3 Bus cables

Only cables according to standard DIN 19245 or EN 50170-2, cable type A, may be used for Profibus DP wiring.

A maximum of up to 32 Profibus devices may be connected in one segment. If more devices are to be connected to one Profibus network, several segments must be connected with repeaters.
The bus cable must be laid at a distance of at least 20 cm from other cables. It should be laid in a separate, conductive and earthed cable trunking.
It must be ensured that there are no potential differences between the individual devices on the Profibus (Perform a potential compensation).

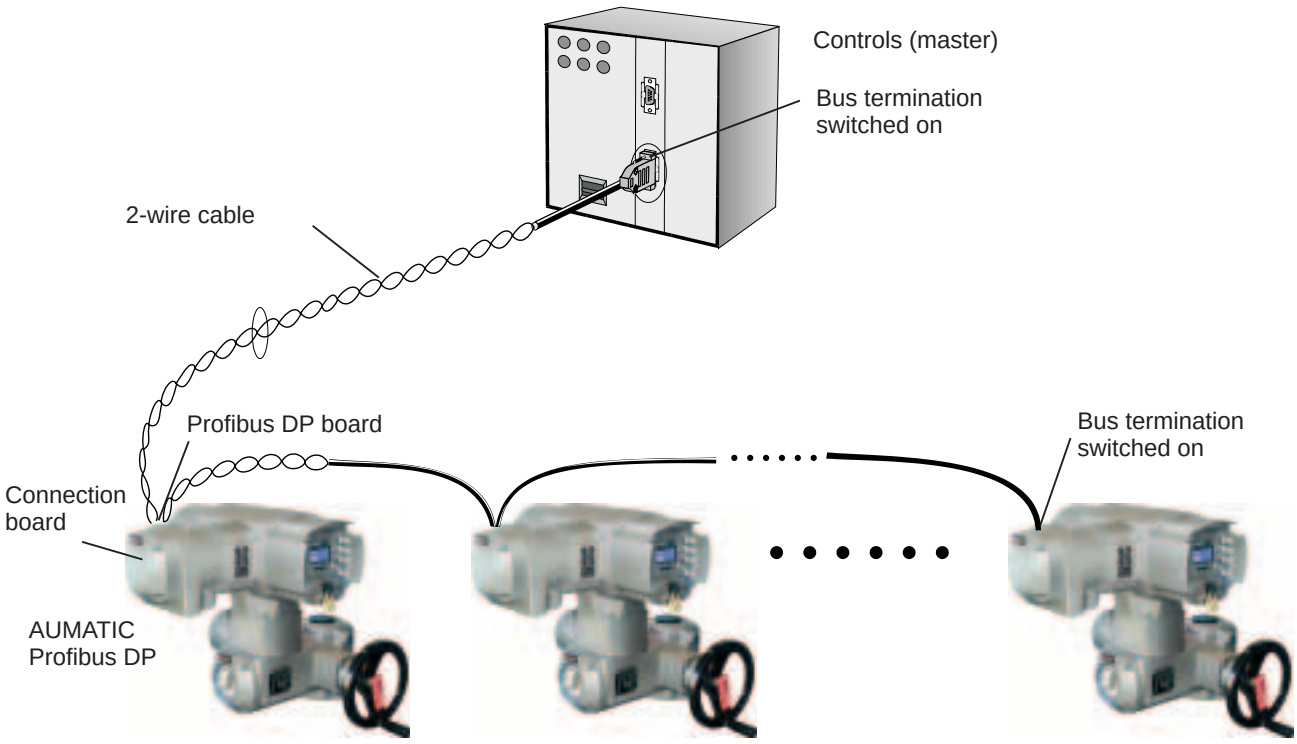
Table 6

Transmission speed in kBit/s	≤ 93,75	187.5	500	1500
Maximum segment length in m	1200	1000	400	200

Cable specification cable type A for Profibus DP

Impedance:	135 to 165 Ohm, at a frequency of 3 to 20 MHz.
Cable capacity:	< 30 pF per metre
Cable diameter	> 0.64mm
Cross section:	> 0.34 mm², corresponds to AWG 22
Loop resistance:	110 Ohm per km
Screening:	CU shielding braid or shielding braid and shielding foil

Figure E: Example: Profibus with one segment



7.6 Setting the Profibus DP address via local controls

This clause only describes the setting of the actuator address (slave address). For further detailed instructions on the indication, operation and setting of the AUMATIC refer to the operation instructions of the actuator (multi-turn actuator SA(R) … / part-turn actuator SG … with AUMATIC AC ...).

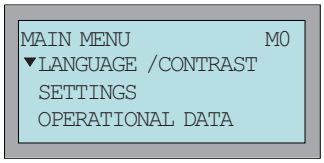
Factory setting:

Slave address: 2

- Set selector switch at the AUMATIC to position OFF (0), figure F-1.
- Switch on supply voltage.
- Select menu indication M0:
- Press push-button Ⓒ in one of the status indications (S0, S1, S2, S3 or S4) longer than 2 seconds:

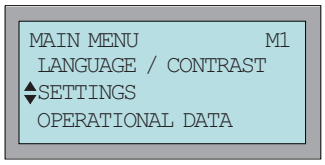
Figure F-1

> 2 Sec.



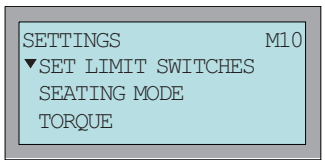
- Select SETTINGS with push-button ▼:

Figure F-2



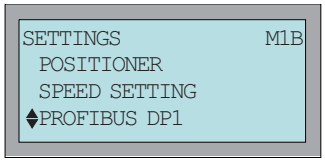
- Confirm the selection SETTINGS with ↵:

Figure F-3



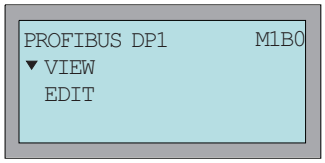
- Select PROFIBUS DP1 by pushing ▼ several times:

Figure F-4



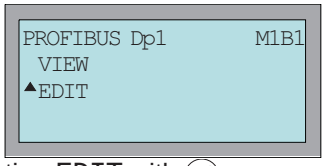
- Confirm the selection PROFIBUS DP1 with ↵.

Figure F-5



- Select EDIT with push-button ▼:

Figure F-6

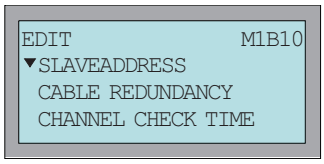


Confirm the selection EDIT with ↵:

Figure F-7

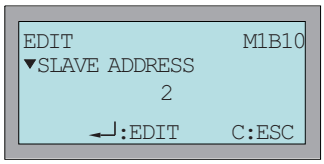
- With the push-buttons ▲ and ▼ the value of the selected position can be changed.
- To accept the input and move to the next digit, press push-button ↵, proceed until all password digits are entered. When accepting the last digit, the entered password is checked (default password: 0000), if it is valid, the following indication appears:

Figure F-8



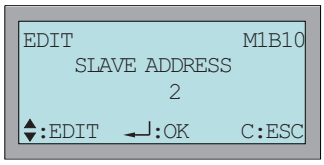
- Confirm SLAVE ADDRESS with push-button ↵.

Figure F-9



- Change to the edit mode with ↵ :

Figure F-10



Now you can use the push-buttons ▲ and ▼ to set the slave address from 0 to 125.

- Pressing the push-button ↵ accepts the input.
- To return to the previous indication without accepting the entered value press the push-button C .

Remarks:
The other parameters CABLE REDUNDANCY and CHANNEL CHECK TIME are reserved for special applications and the factory settings should not be changed. (CABLE REDUNDANCY = OFF;
CHANNEL CHECK TIME = 5.0 S)

For redundant applications an AUMATIC with component redundancy (2nd Profibus DP interface in the AUMATIC, see page 50) is to be used.

8. Commissioning with controls

8.1 Introduction

When commissioning a Profibus DP network, the devices on the Profibus DP must be parameterized and configured with the programming software of 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 properties of the device which are needed by the master. The GSD file can be downloaded from our website www.auma.com.
Afterwards, the user can configure and parameterize each device on 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 the cyclic communication is started.
The control is executed via the process representation input and output bytes.
If a configuration with consistent data is chosen, special functional elements for the control of the Profibus DP slaves must be used with some PLCs.

8.2 Programming

The parameterization is partly determined in the Profibus standard, e.g. a bit for switching bus monitoring on and off (watchdog).
The AUMA Profibus DP controls can additionally receive up to 37 bytes of ‘user parameters’, in which AUMA specific parameters can be set. The AUMA specific parameters are divided into 34 parameters with 1 byte each per parameter. The parameters can be changed via the programming software of the controls. New programming software supports the setting of the parameters via text and menu selection. When using older software the values of the parameters must be entered using hexadecimal numbers.
The meaning of the individual AUMA specific parameters is explained in subclause 8.5 .
Note:
AUMATIC actuator controls with the logic software version Z031.922/04-00 and earlier (see diagnosis page D6) have a reduced parameter number. At www.auma.com, you can find a GSD file with restricted functionalities.

8.3 Configuration of the Profibus DP interface of the AUMATIC

During configuration it is determined how many input and output bytes for each device are reserved in the memory of controls. Additionally it is determined if the data are processed consistently or non-consistently.

Only the number of bytes determined in the configuration is transferred between the DP master and the DP slave.

The following configurations are possible with AUMA Profibus DP actuators:

Table 7:

Number of input bytes	Number of output bytes
1	1
2	1
2	2
4	4
4	6
6	1
6	2
6	4
6	6
8	4
8	6
12	4
12	6

Number of input bytes	Number of output bytes
16	8
20	8
20	12
22	8
24	8
All these configurations (except for 1 In, 1 Out), can be selected as consistent or non-consistent configuration	

The number of input bytes states how many of the maximum 24 bytes the DP slave sends to the DP master.
The number of output bytes states how many of the maximum 8 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 the bytes 9 to 12.
Thereby the DP master saves memory space, since it only has to reserve 8 input bytes for the actuator.
The data of the AUMA actuators are to be processed consistently by the DP master. This ensures that the value of a 2 byte variable (electronic position transmitter, customer analogue input) does not change after the read-out of the first byte and thus does not distort the value.
If the process control system of a master does not offer the possibility to use consistent configurations, a non-consistent configuration can be chosen. The values for the electronic position transmitter and the customer analogue inputs can then be transferred in 1-byte format (parameter 10 = 0).

8.4 Communication start-up

When the DP master is switched on, it first sends a parameter and configuration telegram to each DP slave. If the parameters and the configuration are correct, the DP slave changes to the ‘Data Exchange’ status to exchange net data between the controls and the slave. The DP master can control the DP slave and read its current state via the process representation.
If communication is interrupted (e.g. through the switching off of the slave or the breaking of the Profibus cable), it is resumed automatically by the DP master when the cause of the fault is eliminated.

8.5 Description of AUMA user parameters

AUMA specific parameters are set via the GSD file.
Select the following path to view the parameters in the AUMATIC display:

```
MAIN MENU (M0)
   SETTINGS (M1)
        IN-PROC-IMAGE (M1H)
```

User parameters 1 to 3: “Byte order pattern”

With this parameter a selection can be made from 4 different process representation arrangements.
The values of user parameters 1 to 3 are defined in the Profibus specification and cannot be changed.
Indication in display: `IN-PROC-IMAGE (M1H00)`

Parameter settings:			
Value in GSD file	**Text in GSD file**	**Indication in display**	**Description**
Prm_Text_Ref = 0	Arrangement 1	0	Process representation arrangement 1 (page 25) is used
Prm_Text_Ref = 1	Arrangement 2	1	Process representation arrangement 2 (page 34) is used
Prm_Text_Ref = 2	Arrangement 3	2	Process representation arrangement 3 (page 35) is used
Prm_Text_Ref = 3	Arrangement 4	3	Process representation arrangement 4 (page 36) is used

User parameters 2 to 8 “Configuration Bit 5.0 to Bit 5.6"

These parameters define the contents of the configurable byte 5.

Indication in display:
`BYTE 5.0 CONFIG.` to `BYTE 5.6 CONFIG.`

Parameter setting:			
Value in GSD file	**Text in GSD file**	**Indication in display**	**Description**
Prm_Text_Ref = 0	Not used	`NOT USED`	No signal
Prm_Text_Ref = 1	Closed position	`CLOSED POSITION`	Signal LSC (WSR) or LSC (WSR) + TSC (DSR) (according to type of seating)
Prm_Text_Ref = 2	Open position	`OPEN POSITION`	Signal LSO (WOEL) or (LSO) WOEL + TSO (DOEL) (according to type of seating)
Prm_Text_Ref = 3	Running close	`RUNNING CLOSE`	Actuator is running logically CLOSE
Prm_Text_Ref = 4	Running open	`RUNNING OPEN`	Actuator is running logically OPEN
Prm_Text_Ref = 5	Actuator moving	`ACTUATOR MOVING`	Actuator is running from LOCAL, REMOTE, or in manual operation. (without position transmitter only the LOCAL or REMOTE operation is indicated)
Prm_Text_Ref = 6	LSC (WSR)	`LSC(WSR)`	Limit switch CLOSE operated
Prm_Text_Ref = 7	LSO (WOEL)	`LSO(WOEL)`	Limit switch OPEN operated
Prm_Text_Ref = 8	TSC (DSR)	`TSC(DSR)`	Torque switch CLOSE operated
Prm_Text_Ref = 9	TSO (DOEL)	`TSO(DOEL)`	Torque switch OPEN operated
Prm_Text_Ref = 10	Thermal fault	`THERMAL FAULT`	Motor protection has tripped (reset may be necessary)
Prm_Text_Ref = 11	Torque fault (close)	`TORQUE FAULT (CLOSE)`	Torque fault in direction CLOSE occurred
Prm_Text_Ref = 12	Torque fault (open)	`TORQUE FAULT (OPEN)`	Torque fault in direction OPEN occurred
Prm_Text_Ref = 13	Torque fault (general)	`TORQUE FAULT (GEN)`	Torque fault CLOSE or OPEN (combined signal)
Prm_Text_Ref = 14	Setpoint E1 loss	`SETPOINT E1 LOSS`	Nominal value signal is by 0.3 mA lower than the lowest value programmed
Prm_Text_Ref = 15	Feedback E2 loss	`FEEDBACK E2 LOSS`	Actual position signal is by 0.3 mA lower than the lowest value programmed
Prm_Text_Ref = 16	Speed E3 loss	`SPEED E3 LOSS`	not available
Prm_Text_Ref = 17	Torque E6 loss	`TORQUE E6 LOSS`	Torque signal is by 0.3 mA lower than the lowest value programmed
Prm_Text_Ref = 18	Warning oper.time	`WARNING OPER. TIME`	The programmed max. operating time for an OPEN–CLOSE operation has been exceeded
Prm_Text_Ref = 19	Warning starts/run	`WARNING STARTS/RUN`	The max. number of cycles/h or max. running time / h have been exceeded
Prm_Text_Ref = 20	Local sw. position	`LOCAL SW. POSITION`	Selector switch in position LOCAL
Prm_Text_Ref = 21	Remote sw. position	`REMOTE SW. POSITION`	Selector switch in position REMOTE
Prm_Text_Ref = 22	Off sw. position	`OFF SW. POSITION`	Selector switch in position OFF
Prm_Text_Ref = 23	Remote mode	`REMOTE MODE`	Operation mode REMOTE active
Prm_Text_Ref = 24	Setpoint mode	`SETPOINT MODE`	Operation mode SETPOINT active
Prm_Text_Ref = 25	Intermed. pos.1	`INTERMED. POS 1`	Signalising of the intermediate positions 1 to 4 Signal behaviour according to parameters “POS1: Control” to “POS4: Control”
Prm_Text_Ref = 26	Intermed. pos.2	`INTERMED. POS 2`	
Prm_Text_Ref = 27	Intermed. pos.3	`INTERMED. POS 3`	
Prm_Text_Ref = 28	Intermed. pos.4	`INTERMED. POS 4`	
Prm_Text_Ref = 29	Stepping mode	`STEPPING MODE`	Programmed stepping range (parameter ‘Start step’ ‘Stop step’) has been entered
Prm_Text_Ref = 30	Closing blink	`CLOSING BLINK`	Signal “blinking” during operation in direction CLOSE. Signal active in end position CLOSED.
Prm_Text_Ref = 31	Opening blink	`OPENING BLINK`	Signal “blinking” during operation in direction OPEN. Signal active in end position OPEN.
Prm_Text_Ref = 32	Fault indication	`FAULT IND.`	Faults; include: internal faults (see menu D2), Torque faults, phase failure, thermal faults
Prm_Text_Ref = 33	Warning indication	`WARNING IND.`	Warnings, include: Operating time warning, warning starts/run, no reference operation, internal warnings and signal interruptions
Prm_Text_Ref = 34	Not ready indication	`NOT READY IND.`	Selector switch not REMOTE, incorrect run command, Global Control “CLEAR” telegram
Prm_Text_Ref = 35	Setpoint reached	`SETPOINT REACHED`	Actuator is in nominal position
Prm_Text_Ref = 36	Loss of phase	`LOSS OF PHASE`	One phase is missing
Prm_Text_Ref = 37	I/O analogue IN 2 loss	`I/O ANLOG IN2 LOSS`	Signal interruption of the parallel interface analogue input 2

Parameter setting:			
Value in GSD file	**Text in GSD file**	**Indication in display**	**Description**
Prm_Text_Ref = 38	I/O analogue IN 1 loss	I/O ANLOG IN1 LOSS	Signal interruption of the parallel interface analogue input 1
Prm_Text_Ref = 39	Selector not remote	SELECTOR NOT REMOTE	Selector switch not in position REMOTE
Prm_Text_Ref = 40	Wrong command	WRONG COMMAND	Wrong command received (several run command bits set or nominal value > 100 % or > 1,000 ‰)
Prm_Text_Ref = 41	Internal fault	INTERNAL FAULT	An internal fault has occurred, see diagnosis page D2
Prm_Text_Ref = 42	PE fault	PE FAULT	Only for adjustable output speed actuators
Prm_Text_Ref = 43	Internal feedback	INTERNAL FEEDBACK	Actuator has not been moved to end position OPEN fully open or to end position CLOSED fully closed yet
Prm_Text_Ref = 44	Internal warning	INTERNAL WARNING	An internal warning has occurred, see diagnosis page D3
Prm_Text_Ref = 45	Channel 2 active	CHANNEL 2 ACTIVE	There is communication on the redundant channel
Prm_Text_Ref = 46	Local operation	LOCAL OPERATION	Actuator is running through an operation command from the local controls
Prm_Text_Ref = 47	Remote operation	REMOTE OPERATION	Actuator is running through an operation command from REMOTE
Prm_Text_Ref = 48	Hand wheel operation	RUNNING WITH HANDWHL	Actuator is running through turning of the handwheel
Prm_Text_Ref = 49	Proportional operation	PROPORTIONAL RUNNING	Only for adjustable output speed actuators
Prm_Text_Ref = 50	Operation pause	PHYS. DRIVE BREAK	Actuator is in pause time of stepping mode
Prm_Text_Ref = 51	Clear-state	CLEAR-STATUS	The Profibus DP interface has received a Global Control “CLEAR” telegram.
Prm_Text_Ref = 52	Digital input 1	DIG.IN1 BUS1	A + 24 DC signal is present at the digital input (1 to 4) of the Profibus interface
Prm_Text_Ref = 53	Digital input 2	DIG.IN2 BUS1	
Prm_Text_Ref = 54	Digital input 3	DIG.IN3 BUS1	
Prm_Text_Ref = 55	Digital input 4	DIG.IN4 BUS1	
Prm_Text_Ref = 56	Intermed. pos.5	INTERMED. POS 5	Signalisation of intermediate position 5 to 8 Signal behaviour according to parameters “POS5: Control” to “POS8: Control”
Prm_Text_Ref = 57	Intermed. pos.6	INTERMED. POS 6	
Prm_Text_Ref = 58	Intermed. pos.7	INTERMED. POS 7	
Prm_Text_Ref = 59	Intermed. pos.8	INTERMED. POS 8	
Prm_Text_Ref = 60	Emergency stop button	EMCY STOP BUTTON	The EMERGENCY STOP button (option) has been operated
Prm_Text_Ref = 61	Fault FO communication	FIBER OPTIC LOSS	Fault at the fibre optic module (option)
Prm_Text_Ref = 62	Power for brake OK	BRAKE SUPPLY FAIL	Special applications only
Prm_Text_Ref = 63	Reset indication	NOTIFY RESET	Special applications only
Prm_Text_Ref = 64	Digital input 1 DP2	DIG.IN1 BUS2	Special applications only
Prm_Text_Ref = 65	Digital input 2 DP2	DIG.IN2 BUS2	
Prm_Text_Ref = 66	Digital input 3 DP2	DIG.IN3 BUS2	
Prm_Text_Ref = 67	Digital input 4 DP2	DIG.IN4 BUS2	
Prm_Text_Ref = 68	Local operation open	RUNNING OPEN (LOCAL)	Actuator runs in direction OPEN (by an operation command from the local controls or by turning the handwheel)
Prm_Text_Ref = 69	Local operation close	RUNNING CLOSE (LOCAL)	Actuator runs in direction CLOSE (by an operation command from the local controls or by turning the handwheel)
Prm_Text_Ref = 70	Actuator in intermed. position	INTERMED.POSITION	Actuator is in intermediate position

User parameter 9 “Configuration Fault Bit”

Configuration of the fault signal.

Indication in display: BYTE 5.7 CONFIG.

Parameter Settings:			
Value in GSD file	**Text in GSD file**	**Indication in display**	**Description**
Prm_Text_Ref = 0	Fault group 1	FAULT GROUP 1	Fault + Not ready
Prm_Text_Ref = 1	Fault group 2	FAULT GROUP 2	Fault + Not ready + without torque fault
Prm_Text_Ref = 2	Fault group 3	FAULT GROUP 3	Fault
Prm_Text_Ref = 3	Fault group 4	FAULT GROUP 4	Fault without torque fault
Prm_Text_Ref = 4	Fault group 5	FAULT GROUP 5	Fault + Not ready + warning
Prm_Text_Ref = 5	Fault group 6	FAULT GROUP 6	Fault + Not ready + without thermal fault
Prm_Text_Ref = 6	Fault group 7	FAULT GROUP 7	Fault + Not ready + without torque fault + without thermal fault
Prm_Text_Ref = 7	Fault group 8	FAULT GROUP 8	Fault without thermal fault
Prm_Text_Ref = 8	Fault group 9	FAULT GROUP 9	Fault without torque fault and + without thermal fault
Prm_Text_Ref = 9	Fault group 10	FAULT GROUP 10	Fault + Not ready + Warnings + without thermal fault

User parameter 10 “Format of analogue indications”

This parameter determines the switch-over of the coding of all analogue transmission values between 0 and 100% or 0 and 1,000 ‰.

Indication in display: ANALOGUE VALUES DP

Parameter settings:			
Value in GSD file	**Text in GSD file**	**Indication in display**	**Description**
Prm_Text_Ref = 0	0 to 100 percent	0-100% PERCENT	Indication and transmission of analogue values in percent
Prm_Text_Ref = 1	0 to 1,000 per mil	0-1000 PER MIL	Indication and transmission of analogue values in per mil

User parameters 11 to 34 “Configuration Bit 6.0 to Bit 8.7"

These parameters define the contents of the configurable bytes 6, 7 and 8.

Indication in display:
BYTE 6.0 CONFIG. to BYTE 6.6 CONFIG.
BYTE 7.0 CONFIG. to BYTE 5.6 CONFIG.
BYTE 8.0 CONFIG. to BYTE 6.6 CONFIG.

For the settings refer to parameters 2 to 8 in the table.

9. Process representation input

Via the process representation input, the master (control) can read the state of the slave (actuator).

With AUMA user parameter 1 (page 21) a selection can be made from 4 different process representation arrangements.

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

9.1 Process representation input arrangement 1 (default process representation)

Byte1: Logical signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault ind.	Warning ind.	Running CLOSE	Running OPEN	Not ready ind.	Setpoint reached	Closed position	Open position

Byte 2: Actuator signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
TSC (DSR)	TSO (DOEL)	LSC (WSR)	LSO (WOEL)	Local sw. position	Remote sw. position	Loss of phase	Thermal faut

Byte 3: E2 (Actual position)

Actual position high-byte (positioner)

Byte 4: E2 (Actual position)

Actual position low-byte (positioner)

Byte 5: Configurable byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(Fault 3)	(Not ready ind.)	(Loss of phase)	(Torque fault (OPEN))	(Torque fault (CLOSE))	(Remote sw. position)	(Open position)	(Closed position)

Byte 6: Physical operation (configurable byte 2)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(Runs fom Local)	(Runs from REMOTE)	(Runs via handhweel)	(Actuator moving)	--	(Start stepping mode)	Reserved	(Operation pause)

Byte 7: Options part 1 (configurable byte 3)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(DP1 dig. input 4)	(DP1 dig. input 3)	(DP1 dig. input 2)	(DP1 dig. input 1)	(Intermed. pos. 4)	(Intermed. pos. 3)	(Intermed. pos. 2)	(Intermed. pos. 1)

Byte 8: Options part 2 (configurable byte 4)

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

Byte 9: DP1 An1

DP1 Analogue input high byte

Byte 10: DP1 An1

DP1 Analogue input low byte

Byte 11: E4 (Torque)

Torque high byte

Byte12: E4 (Torque)

Torque low byte

Byte13: Not ready ind.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
External operation	Clear state	Emergency mode	Emcy stop active	--	Actuator locked	Selector not remote	Wrong command

Byte14: Fault signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
--	Internal fault	Torque fault (CLOSED)	Torque fault (OPEN)	Loss of phase	Thermal fault	--	Config. fault

Byte15: Warning signals part 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Operation time	Starts/run	Internal feedback	Internal warning	I/O1 Anlog In2 loss	I/O1 Anlog In1 loss	Channel 2 active	--

Byte16: Warning signals part 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Analog In1 DP1 loss	Analog In2 DP2 loss	--	--	Setpoint E1 loss	Feedback E2 loss	--	Torque E4 loss

Byte 17: DP1 An2

DP1 Analogue input 2 high byte

Byte 18: DP1 An2

DP1 Analogue input 2 low byte

Byte 19: Reserved

Reserved for future extensions

Byte 20: Reserved

Reserved for future extensions

Byte 21: Reserved

Reserved for future extensions

Byte 22: Reserved

Reserved for future extensions

Byte 23: Additional data

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
In intermed.. position	--	--	--	Intermed. pos. 8	Intermed. pos. 7	Intermed. pos. 6	Intermed. Pos. 5

Byte 24: Reserved

Reserved for future extensions

9.2 Description of the process representation input arrangement 1 (default process representation)

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 the command to perform an electrical operation (also present when e.g. the actuator happens to be in a stepping pause during stepping mode or waits for the end of the dead time).

Bit	Designation	Value	Description
0	**Open position** Limit seating in end position OPEN	1	Limit switch in direction OPEN operated.
		0	other
	Open position Torque seating in end position OPEN	1	Torque switch and limit switch in direction OPEN operated.
		0	other
1	**Closed position** Limit seating in end position CLOSED	1	Limit switch in direction CLOSE operated
		0	other
	Closed position Torque seating in end position CLOSED	1	Torque switch and limit switch in direction CLOSE operated.
		0	other
2	**Setpoint reached**	1	Nominal value position is within max. error variable (outer dead band). Signal occurs only if Profibus DP master has set the remote SETPOINT bit.
		0	other
3	**Not ready ind.**	1	Collective signal: Contains the result of a disjunction (OR-operation) of all bits of the byte “Not ready ind.” (page 30)
		0	No signal is active In byte “Not ready ind.” (page 30).
4	**Running OPEN**	1	Run command (OPEN or SETPOINT) from Profibus DP in direction OPEN is executed. For operation in stepping mode, this signal is also active during an off-time, the dead time and the reversing prevention.
		0	No such command is carried out via the Profibus DP.
5	**Running CLOSE**	1	Run command (CLOSE or SETPOINT) from Profibus DP in direction CLOSE is executed. For operation in stepping mode, this signal is also active during an off-time, the dead time and the reversing prevention.
		0	No such command is carried out via the Profibus DP.
6	**Warning ind.**	1	Collective signal: Contains the result of a disjunction (OR-operation) of all bits of the two bytes “Warning signals” (page 31).
		0	No warnings are active (all bits of the warnings cancelled).
7	**Fault ind.**	1	Collective signal: Contains the result of a disjunction (OR-operation) of all bits of the byte “Fault signals” (page 30).
		0	No faults are active (all bits cancelled in byte “Fault signals).

Byte 2: Actuator signals

Bit	Designation	Value	Description
0	**Thermal fault**	1	A thermal fault (motor protection) has occurred.
		0	No thermal fault has occurred.
1	**Loss of phase**	1	One phase missing.
		0	All phases are present.
2	**Remote sw. position**	1	Selector switch in position REMOTE.
		0	Selector switch not in position REMOTE.
3	**Local sw. position**	1	Selector switch in position LOCAL.
		0	Selector switch not in position LOCAL.
4	**LSO (WOEL)**	1	Limit switch OPEN left operated.
		0	Limit switch OPEN left not operated.
5	**LSC (WSR)**	1	Limit switch CLOSE right operated.
		0	Limit switch CLOSE right not operated.
6	**TSO (DOEL)**	1	Torque switch OPEN left operated (storing).
		0	Torque switch OPEN left not operated.
7	**TSC (DSR)**	1	Torque switch CLOSE right operated (storing).
		0	Torque switch CLOSE right not operated.

Byte 3: E2 (actual position) high byte
Byte 4: E2 (actual position) low byte

The actual position can be transmitted either as a value between 0 – 100 (percent) or 0 – 1000 (per mil). For the 0 – 100 scaling the consistency does not have to be regarded in the transmission and only the low byte must be regarded. The change-over between 0 – 100 and 0 – 1,000 is realised via a parameter in the GSD file (default setting: transmission in 0 – 100 format).

Byte 5:
Configurable Byte 1

The bits in the configured byte 5 can be assigned to different signals. The bit 7 is only for fault signals, the other bits for other signals. The definition of the bit assignment is realised via parameters in the GSD file (default assignments are indicated in the table).

Bit	Designation	Value	Description
0	**Closed position** Limit seating in end position CLOSED	1	Limit switch in CLOSE direction operated
		0	other
	Closed position Torque seating in end position CLOSED	1	Torque switch and limit switch in direction CLOSE operated.
		0	other
1	**Open position** Limit seating in end position OPEN	1	Limit switch in direction OPEN operated.
		0	other
	Open position Torque seating in end position OPEN	1	Torque switch and limit switch in direction OPEN operated.
		0	other
2	**Remote sw. position**	1	Selector switch in position REMOTE
		0	other
3	**Torque fault (CLOSE)**	1	Torque fault in CLOSE direction (storing)
		0	other
4	**Torque fault (OPEN)**	1	Torque fault in OPEN direction (storing)
		0	other
5	**Loss of phase**	1	One phase is missing
		0	other
6	**Not ready ind.**	1	Collective signal: Contains the result of a disjunction (OR-operation) of all bits of the byte “Not ready ind.” (page 30)
		0	other
7	**Fault ind.**	1	see page 30
		0	other

Byte 6:
Physical operation (Configurable Byte 2)

This is where the information about the actual movement of the actuator is stored.
The definition of the bit assignment is realised via parameters in the GSD file (default assignments are indicated in the table).

Bit	Designation	Value	Description
0	**Operation pause**	1	Indicates the passing of operation pauses (reversing prevention time, dead time, pause times in stepping mode)
		0	other
1	**Proportional operation**	1	only for adjustable output speed actuators
		0	
2	**Start stepping mode**	1	Indicates that the actuator has entered the set stepping range while in stepping mode
		0	other
3	—	1	
		0	
4	**Actuator moving**	1	Collective signal: contains the result of a disjunction (OR-operation) of bit 7, bit 6 and bit 5
		0	other

5	**Runs via handwheel**	1	Indicates a movement at the output drive without electrical operation command
		0	other
6	**Runs from REMOTE**	1	Indicates the movement of the output drive during electrical operation from REMOTE
		0	other
7	**Runs from LOCAL**	1	Indicates the movement of the output drive during electrical operation from LOCAL
		0	other

Byte 7: Options part 1 (Configurable Byte 3)

In the Options part 1 the additional freely available inputs and the possibly activated signals of the intermediate positions are situated. The definition of the bit assignment is realised via parameters in the GSD file (default assignments are indicated in the table).

Bit	Designation	Value	Description
0	**Intermed. pos. 1**	1	Intermediate position 1 is signalled
		0	other
1	**Intermed. pos. 2**	1	Intermediate position 2 is signalled
		0	other
2	**Intermed. pos. 3**	1	Intermediate position 3 is signalled
		0	other
3	**Intermed. pos. 4**	1	Intermediate position 4 is signalled
		0	other
4	**DP1 dig. input 1**	1	A 24 V signal is present at the digital input 1
		0	other
5	**DP1 dig. input 2**	1	A 24 V signal is present at the digital input 2
		0	other
6	**DP1 dig. input 3**	1	A 24 V signal is present at the digital input 3
		0	other
7	**DP1 dig. input 4**	1	A 24 V signal is present at the digital input 4
		0	other

Byte 8: Options part 2 (Configurable Byte 4)
The definition of the bit assignment is realised via parameters in the GSD file.

The contents of Options part 2 (byte 8) are reserved for future extensions and can be defined via the parameters in the GSD file.

Byte 9: DP1 analogue input 1 high byte
Byte 10: DP1 analogue input 1 low byte

Byte 9 and byte 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 AUMATIC via the push-buttons and the display. (For the operation see appropriate operation instructions for the multi-turn actuator/ part-turn actuator).
If the measuring values are 0.3 mA below the initial value a loss of signal is indicated. (refer to warning signals 2, byte 16)
The input current is transmitted as a value between 0 to 1,000 per mil. For the 0 – 100 scaling the consistency does not have to be regarded in the transmission and only the low byte must be regarded. The change-over between 0 – 100 and 0 – 1,000 is realised via a parameter in the GSD file (default: transmission in 0 – 100 format).

Byte 11: Torque high byte
Byte 12: Torque low byte

Byte 11 and byte 12 transmit the current torque of the actuator (only if an MWG is installed in the actuator). The torque can be transmitted either as a value between 0 – 100 (percent) or 0 – 1000 (per mil). For the 0 – 100 scaling the consistency does not have to be regarded in the transmission and only the low byte must be regarded. The change-over between 0 - 100 and 0 – 1,000 is realised via a parameter in the GSD file (default: transmission in 0 – 100 format).
The value transmitted is the current torque in percent or per mil of the nominal torque of the actuator. The torque zero point is at 500 or 50, for 100.0 % of the actuator torque in direction OPEN the value 1000 or 100 is transmitted, for 100.0 % of the torque in direction CLOSE the value 0 is transmitted.

Byte 13: Not ready ind.

The data byte Not ready ind. contains the indication of causes why the actuator can not be operated from Remote.

Bit	Designation	Value	Description
0	**Wrong command**	1	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 (nominal) simultaneously) or that the max. value for a nominal position has been exceeded (nominal position 1,000).
		0	Operation commands are o.k.
1	**Selector not remote**	1	Selector switch: Position LOCAL or OFF
		0	Selector switch: Position REMOTE
2	**Actuator locked**	1	Actuator locked (is only used for special applications e.g. the bypass function)
		0	Actuator enabled
3	**—**	1	
		0	
4	**EMERGENCY STOP active**	1	The EMERGENCY STOP button has been operated (see page 48).
		0	EMERGENCY STOP button not operated (normal operation)
5	**EMERGENCY MODE**	1	Emergency mode is active.
		0	Normal operation
6	**Clear state**	1	Indicates that a telegram Global Control Clear was sent via the Profibus DP (the bit can only be deleted with a telegram Global Control Operate). In this state the actuator can not be operated from REMOTE.
		0	
7	**External control**	1	External operation (option). As soon as the bus/external input is connected to 24 V DC (or 115 V AC), the AUMATIC will only react to operation commands by the I/O (OPEN-STOP-CLOSE or MODE and 0/4 – 20 mA) (see page 45 or page 47).
		0	Normal operation

Byte 14: Fault signals

The fault signals contain the causes why the actuator can not be operated.

Bit	Designation	Value	Description
0	**Config. fault**	1	Indicates a faulty configuration, i.e. the current setting of the AUMATIC is not valid, the exact cause can be determined from a diagnosis indication (D4) on the display
		0	AUMATIC is correctly configured
1	**–**	1	
		0	

Bit	Designation	Value	Description
2	**Thermal fault**	1	Motor protection tripped; help: Cool down or perform a reset with the push-button “Reset” of the local controls after cooling down. Check fuse F4.
		0	other
3	**Loss of phase**	1	One phase missing; help: Connect phase. When externally supplied with 24 V DC, the complete AC power supply might be missing, check and connect if necessary.
		0	other
4	**Torque fault (OPEN)**	1	Torque fault OPEN occurred (only torque or torque before limit, according to type of seating); help: Reset with counter command, or with push-button “Reset” of the local controls.
		0	other
5	**Torque fault (CLOSE)**	1	Torque fault CLOSE occurred (only torque or torque before limit, according to type of seating); help: Reset with counter command, or with push-button “Reset” of the local controls.
		0	other
6	**Internal fault**	1	The internal diagnostics of the AUMATIC have detected a fault (the exact cause can be determined on the diagnosis page D2 and DQ of the display).
		0	other
7	**- -**	1	
		0	

Byte 15: Warning signals part 1

The two data bytes 15 and 16 contain warning signals. The warning signals serve only information purposes and do not interrupt or cancel an operation (as opposed to faults).

Bit	Designation	Value	Description
0	**P-feedback E4 loss**	1	Signal interruption of the actual process value E4 (only if PID controller is available and active).
		0	other
1	**Channel 2 active**	1	Indicates a communication with the control system via the redundant channel.
		0	other
2	**Anlog In1 I/O1 loss**	1	Loss of signal of the analogue input 1 of the parallel interface (only for Profibus DP in combination with parallel interface).
		0	other
3	**Anlog In2 I/O1 loss**	1	Loss of signal of the analogue input 2 of the parallel interface (only for Profibus DP in combination with parallel interface).
4	**Internal warning**	1	The internal diagnostics of the AUMATIC have detected a warning (the exact cause can be determined on the diagnosis page D3 of the display).
		0	other
5	**Internal feedback**	1	Indicates that the position transmitter has not been adjusted to the limit end positions yet. To adjust the actuator: operate the actuator to the end positions OPEN or CLOSED via the push-buttons on the local controls.
		0	other
6	**Starts/run**	1	Indicates an exceeding of the set limits of the starts/run monitoring, indication is deleted automatically.
		0	other

Bit	Designation	Value	Description
7	**Warning oper. time**	1	Indicates that the set operating time for an operation from one end position to the other has been exceeded, the next new operation command deletes this indication.
		0	other

Byte 16: Warning signals part 2

The warning signals part 2 contain the wire break signals of the different inputs.

Bit	Designation	Value	Description wire break
0	**Torque E6 loss**	1	A loss of signal has occurred in the torque measuring.
		0	other
1	**Fiber Optic Loss**[1)]	1	There is an interruption of the FO cable
		0	other
2	**Feedback E2 loss**	1	A loss of signal has occurred in the actual position.
		0	other
3	**Setpoint E1 loss**	1	A loss of signal has occurred in the nominal position.
		0	other
4	**- -**	1	
		0	
5	**- -**	1	
		0	
6	**DP1 Analog In2 loss**	1	A loss of signal has occurred in the analogue input 2.
		0	other
7	**DP1 Analog In1 loss**	1	A loss of signal has occurred in the analogue input 1.
		0	other

1) Only for Profibus DP with FO ring topology, refer to separate documentation “AUMATIC with FO connection”

Byte 17: Torque high byte
Byte 18: Torque low byte

Byte 17 and byte 18 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 AUMATIC via the push-buttons and the display. (For information about the operation see operation instructions for the multi-turn actuator/ part-turn actuator).
If the measuring values are 0.3 mA below the initial value a loss of signal is indicated.
The actual position can be transmitted either as a value between 0 – 100 (percent) or 0 – 1000 (per mil). For the 0 – 100 scaling the consistency does not have to be regarded in the transmission and only the low byte must be regarded. The change-over between 0 – 100 and 0 – 1000 is realised via a parameter in the GSD file (default: transmission in 0 – 100 format).

Byte 19 - 22 : Reserved

The contents of the bytes 19 to 22 are reserved for future extensions.

Byte 23: Additional data

Feed-back signals of the intermediate positions

Bit	Designation	Value	Description loss of signal
0	**Intermed. pos. 5**	1	Intermediate position 5 is signalled.
		0	other
1	**Intermed. pos. 6**	1	Intermediate position 6 is signalled.
		0	other
2	**Intermed. pos.** 7	1	Intermediate position 7 is signalled.
		0	other
3	**Intermed. pos. 8**	1	Intermediate position 8 is signalled.
		0	other
4	**(reserved)**	1	
		0	
5	**(reserved)**	1	
		0	
6	**(reserved)**	1	
		0	
7	**In intermediate position**	1	Is set if the actuator does not perform a run command and is neither in end position OPEN nor end position CLOSED
		0	

Byte 24: Reserved

The contents of byte 24 are reserved for future extensions.

9.3 Process representation input arrangement 2

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 ind.	Warning ind.	Running CLOSE	Running OPEN	Not ready ind.	Setpoint reached	Closed position	Open position

Byte 2: Actuator signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
TSC (DSR)	TSO (DOEL)	LSC (WSR)	LSO (WOEL)	Local sw. positionl	Remote sw. position	Loss of phase	Thermal faut

Byte 3: E2 (Actual position)

Actual position high-byte (positioner)

Byte 4: E2 (Actual position)

Actual position low-byte (positioner)

Byte 5: Configuable byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(Fault 3)	(Not ready ind.)	(Loss of phase)	(Torque fault (OPEN))	(Torque fault (CLOSE))	(Remote sw. position)	(Open position)	(Closed position)

Byte 6: Physical operation (configurable byte 2)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(Runs fom Local)	(Runs from REMOTE)	(Runs via handhweel)	(Actuator moving)	--	(Start stepping mode)	(Proportional operation)	(Operation pause)

Byte 11: E4 (Torque)

Torque high byte

Byte12: E4 (Torque)

Torque low byte

Byte 7: Options part 1 (configurable byte 3)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DP1 dig. input 4	DP1 dig. input 3	DP1 dig. input 2	DP1 dig. input 1	Intermed. pos. 4	Intermed. pos. 3	Intermed. pos. 2	Intermed. pos. 1

Byte 8: Options part 2 (configurable byte 4)

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

Byte 9: DP1 An1

DP1 Analogue input high byte

Byte 10: DP1 An1

DP1 Analogue input low byte

Byte 17: DP1 An2

DP1 Analogue input 2 high byte

Byte 18: DP1 An2

DP1 Analogue input 2 low byte

Byte13: Not ready ind.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
External operation	Clear state	Emergency mode	Emcy stop active	--	Actuator locked	Selector not remote	Wrong command

Byte14: Fault signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
--	Internal fault	Torque fault (CLOSED)	Torque fault (OPEN)	Loss of phase	Thermal fault	--	Config. fault

Byte15: Warning signals part 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Operation time	Starts/run	Internal feedback	Internal warning	I/O1 Analog In2 Loss	I/O1 Analog In1 Loss-	Channel 2 active	P-Feedback E4 loss

Byte16: Warning signals part 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Analog In1 DP1 loss	Analog In2 DP2 loss	--	--	Setpoint E1 loss	Feedback. E2 loss	Fiber optic loss	Torque E6 loss

Byte 19: Reserved

Reserved for future extensions

Byte 20: Reserved

Reserved for future extensions

Byte 23: Additional data

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
In inntermed. position	--	--	--	Intermed. pos. 8	Intermed. pos. 7	Intermed. pos. 6	Intermed. pos. 5

Byte 24: Reserviert

Reserved for future extensions

Byte 21: Reserved

Reserved for future extensions

Byte 22: Reserved

Reserved for future extensions

9.4 Process representation input arrangement 3

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

Byte 5: Configurable byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(Fault 3)	(Not ready ind.)	(Loss of phase)	(Torque fault (OPEN))	(Torque fault (CLOSE))	(Remote sw. position)	(Open position)	(Closed position)

Byte 6: Physical operation (configurable byte 2)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Runs fom Local	Runs from REMOTE	Runs via handhweel	Actuator runs	--	Start stepping mode	Proportional operation	Operation pause

Byte 3: E2 (Actual position)

Actual position high-byte (positioner)

Byte 4: E2 (Actual position)

Actual position low-byte (positioner)

Byte 9: DP1 An1

DP1 Analogue input high byte

Byte 10: DP1 An1

DP1 Analogue input low byte

Byte 17: DP1 An2

DP1 Analogue input 2 high byte

Byte 18: DP1 An2

DP1 Analogue input 2 low byte

Byte 7: Options part 1 (configured byte 3)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DP1 dig. input 4	DP1 dig. input 3	DP1 dig. input 2	DP1 dig. input 1	Intermed. pos. 4	Intermed. pos. 3	Intermed. pos. 2	Intermed. pos. 1

Byte 8: Options part 2 (configured byte 4)

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

Byte 11: E4 (Torque)

Torque high byte

Byte12: E4 (Torque)

Torque low byte

Byte1: Logical signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault ind.	Warning ind.	Running CLOSE	Running OPEN	Not ready ind.	Setpoint reached	Closed position	Open position

Byte 2: Actuator signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
TSC (DSR)	TSO (DOEL)	LSC (WSR)	LSO (WOEL)	Local sw. position	Remote sw. position	Loss of phase	Thermal faut

Byte13: Not ready ind.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
External operation	Clear state	Emergency mode	Emcy stop active	--	Actuator locked	Selector not remote	Wrong command

Byte14: Fault signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
--	Internal fault	Torque fault (CLOSED)	Torque fault (OPEN)	Loss of phase	Thermal fault	--	Config. fault

Byte15: Warning signals part 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Operation time	Starts/run	Internal feedback	Internal warning	I/O1 Anlog In2 loss	I/O1 Anlog In1 loss	Channel 2 active	--

Byte16: Warning signals part 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Analog In1 DP1 loss	Analog In2 DP2 loss	--	--	Setpoint E1 loss	Feedback. E2 loss	Fiber optic loss	Torque E4 loss

Byte 19: Reserved

Reserved for future extensions

Byte 20: Reserved

Reserved for future extensions

Byte 23: Additional data

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
In intermed. position	--	--	--	Intermed. pos. 8	Intermed. pos. 7	Intermed. pos. 6	Intermed. Pos. 5

Byte 24: Reserved

Reserved for future extensions

Byte 21: Reserved

Reserved for future extensions

Byte 22: Reserved

Reserved for future extensions

9.5 Process representation input arrangement 4

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

Byte 5: Configured byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
(Fault 3)	(Not ready ind.)	(Loss of phase)	(Torque fault (OPEN))	(Torque fault (CLOSE))	(Remote sw. position)	(Open position)	(Closed position)

Byte 6: Physical operation (configured byte 2)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Runs fom Local	Runs from REMOTE	Runs via handlweel	Actuator moving	--	Start stepping mode	Proportional operation	Operation pause

Byte 3: E2 (Actual position)

Actual position high-byte (positioner)

Byte 4: E2 (Actual position)

Actual position low-byte (positioner)

Byte 7: Options part 1 (configured byte 3)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DP1 dig. input 4	DP1 dig. input 3	DP1 dig. input 2	DP1 dig. input 1	Intermed. pos. 4	Intermed. pos. 3	Intermed. pos. 2	Intermed. pos. 1

Byte 8: Options part 2 (configured byte 4)

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

Byte 9: DP1 An1

DP1 Analogue input 1 high byte

Byte 18: DP1 An1

DP1 Analogue input 1 low byte

Byte1: Logical signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault ind.	Warning ind.	Running CLOSE	Running OPEN	Not ready ind.	Setpoint reached	Closed position	Open position

Byte 2: Actuator signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
TSC (DSR)	TSO (DOEL)	LSC (WSR)	LSO (WOEL)	Local sw. position	Remote sw. position	Loss of phase	Thermal faut

Byte 11: E4 (Torque)

Torque high byte

Byte12: E4 (Torque)

Torque low byte

Byte 17: DP1 An2

DP1 Analogue input 2 high byte

Byte 18: DP1 An2

DP1 Analogue input 2 low byte

Byte13: Not ready ind.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
External operation	Clear state	Emergency mode	Emcy stop active	--	Actuator locked	Selector not remote	Wrong command

Byte14: Fault signals

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
--	Internal fault	Torque fault (CLOSED)	Torque fault (OPEN)	Loss of phase	Thermal fault	--	Config. fault

Byte15: Warning signals part 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Operation time	Starts/run	Internal feedback	Internal warning	I/O1 Analog In2 Loss	I/O1 Analog In1 Loss-	Channel 2 active	P-Feedback E4 loss

Byte16: Warning signals part 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Analog In1 DP1 loss	Analog In2 DP2 loss	--	--	Setpoint E1 loss	Feedback. E2 loss	Fiber Optic loss	Torque E6 loss

Byte 19: Reserved

Reserved for future extensions

Byte 20: Reserved

Reserved for future extensions

Byte 23: Additional data

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

Byte 24: Reserved

Reserved for future extensions

Byte 21: Reserved

Reserved for future extensions

Byte 22: Reserved

Reserved for future extensions

10. Process representation output

Via the process representation output, the master (control) can control the slave (actuator).

Byte 1: Commands

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
—	—	—	—	Reset	Remote SETPOINT	Remote CLOSED	Remote OPEN

Byte 2: E3 (reserved)

Byte 3: E1 (Setpoint)

Setpoint high byte

Byte 4: E1 (Setpoint)

Setpoint low byte

Byte 5: Reserved

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

Byte 5: Additional commands

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
—	—	Channel 2	Channel1	—	Local sw. Position	Off sw. Position	Remote sw. Position

Byte 6: Operation commands for multiport valve function[1)]

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

1) The multiport valve function is available as an option (refer to short instructions AUMATIC with multiport valve function)

To be able to perform remote operations, the selector switch must be in position 'REMOTE'.

In Byte 1 only one operation bit may be set at any given time.
If several operation bits are set at the same time, the actuator stops and signals the fault "Wrong command".

10.1 Description of the output data

Byte 1: Commands (high byte)

With the bits 0 – 2 the operation commands are transmitted to the actuator. Only one of these bits may be set at any given time. If Remote SETPOINT (remote nominal) is set, the value of the nominal position (byte 3 and byte 4) is used.
Bits 4 – 7 are reserved for future extensions and must remain set to 0.

Bit	Designation	Value	Description
0	**Remote OPEN**	1	Run OPEN
		0	Do not run OPEN
1	**Remote CLOSE**	1	Run CLOSE
		0	Do not run CLOSE
2	**Remote SETPOINT**	1	Run to setpoint Can only be set if position transmitter e. g. potentiometer / RWG (options) is available.
		0	Do not run to setpoint
3	**RESET**	1	Certain indications of the AUMATIC can be reset (e.g. PTC tripping device and torque fault). The function of this bit equals the push-button Reset of the local controls in the selector switch position LOCAL.
		0	other
4	- -	1	
		0	
5	- -	1	
		0	
6	- -	1	
		0	
7	- -	1	
		0	

Byte 2: Reserved (low byte) For additional extensions.

Byte 3: E1 setpoint (high byte)
Byte 4: E1 setpoint (low byte)

The nominal position can be transmitted either as a value between 0 – 100 (percent) or 0 – 1000 (per mil). For the 0 – 100 scaling the consistency does not have to be regarded in the transmission and only the low byte must be regarded. The change-over between 0 - 100 and 0 - 1000 is realised via a parameter in the GSD file (default: transmission in 0 - 100 format). According to this programming different maximum values apply. When these limits are exceeded the actuator stops and signals the fault "WRONG COMMAND".

Byte 3: High byte of setpoint 0..1000

Condition	Value
Parameter 2 (data code from position transmitter) = 0	0
Parameter 2 (data code from position transmitter) = 1	High Byte of setpoint 0..1,000

Byte 4: Low byte of setpoint 0...100 or 0..1000

Condition	Value
Parameter 2 (data code from position transmitter) = 0	Setpoint 0..100
Parameter 2 (data code from position transmitter) = 1	Low byte of setpoint 0..1,000

Byte 5: Additional commands

Bit	Designation	Value	Description
0	**Remote sw. position**[1]	1	Selector switch position REMOTE is released
		0	Selector switch position REMOTE is locked
1	**OFF sw. position**[1]	1	Selector switch position OFF is released
		0	Selector switch position OFF is locked
2	**Local sw. position**[1]	1	Selector switch position LOCAL is released
		0	Selector switch position LOCAL is locked
3	- -	1	
		0	
4	**Channel 1**[2]	1	Switch-over to Profibus DP communication channel 1
		0	No switch-over
5	**Channel 2**[2]	1	Switch-over to Profibus DP communication channel 2
		0	No switch-over
6	- -	1	
		0	
7	- -	1	
		0	

1) Release of the local controls (page 44, clause 14.) (only available when function "Enable local controls" is activated)

2) Only available when 2 Profibus DP interfaces are installed. (see page 50, clause 18.).

Byte 6: Operation commands for multiport valve function

The multiport valve function is available as an option (refer to short instructions AUMATIC with multiport valve function)

Bit	Designation	Value	Description
0	**Intermed. pos. 1**	1	Actuator is to approach intermediate position 1.
		0	other
1	**Intermed. pos. 2**	1	Actuator is to approach intermediate position 2.
		0	other
2	**Intermed. pos. 3**	1	Actuator is to approach intermediate position 3.
		0	other
3	**Intermed. pos. 4**	1	Actuator is to approach intermediate position 4.
		0	other
4	**Intermed. pos. 5**	1	Actuator is to approach intermediate position 5.
		0	other
5	**Intermed. pos. 6**	1	Actuator is to approach intermediate position 6.
		0	other
6	**Intermed. pos. 7**	1	Actuator is to approach intermediate position 7.
		0	other
7	**Intermed. pos. 8**	1	Actuator is to approach intermediate position 8.
		0	other

11. Operation parameters of the AUMATIC

11.1 Profibus DP V1 services

The most important operation parameters of the AUMATIC can be read or written via the optional Profibus DP V1 services.
To check the availability of Profibus DP V1 services the parameter ”DP V1 SERVICES” can be used. For the version with DP V1 services the indication “FUNCTION ACTIVE” is displayed. The setting is made in the factory.

Menu structure:

```
MAIN MENU (M0)
   CONFIGURATION (M4)
        SPECIAL FUNCTIONS (M40)
             DP-V1 SERVICES (M40X9)
```

An AUMATIC actuator controls with activated Profibus DP V1 services provides access to the contents of the electronic name plate, the operating data and the essential application parameters.
This enables access from a central control room to the data of all actuators connected from the Profibus DP network for preventive maintenance and uniform programming.

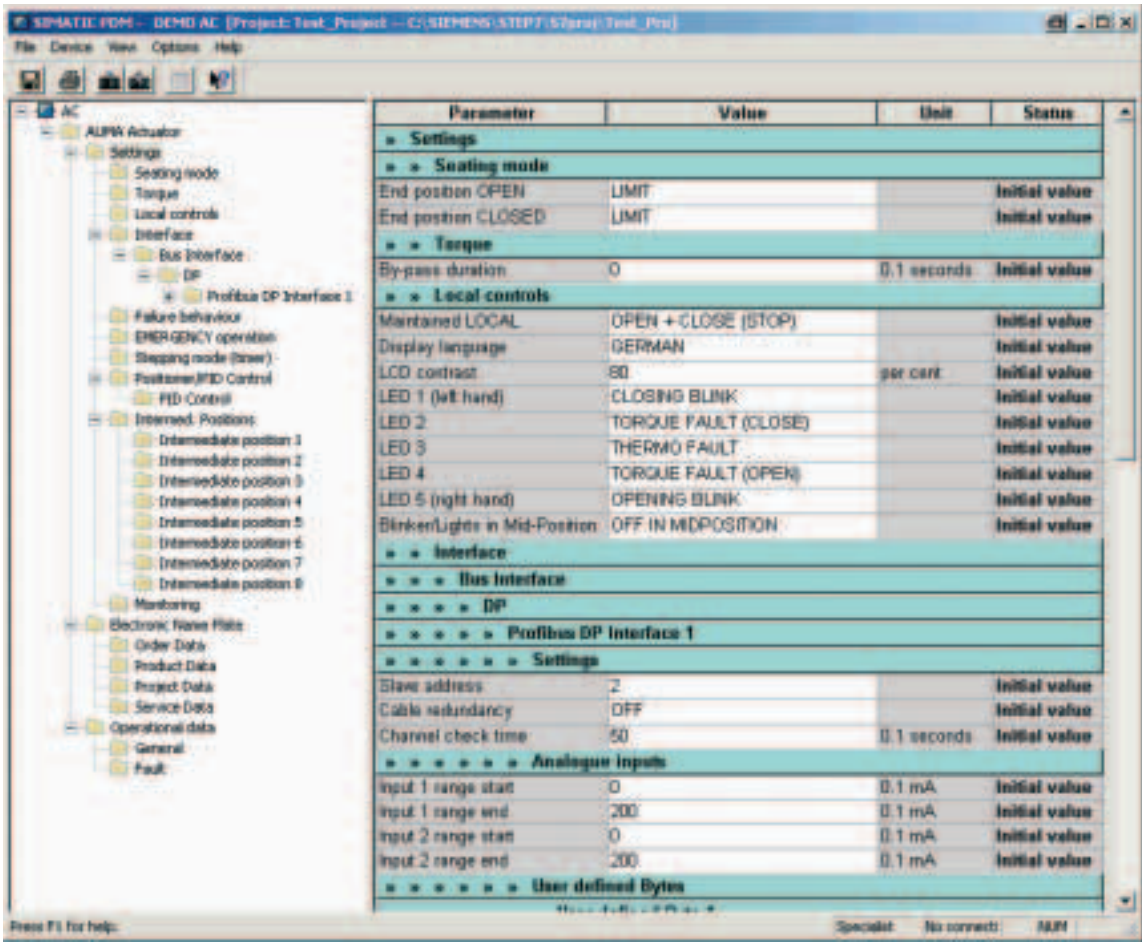
11.2 Integration into the process control system

For simple integration of the AUMATIC application parameters into the process control system the following possibilities are available:

Electronic Device Description = EDD)
for Simatic Process Device Manager (PDM from version 5.1)

The EDD of the AUMATIC actuator controls can be downloaded from the Internet at www.auma.com.

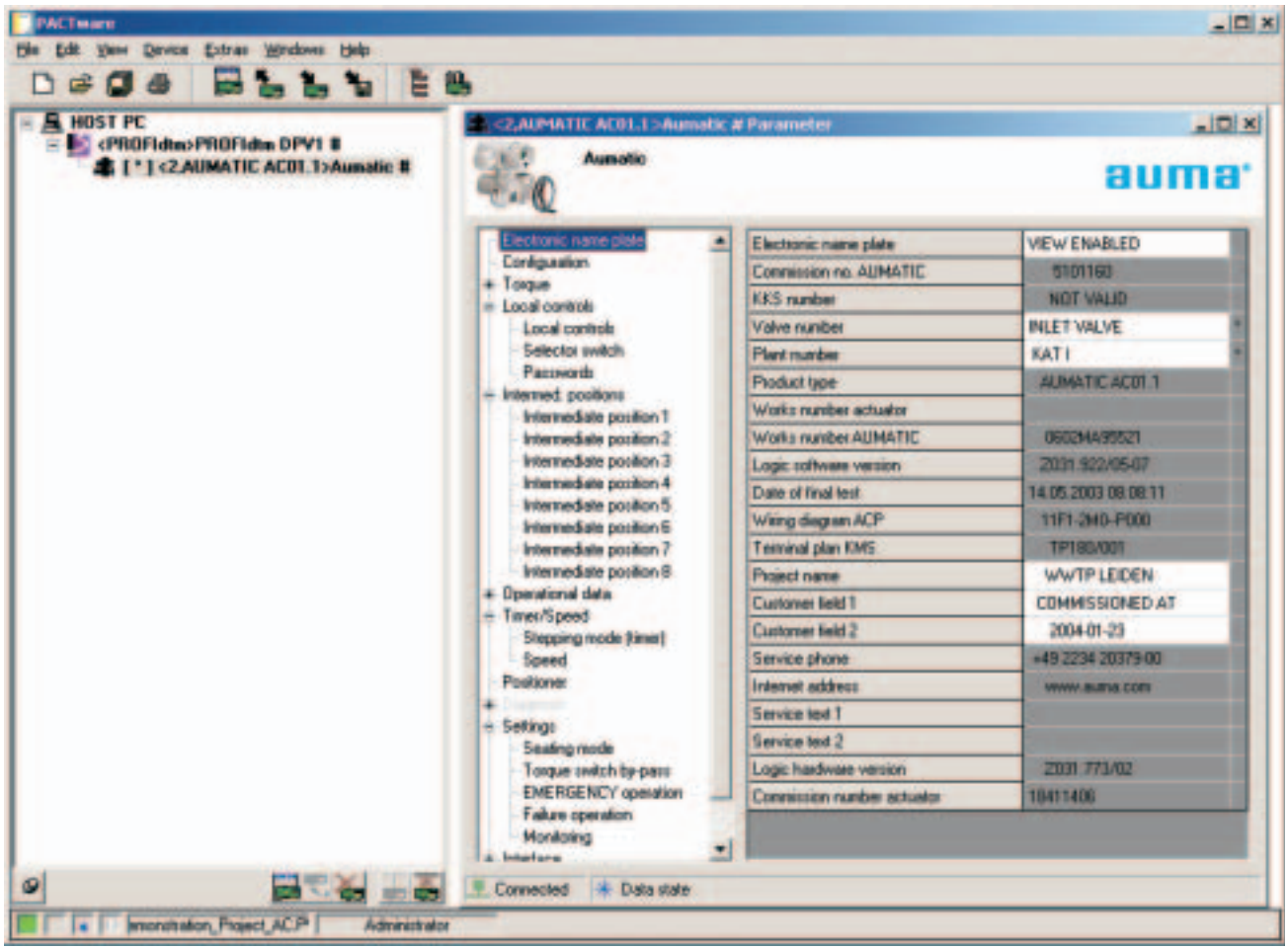
Example: AUMATIC EDD in Simatic PDM



Device Type Manager (DTM) for process control systems with Field Device Tool (FDT) software interface

The DTM of the AUMATIC actuator controls for FDT1.2 frame applications can be downloaded from the Internet at www.auma.com.

Example AUMATIC DTM in PACTware FDT frame application



12. Description of actuator functions

12.1 Operation commands for OPEN / CLOSE operation

Operation commands are determined by operation command bits and the nominal value (setpoint) of the process representation output. Only one command bit may be set at any given time. If several command bits are set, no operation is performed and the fault signal 'Wrong command' is given.
To avoid placing too much strain on the mechanics the actuator is equipped with a (programmable) delay when changing direction (reversing prevention).

The following operation command bits are required for OPEN / CLOSE operation:
Remote OPEN
Remote CLOSE

Remote operation OPEN/ STOP
Remote OPEN = 1 The actuator runs in direction OPEN.
Remote OPEN = 0 The actuator stops.
The actuator is switched off automatically if the end position OPEN is reached (limit switch LSO (WOEL) for limit seating or LSO (WOEL) and TSO (DOEL) for torque seating).
Faults (thermal protection, phase failure, torque) stop the operation.

Remote operation CLOSE/ STOP
Remote CLOSE = 1 The actuator runs to position CLOSED.
Remote CLOSE = 0 The actuator stops.
The actuator is switched off automatically if the end position CLOSED is reached (limit switch LSC (WSR) for limit seating or LSC (WSR) and TSC (DSR) for torque seating). Faults (thermal protection, phase failure, torque) stop the operation.

Remote operation to nominal position (SETPOINT) / STOP

The positioner can only function when the actuator is equipped with a position transmitter, e.g. potentiometer / RWG/MWG (option).

Remote SETPOINT = 1 The actuator moves to the set nominal value.
Remote SETPOINT = 0 The actuator stops.
The nominal position must either be stated in % or in ‰ (depending on the AUMA user parameter "Format of analogue indications" in the GSD file).
Faults (thermal protection, phase failure, torque) stop the operation via the positioner.

With a setpoint of 0 % (0 ‰) the actuator runs to the end position CLOSED
With a setpoint of 100 % (1,000 ‰) the actuator runs to the end position OPEN. In case the set point is more than 1,000 ‰ , no operation is performed and the fault signal WRONG COMMAND is given.

12.2 Positioner

The positioner is activated via the bit 'Remote SETPOINT'.
The positioner is a three-position-controller. Via the 'NOMINAL' position (setpoint) in the data output, the nominal value of the position is transmitted to the actuator as nominal variable.

For further information on the stepping mode refer to the operation instructions for the actuator (multi-turn actuator SA(R) . . . / part-turn actuator SG . . . with AUMATIC AC . . .).

12.3 Stepping mode

Stepping mode requires a position transmitter (option).
The stepping mode lengthens the operating time for a part or for the whole travel.

For further information on the stepping mode refer to the operation instructions for the actuator (multi-turn actuator SA(R) . . . / part-turn actuator SG . . . with AUMATIC AC . . .).

13. Safety function

The safety function permits the start of safety operations in case of special events, e.g. when the communication between the actuator and the master is interrupted. This function can be set via the parameter FAILURE OPERATION (refer to the operation instructions for the actuator (multi-turn actuator SA(R) . . . / part-turn actuator SG . . . with AUMATIC AC . . .).

The safety function can only be set off when the watchdog function is activated in the master.

If the actuator is in the safety mode, the set safety position is approached via a safety operation.
If the actuator is then moved to another position (e.g. by manual operation), it will try to perform the set safety action while the selector switch is in position REMOTE.

To prevent a new approach to the safety position during manual operation, the selector switch (local controls) must be switched to position 'LOCAL' or 'OFF' before operating the handwheel.

The following events can trigger the safety mode:

- The connection to the master is interrupted.
- The master goes into Clear state and sends:
  either a) global control telegrams with the content Clear.
  or b) data telegrams of the length 0 (DP fail safe mode).

As soon as the cause for triggering the safety function is eliminated (connection restored, master in state Operate), the operation commands from the master can again be executed.

14. Release function of the local controls (option)

The AUMATIC can be set in such a way that the AUMATIC-internal selector switch position is additionally determined by 3 Bits in the process representation output. (see description process representation output page 38 ff) This makes it possible to release (enable) or disable a certain selector switch position from REMOTE via the Profibus DP. In addition, an automatic release can programmed for the event of loss of communication.

The parameter ENABLE LOCAL MODE is set in the factory according to the order details.

Menu structure

```
MAIN MENU (M)
    CONFIGURATION (M4)
        SETUP (M41)
            SELECTOR SWITCH (M410V)
            ENABLE LOCAL MODE (M410W)
```

Table 8: Release functions of the local controls

Parameter ENABLE LOCAL MODE[1]		Selector switch at the local controls			
		is available (Parameter SELECTOR SWITCH = AVAILABLE)		is not available (Parameter SELECTOR SWITCH = NOT AVAILABLE)	
Value	Display text	Profibus DP communication to the master		Profibus DP communication to the master	
		is available	is not available	is available	is not available
0	NOT ACTIVE	SS	SS	OFF	OFF
1	BUS	Bits & SS	OFF	Bits	OFF
2	BUS,AUTO.LOCAL	Bits & SS	SS = LOCAL or OFF	Bits	LOCAL <> OFF
3	BUS,AUTO.REMOTE	Bits & SS	WS = REMOTE or OFF	Bits	REMOTE <> OFF
4	BUS AUTO	Bits & SS	SS	Bits	OFF

SS	The AUMATIC-internal selector switch position is the same as the selector switch position at the local controls (LOCAL, OFF or REMOTE).
Bits	The status is determined by the bits in the process representation (LOCAL sw. position, OFF sw. position or REMOTE sw. position)
Bits & SS	The status is determined by an AND-connection of the bits in the process representation with the selector switch position. Only in case they do correspond, the release is given (LOCAL, OFF or REMOTE). If the selector switch position does not correspond with the release bits, the release is not given. In this case the local controls remains disabled (Indication in the LCD on the status page S0: RESTRICTED)
REMOTE <> OFF	The underlined value will be assumed for the selector switch position within the AUMATIC if the bus communication fails. Special setting via push-button may be necessary to set the address: To change over between REMOTE and OFF, enter the following key sequence: 1. Press STOP button 2. Then hold down STOP button and press the OPEN button 5 times in a row within two seconds[2].
LOCAL <> OFF	The underlined value will be assumed for the selector switch position within the AUMATIC if the bus communication fails. Special setting via push-button may be necessary to set the address: To change over between REMOTE and OFF, enter the following key sequence: 1. Press STOP button 2. Then hold down STOP button and press the OPEN button 5 times in a row within two seconds.[2].
WS = REMOTE or OFF	Only selector switch positions REMOTE or OFF are possible (enabled).
SS = LOCAL or OFF	Only selector switch positions REMOTE or OFF are possible (enabled).

1) If the release function of the local controls is required, the parameter ENABLE LOCAL MODE is set to BUS,AUTO.LOCAL in the factory the other setting options reduce the function during loss of communication and are therefore provided only for special applications.

2) The following special setting is required for software versions up to Z031.922/05-xx (see diagnosis page D6):
1. Press RESET button 2. press the STOP button within 2 seconds, 3. press both the OPEN and the CLOSE button within two seconds.

15. Additional control inputs (option)

The digital and analogue input signals of the Profibus DP interface can be interpreted as additional operation commands. Through this, an additional operation command channel is available (four digital inputs or one analogue 0/4 – 20 mA input). Independent of the signal assignment of these inputs, the fieldbus communication with the DCS will remain intact.

Menu structure

```
MAIN MENU (M)
   CONFIGURATION (M4)
       SETUP (M41)
            EXTERNAL INPUTS BUS (M410G)
```

Possible settings of the parameter EXTERNAL INPUTS BUS:

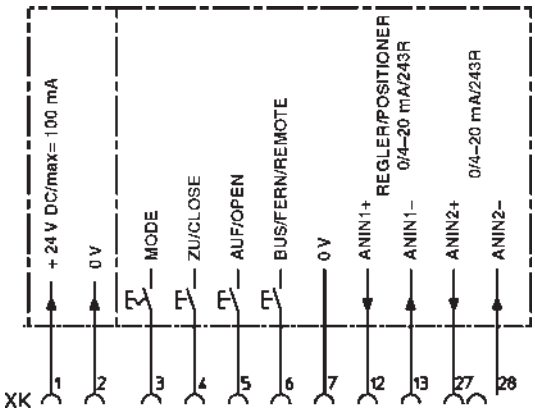
STANDARD

The signals of the four digital inputs and the analogue inputs are transmitted by the fieldbus to the process control system. They do not influence the operation behaviour of the actuator.

OPEN CLOSE CONTROL

Conventional control of the actuator is both possible in OPEN-CLOSE duty and in modulating duty (setpoint of 0/4 – 20 mA).
Generally, the bus communication has priority, i.e. in case of unconnected I/O inputs, the AUMATIC reacts only to operation commands which are received by the fieldbus interface.

Figure G-1: Pin assignment for OPEN–CLOSE–modulating duty (wiring diagram extract)

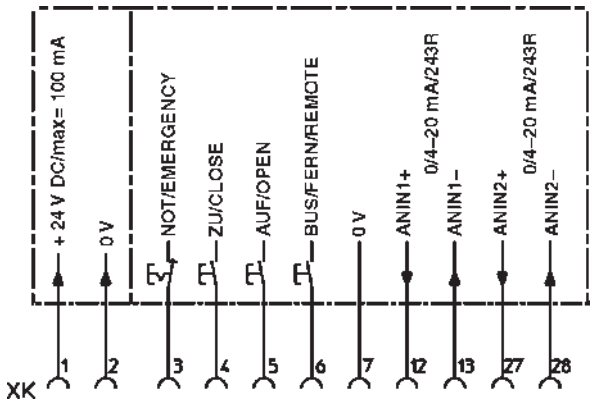


As soon as the ‘BUS/REMOTE’ input (figure G-1) is supplied with 24 V DC (or 115 V AC as a option), the AUMATIC will only react to operation commands which are read in via these digital inputs (OPEN-CLOSE or MODE and 0/4 – 20 mA nominal value). Self-retaining is not available for the OPEN-CLOSE commands.
In case of an unconnected MODE input (or MODE input connected to 0 V), the input signal of the analogue input 1 is interpreted as nominal position signal. The measuring range of this analogue input is programmable. Furthermore, the safety function (see clause, page 43) can be tripped in case a signal loss of this nominal setpoint signal was detected (Parameter: FAILURE SOURCE = SETPOINT E1).
For this function, the selector switch must be in position “REMOTE”.

OPEN CLOSE ESD

Conventional control is possible in the open-close duty (OPEN-CLOSE-EMERGENCY). The analogue inputs ANIN1 and ANIN2 have no function.
In this configuration, the EMERGENCY function has the highest priority. The polarity of the EMERGENCY input is identical to the standard AUMATIC version (equipped with an I/O interface). This means that the actuator will perform the programmed EMERGENCY operation if 0 V is applied at the EMERGENCY input (or the EMERGENCY input is unconnected) independently from the “BUS/REMOTE” input and from the operation commands received via fieldbus. As long as this EMERGENCY signal is present, the actuator can neither be operated by the digital input signals of the fieldbus interface nor via the Profibus.
The EMERGENCY function is set via the parameters for the operation mode EMERGENCY. Refer to the operation instructions for the actuator (multi-turn actuator SA(R) … / part-turn actuator SG . . . with AUMATIC AC . . .).
As soon as the EMERGENCY signal is no longer present (EMERGENCY input at 24 V DC or 115 V AC as an option), operation commands which are transferred via Profibus are immediately executed, while OPEN/CLOSE operation commands which are present at the additional control inputs are deleted and have to be reconnected.

Figure G-2: Pin assignment for OPEN–CLOSE–EMERGENCY (wiring diagram extract)



For this function, the selector switch must be in position “REMOTE”.

OPEN CLOSE STOP

Conventional control is possible in the open-close duty (OPEN-CLOSE-STOP). The analogue inputs ANIN1 and ANIN2 have no function.
Generally, the bus communication has priority, i.e. in case of unconnected I/O inputs, the AUMATIC reacts only to operation commands which are received by the fieldbus interface.
As soon as the ‘BUS/REMOTE’ input is supplied with 24 V DC (115 V AC as an option), the AUMATIC will only react to operation commands which were received via these digital inputs (OPEN-CLOSE-STOP). In this case, self-retaining is active and there is no possibility to operate the actuator via an analogue nominal setpoint signal.
For this function, the selector switch must be in position “REMOTE”.

Feedback signals via AUMATIC display or via Profibus DP

Feedback signals on the display			Profibus DP	Note
S3	NOT READY IND.	EXTERNAL CONTROL	Bit 13.7 = 1 (page 30)	Operation via additional control inputs (i.e. BUS/REMOTE connected to 24 V DC or 115 V AC as an option)
		EMERGENCY MODE	Bit 13.5 = 1 (page 30)	Emergency mode is active (the EMERGENCY function is active and 0 V are applied at the EMERGENCY input).

16. Combination fieldbus / standard interface (option)

The AUMATIC can also be equipped with an additional interface. By this, an additional operation command channel (digital inputs or an analogue 0/4 – 20 mA input) is available and furthermore, the available feedback possibilities of the I/O interface (relay contacts, analogue feedbacks) can be used, additionally to the feedback signals, transmitted via fieldbus. Independent of the signal assignment of these inputs, the fieldbus communication with the DCS will remain intact.

The settings for the I/O interface and the fieldbus interface are performed via the following menus:

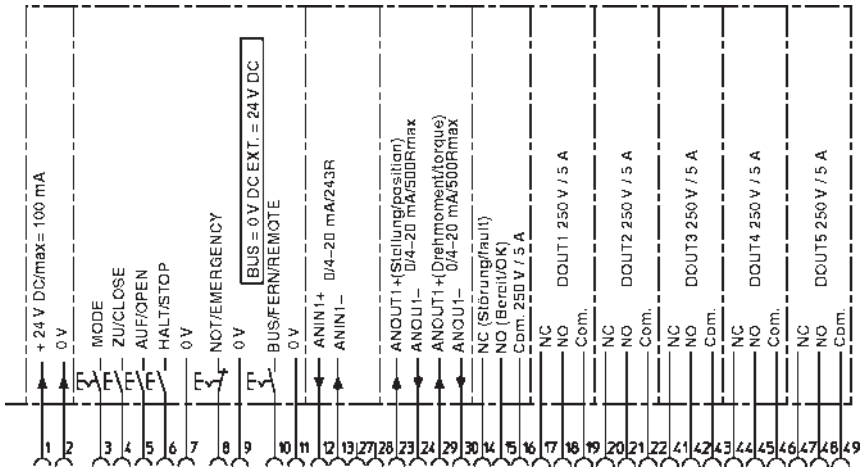
Menu structure

```
MAIN MENU (M)
   SETTINGS (M1)
        I/O 1 (M14)
        PROFIBUS DP 1 (M1B)
```

Standard application

Generally, the bus communication has priority, i.e. in case of unconnected I/O inputs, the AUMATIC reacts only to operation commands which are received by the fieldbus interface. At the same time, the programmed feedback signals of the I/O interface (relay output and analogue outputs) are available.

Figure K: Pin assignment with parallel interface (wiring diagram extract)



As soon as the ‘BUS/REMOTE’ (figure H-2) input is supplied with 24 V DC (or 115 V AC), the AUMATIC will only react to operation commands which are received via the conventional I/O interface (OPEN-CLOSE or MODE and 0/4 – 20 mA nominal value).
In case of an unconnected MODE input (or MODE input connected to 0 V), the input signal of the analogue input 1 is interpreted as nominal value signal. If the safety behaviour is accordingly programmed (see page 43), a safety position can be approached, in case of interruption of the nominal value signal (parameter: FAILURE SOURCE = SETPOINT E1).).

Application with EMERGENCY function active:

The EMERGENCY function has the highest priority. The polarity of the EMERGENCY input is identical to the standard AUMATIC version (equipped with an I/O interface). This means that the actuator will perform the programmed EMERGENCY operation if 0 V is applied at the EMERGENCY input (or the EMERGENCY input is unconnected) independently from the “BUS/REMOTE” input and from the operation commands received via fieldbus. As long as this EMERGENCY signal is present, the actuator can neither be operated by the digital input signals of the parallel interface nor via the fieldbus.

The EMERGENCY function is defined via the parameters for the operation mode EMERGENCY. Refer to the operation instructions for the actuator (multi-turn actuator SA(R) … / part-turn actuator SG . . . with AUMATIC AC . . .).
If the actuator is to be operated via fieldbus or the inputs of the I/O, the selector switch has to be in position “REMOTE”.
As soon as the EMERGENCY signal is no longer present (EMERGENCY input at 24 V DC or 115 V AC as an option), operation commands which are transferred via Profibus are immediately executed, while OPEN/CLOSE operation commands which are present at the additional control inputs are deleted and have to be reapplied.

Note:
An automatic change-over to the I/O interface in case of a loss of the bus communication is not available!

Feedback signals via AUMATIC display or Profibus DP

Feedback signals on the display			Profibus DP	Note
S3	NOT READY IND.	EXTERNAL CONTROL	Bit 13.7 = 1 (page 30)	Operation via parallel interface (i.e. BUS/REMOTE on 24 V DC or optional 115 V AC)
		EMERGENCY MODE	Bit 13.5 = 1 (page 30)	Emergency mode is active (the EMERGENCY function is active and 0 V are applied at the EMERGENCY input).

17. EMERGENCY STOP function (option)

As an option, the AUMATIC can also be equipped with an EMERGENCY STOP mushroom button. When engaged, this EMERGENCY STOP interrupts the control voltage of the contactors.

Figure L: AUMATIC with EMERGENCY STOP mushroom button

Restrictions

- The EMERGENCY STOP function is not available for ACExC, but only for the weatherproof versions of the AUMATIC!

Function

As soon as this EMERGENCY STOP button is engaged, several steps are performed in the AUMATIC.
- The 24 V AC control voltage of the AUMATIC contactors is interrupted.
- Switch-off of the operation command and cancelling of a possibly set self-retaining.
- Indication of the EMERGENCY STOP status by setting a bit in the process representation output (byte 13 – Not ready ind., bit 4 – Emergency STOP active).
- Optional: Indication of the operation status of the EMERGENCY STOP button by activating a signal relay.
- Optional: Indication of the operation status of the EMERGENCY STOP button by lighting up of a local control LED.
- Indication of the EMERGENCY STOP status in the display showing the entry ‘EMCY STOP ACTIVE’ in the diagnosis page S3 “NOT READY IND.”

- EMERGENCY STOP status indication in the status indication S0: Operation status “EMERGENCY STOP”

After having unlocked the EMERGENCY STOP button, a possibly active operation command will **not immediately** be re-activated, but only after a confirmation by the user has been given which resets the EMERGENCY STOP status.
For confirmation, the RESET button of the local controls in selector switch position LOCAL has to be pressed so that the controls will be reset into normal operation. After this, operation commands can be performed right away, also emergency and safety operations.
Alternatively to the confirmation with the RESET button, it can also be done with the RESET bit of the process representation output (when selector switch is in position REMOTE).

Feedback signals via AUMATIC display or Profibus DP

Feedback signals on the display			Profibus DP	Note
S0	1st line (only if EMERGENCY STOP button was operated)	EMER-GENCY STOP		The EMERGENCY STOP button has been operated and has put the AUMATIC into the EMERGENCY STOP status. This status can only be cancelled by unlocking the EMER-GENCY STOP button and a subsequent RESET command.
S3	NOT READY IND.	EMCY STOP ACTIVE	Bit 13.4 = 1 (page 30)	

Setting the feedback signals via output relay (at the local controls)

Menu structure

```
MAIN MENU (M)
   SETTINGS (M1)
        I/O 1 (M14)
             OUTPUT RELAY X
```

OUTPUT RELAY X = EMCY STOP BUTTON
The selected output relay is activated, after the EMERGENCY STOP button was operated.
This signal can be cancelled by unlocking the EMERGENCY STOP button.

Setting the feedback signals via LED’s (at the local controls)

Menu structure

```
MAIN MENU (M)
   SETTINGS (M1)
        LOCAL CONTROLS (M14)
             LED X LOCAL CONTROLS
```

LED X LOCAL CONTROLS = EMCY STOP BUTTON
The selected LED is illuminated after the EMERGENCY STOP button was operated.
The signal can be cancelled by unlocking the EMERGENCY STOP button.

18. Redundant bus connection with component redundancy (option)

The AUMATIC can be equipped with a second (redundant) Profibus interface. In this version, communication to the actuator can be established simultaneously through both Profibus interfaces. If one of the Profibus components fails, e. g. through cable break, those operation commands, which are sent via the other Profibus component, are executed.
If there is a communication to the master available via both Profibus interfaces, the operation commands of the interface which first established a communication to the master will be executed.
For the bus connection refer to page 13 ff.

Both Profibus DP sub-assemblies have to be programmed in the same way by the master (identical setting in the GSD file).

18.1 Settings for the redundant Profibus interface 2 (component redundancy)

The redundant Profibus DP component 2 is set in the same way as the setting for the Profibus component 1 (see page 18 ff and via the following menus:

Menu structure

```
MAIN MENU (M)
   SETTINGS (M1)
       PROFIBUS DP2 (M1E)
           SLAVE ADDRESS (M1EX0)
```

In case of component redundancy, the parameter CABLE REDUNDANCY of both Profibus components must be set to OFF (this corresponds to the factory setting).

18.2 External change-over of the communication channels

A communication channel can be externally selected via the change-over bits channel 1 and channel 2 in the process representation output (page 38).

Bit 5 Channel 2	Bit 4 Channel 1	Designation
0	0	No channel selected, change-over does not take place. The previous channel is retained.
0	0 → 1	Change-over to channel 1 (A) is started.
0	1	Channel 1 (A) remains selected
0	1 → 0	Channel 1 (A) remains selected.
0	0	Channel is retained.
0 → 1	0	Change-over to channel 2 (B) is started.
1	0	Channel 2 (B) remains selected.
1 → 0	0	Channel 2 (B) remains selected.
0	0	Channel is retained.
0 → 1	0 → 1	No change-over.
1	0 → 1	No change-over.
0 → 1	1	No change-over.
1	1	Channel is retained.
0 → 1	1 → 0	Change-over to channel 2 (B) is started.
1 → 0	0 → 1	Change-over to channel 1 (A) is started.

18.2.1 Details of the change-over

- The change-over is only executed in response to transition of these bits, i.e. the change-over is initiated by the transition 0 → 1.
- If the bit for channel changing is set, the addition of the second bit does not have any effect.
- Transition from one channel to the other is supported, i.e. bits can be changed simultaneously (e.g. channel A: 1 → 0 and channel B: 0 → 1).

The change-over is only performed if the bits in the process representation input are set accordingly and both components communicate with the master.

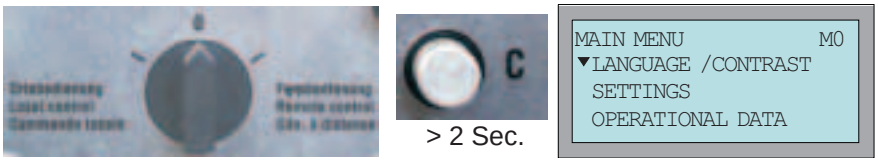
19. Indication and programming of the AUMATIC

19.1 Software parameters of the Profibus DP interface

To get to the display indications and to the software parameters:

- Set selector switch to position **OFF** (0), figure N-1.
- Switch on voltage supply.
- Select menu indication M0 :
  Press push-button Ⓒ in one of the status indications longer than 2 seconds:

Figure N-1



- Select the sub-items required with the push-buttons ▲ and ▼ .
- Confirm the selection with ↵ .

A list of additional parameters is included in the operation instructions to the actuator (multi-turn actuators SA(R) . . ./ part-turn actuators SG . . .with AUMATIC AC . . .).

19.1.1 Menu indications

Parameters with the wild card “x” in the submenu can be indicated and changed:
x = 0 : indicate only (grey background)
x = 1 : indicate and change (white background)
(only possible in selector switch position OFF)

To change a parameter, a password must first be entered (for information on how to enter a password see operation instructions of the actuator).

	Subgroup	Parameter name	Sub menu	Standard value	Min/ Max	Valuetext	Note
M1	**SETTINGS**						
M1B	PROFIBUS DP1	SLAVE ADDRESS	M1BX0	2	0		Slave address of the DP1 sub-assembly
					125		
M1E	PROFIBUS DP2	SLAVE ADDRESS	M1EX0	2	0		Slave address of the DP2 sub-assembly (option, only for component redundancy)
					125		
M1H	IN-PROC-IMAGE 1	BYTE ORDER PATTERN	M1H00	0	0		Selection from 4 process representations[1)] Description see page 21.
					3		

1) The programming is performed via the GSD file and may be indicated only in the AUMATIC display.

	Subgroup	Parameter name	Sub menu	Standard value	Min/ Max	Valuetext	Note
M1H	IN-PROC-IMAGE 1	BYTE 5.0 CONFIG.	M1H01	1	0-55		Configured byte 1.[1)] For the description of values 0 – 55 see page 22 ff.
		BYTE 5.1 CONFIG.	M1H02	2	0-55		
		BYTE 5.2 CONFIG.	M1H03	21	0-55		
		BYTE 5.3 CONFIG.	M1H04	11	0-55		
		BYTE 5.4 CONFIG.	M1H05	12	0-55		
		BYTE 5.5 CONFIG.	M1H06	36	0-55		
		BYTE 5.6 CONFIG.	M1H07	34	0-55		
		BYTE 5.7 CONFIG.	M1H08	2	0-9		
		ANALOGUE VALUES DP	M1H09	1	0	0-100 PERCENT	Coding of the DP transmission values (percent/per mil switch-over)[1)] Description see page 24
					1	0-1000 PER MIL	
		BYTE 6.0 CONFIG.	M1H0A	50	0-55		Configurable Byte 2.[1)] For the description of values 0 – 55 see page 22 ff.
		BYTE 6.1 CONFIG.	M1H0B	49	0-55		
		BYTE 6.2 CONFIG.	M1H0C	29	0-55		
		BYTE 6.3 CONFIG.	M1H0D	0	0-55		
		BYTE 6.4 CONFIG.	M1H0E	5	0-55		
		BYTE 6.5 CONFIG.	M1H0F	78	0-55		
		BYTE 6.6 CONFIG.	M1H0G	47	0-55		
		BYTE 6.7 CONFIG.	M1H0H	46	0-55		

1) The programming is performed via the GSD file and may be indicated only in the AUMATIC display.

	Subgroup	Parameter name	Sub menu	Standard value	Min/ Max	Valuetext	Note
M1I	IN-PROC-IMAGE 2	BYTE ORDER PATTERN	M1I00	0	0		Selection from 4 process representations[1)] Description see page 21.
					3		
		BYTE 5.0 CONFIG.	M1I01	1	0-55		Configurable Byte 1.[1)] (redundant second sub-assembly) For the description of values 0 – 55 see page 22 ff.
		BYTE 5.1 CONFIG.	M1I02	2	0-55		
		BYTE 5.2 CONFIG.	M1I03	21	0-55		
		BYTE 5.3 CONFIG.	M1I04	11	0-55		
		BYTE 5.4 CONFIG.	M1I05	12	0-55		
		BYTE 5.5 CONFIG.	M1I06	36	0-55		
		BYTE 5.6 CONFIG.	M1I07	34	0-55		
		BYTE 5.7 CONFIG.	M1I08	2	0-9		
		ANALOGUE VALUES DP	M1I09	1	0	0-100 PERCENT	Coding of the DP2 transmission values (percent/per mil switch-over)[1)] Description see page 24
					1	0-1000 PER MIL	
		BYTE 6.0 CONFIG.	M1I0A	50	0-55		Configurable Byte 2.[1)] (redundant second sub-assembly) For the description of values 0 – 55 see page 22 ff.
		BYTE 6.1 CONFIG.	M1I0B	49	0-55		
		BYTE 6.2 CONFIG.	M1I0C	29	0-55		
		BYTE 6.3 CONFIG.	M1I0D	0	0-55		
		BYTE 6.4 CONFIG.	M1I0E	5	0-55		
		BYTE 6.5 CONFIG.	M1I0F	78	0-55		
		BYTE 6.6 CONFIG.	M1I0G	47	0-55		
		BYTE 6.7 CONFIG.	M1I0H	46	0-55		

1) The programming is performed via the GSD file and may be indicated only in the AUMATIC display.

	Subgroup	Parameter name	Sub menu	Standard value	Min/ Max	Valuetext	Note
M4	**CONFIGURATION**						
M40	SPECIAL FUNCTIONS	PROFIBUS DP V1 SERVICES	M4009	0	0	FUNCTION NOT ACTIVE	Availability of the Profibus DP (V1) services
					1	FUNCTION ACTIVE	
M41	SETUP	DP1 ANLOG IN1 START	M41XL	0	0		Analogue input 1: (Profibus DP1) Start value and end value (in mA)
					20,0		
		DP1 ANLOG IN1 END	M41XM	20,0	0		
					20,0		
		DP1 ANLOG IN2 START	M41XN	0	0		Analogue input 2: (Profibus DP1) Start value and end value (in mA)
					20,0		
		DP1 ANLOG IN2 END	M41XP	20,0	0		
					20,0		

20. Description Profibus DP interface

Figure P: Profibus DP interface

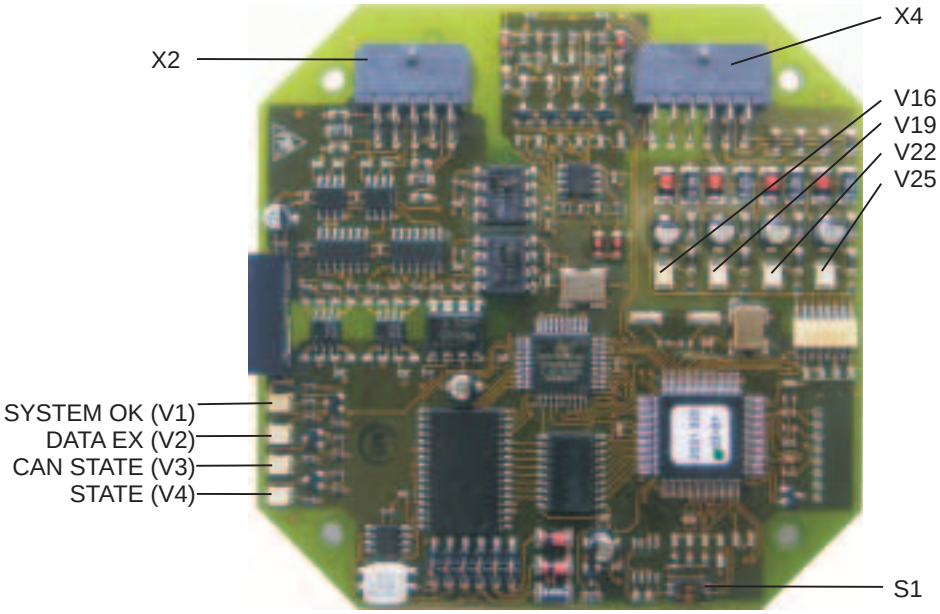


Table 9: DIP switch S1: Configuration of the Profibus DP board

S1-1	Only one Profibus DP interface available	OFF
	Two Profibus DP interfaces available	1st Profibus DP interface: OFF 2nd Profibus DP interface: ON
S1-2	Spare	OFF

V1 to V4
Description see page 57.

V16, V19, V22, V25
LEDs of the digital customer inputs (option); they are illuminated when + 24 V DC are applied to the inputs.

20.1 Assignment of the customer inputs of the Profibus DP interface (option)

X4 This plug provides pins for 4 digital customer inputs and 2 analogue customer inputs.

Table 10: Digital inputs (galvanically isolated)

Pin	Description	LED
3	R1: digital input 1	V 16
4	R2: digital input 2	V 19
5	R3: digital input 3	V 22
6	R4: digital input 4	V 25
7	0 V	

These signals are freely available inputs, which the microcontroller transmits into the process representation input (OPTIONS part 1, bits 4-7). The inputs are galvanically isolated and internally connected to 0 V via pull-down resistors. In an unconnected state a logical zero is transmitted. To set an input to logical one, + 24 V DC must be applied.

Table 11: Analogue inputs

Pin	Description
2	AN1: Analogue signal (0 – 20 mA)
13	GND (Systemground)
25	AN2: Analogue signal (0 – 20 mA)
28	GND (Systemground)

Via these inputs external 0/4 – 20mA sensors for transmitting the measured values through the Profibus can be connected.

- **Proposed wiring diagrams (appendix C of the operation instructions) for these signals must be observed.**
- **The bounce time of the connected switches should not be more than 1 ms.**
- **The inputs AN1 and AN2 do not have galvanic isolation via opto-isolator.**

The measuring range of the analogue inputs can be set (see page 54, `CONFIGURATION`).

20.2 Assignment of the Profibus DP connection

X2 On this plug the bus signals and the galvanically isolated voltage supply for the bus termination, as well as the bus termination resistors on the Profibus DP board, are connected.

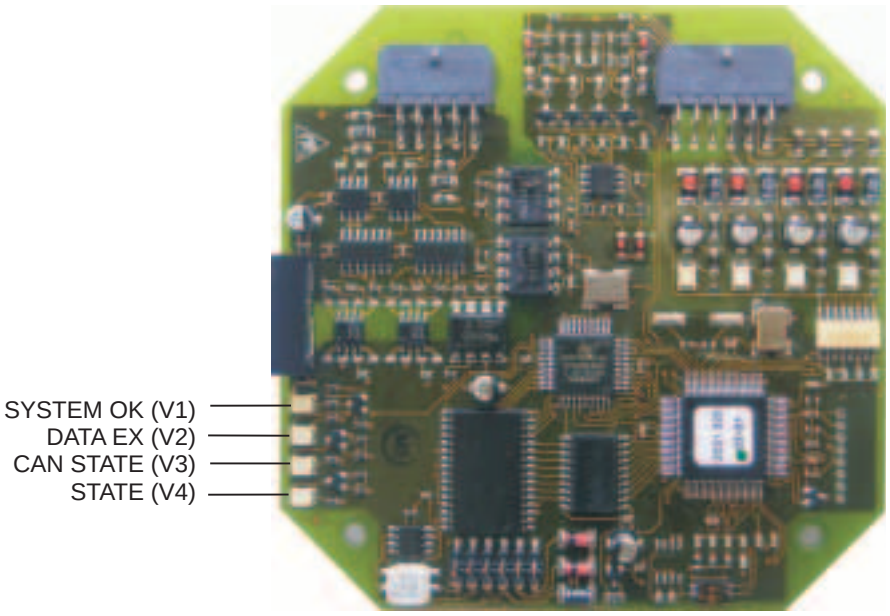
Table 12: Pin assignment X2

Pin	Description
1	Channel 1: B-cable bus termination
2	Channel 1: A-cable bus termination
3	Channel 1: B-cable Profibus
4	Channel 1: A-cable Profibus
8	Channel 2: A-cable Profibus (redundant channel)
7	Channel 2: B-cable Profibus (redundant channel)
9	Channel 2: B-cable bus termination (redundant channel)
10	Channel 2: A-cable bus termination (redundant channel)

21. Trouble shooting and corrective actions

21.1 Optical signals during operation

Figure Q: Profibus DP interface



LED 'SYSTEM OK' (V1)(green)

This LED shows the correct voltage supply to the Profibus DP board.

Is continuously illuminated:	Voltage connected to Profibus DP interface.
Is blinking:	Microcontroller defective.
Is not illuminated:	No voltage at the DP interface.

LED 'DATA EX' (V2) (green)

When LED is illuminated, the Profibus DP interface has entered 'Data Exchange' state (see page 57). Only in this state can the actuator be controlled by the Profibus DP master and the state of actuator be read.

LED 'CAN STATE' (V3) (red)

Is illuminated or blinking:	Communication to logic is faulty
Is not illuminated:	Communication with logic is o.k.

LED 'STATE' (V4) (green)

Is illuminated or not illuminated:	Profibus DP interface is not ready
is blinking:	Program on the Profibus DP interface is being executed.

Regular blinking of the LED during operation indicates correct operation of the Profibus DP interface.

21.2 Status indications in the display

The status indications (Group S) in the display show the current operation mode as well as faults and warnings. For detailed notes regarding the indication and operation see the appropriate operation instructions of the actuator.

21.3 Profibus DP diagnosis indication in the display

The information contained in the diagnosis indication (Group D) is only provided for the AUMA service and for enquiries in the factory. Status information can be called up via Profibus DP in the subgroup DC, DD, DE, DG, DH, DI.

To go to the Profibus DP diagnosis indications:

- Set selector switch at the AUMATIC to position **OFF** (0), figure R-1.
- Switch on supply voltage.
- Press push-button Ⓒ and hold it until the group D0 appears (menu indications M are hereby skipped).

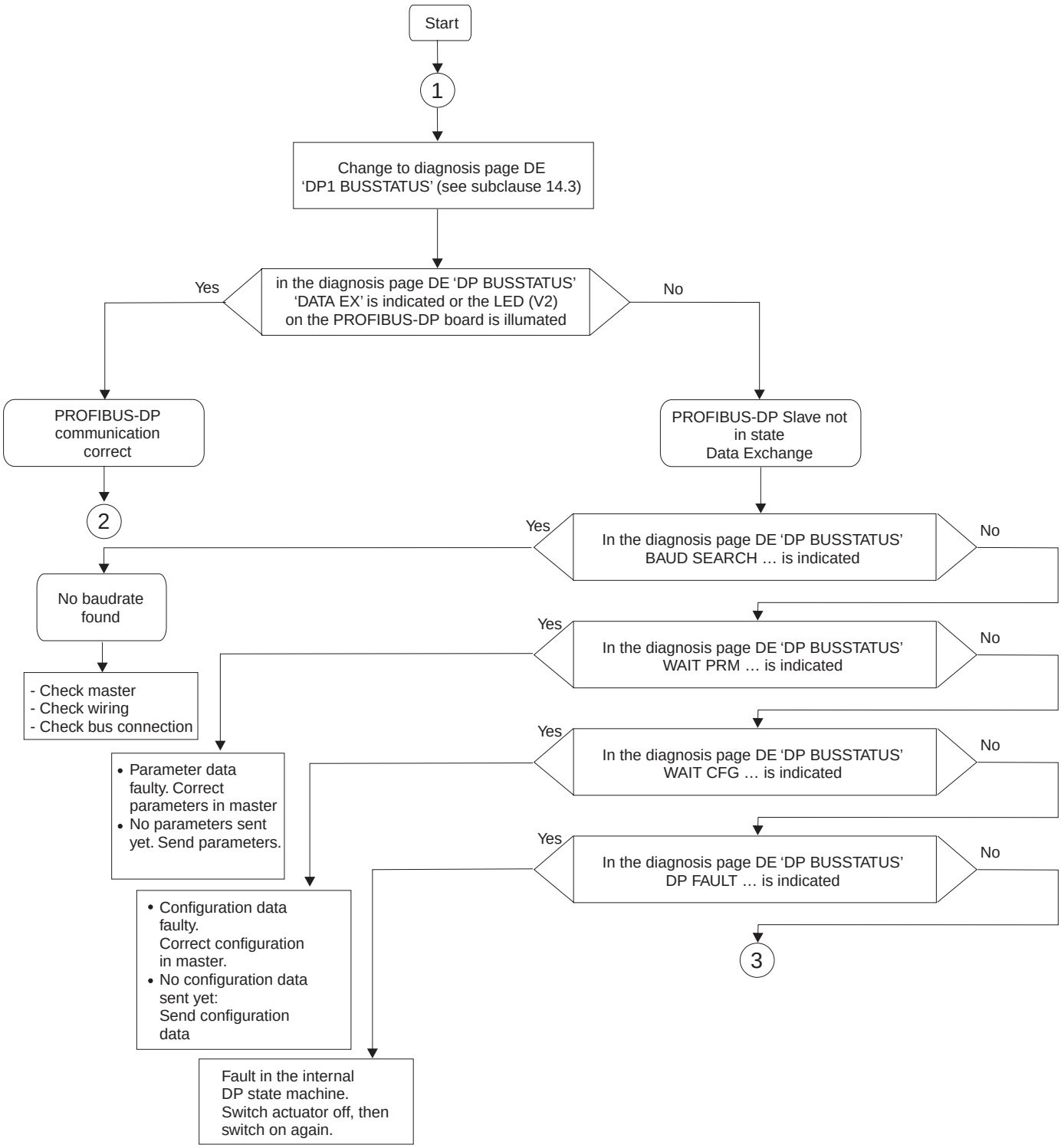
Figure R

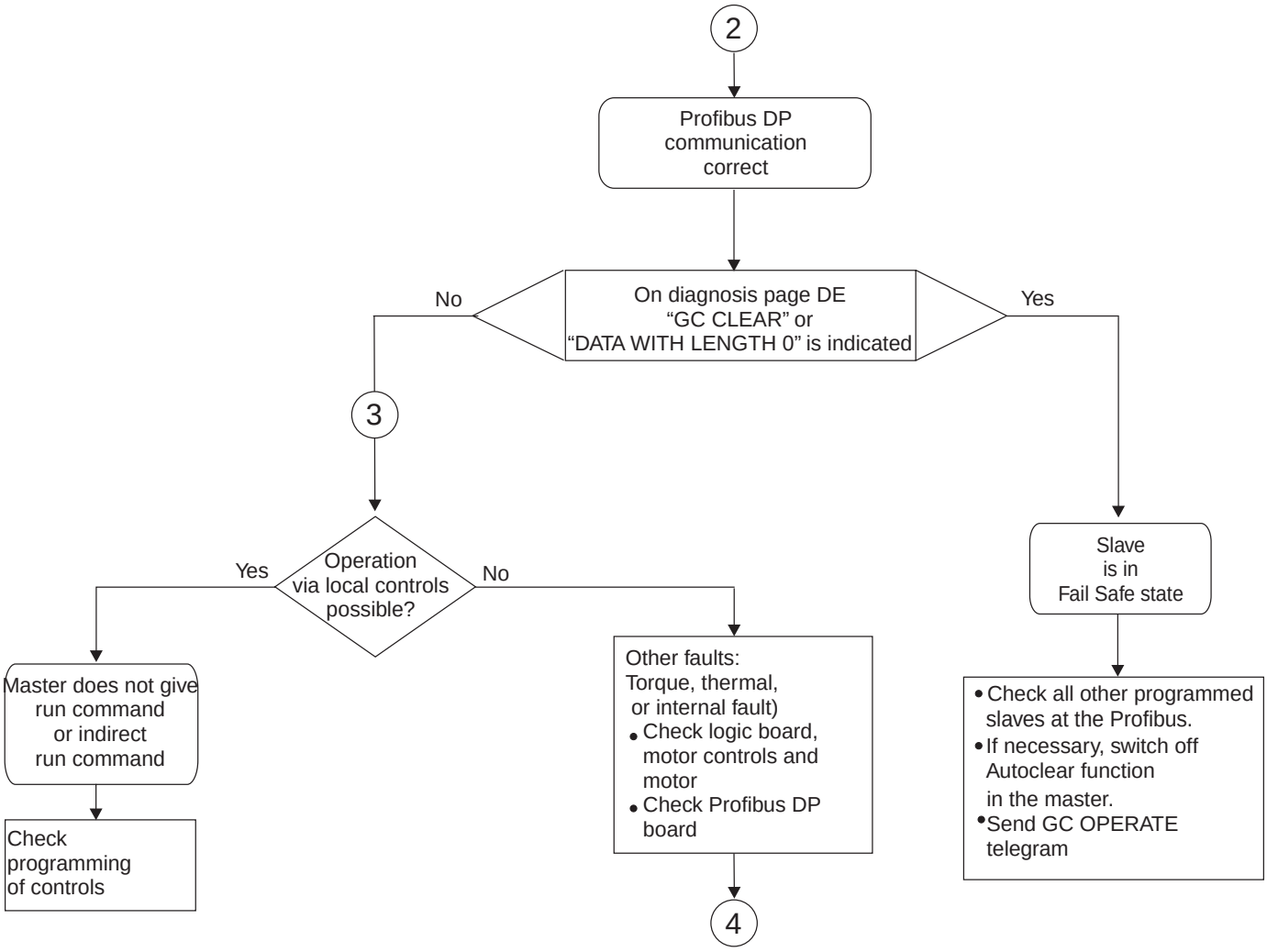
- Select the sub-items required with the push-buttons ▲ and ▼.
- To go back to the status indication:
  Press push-button Ⓒ briefly once.

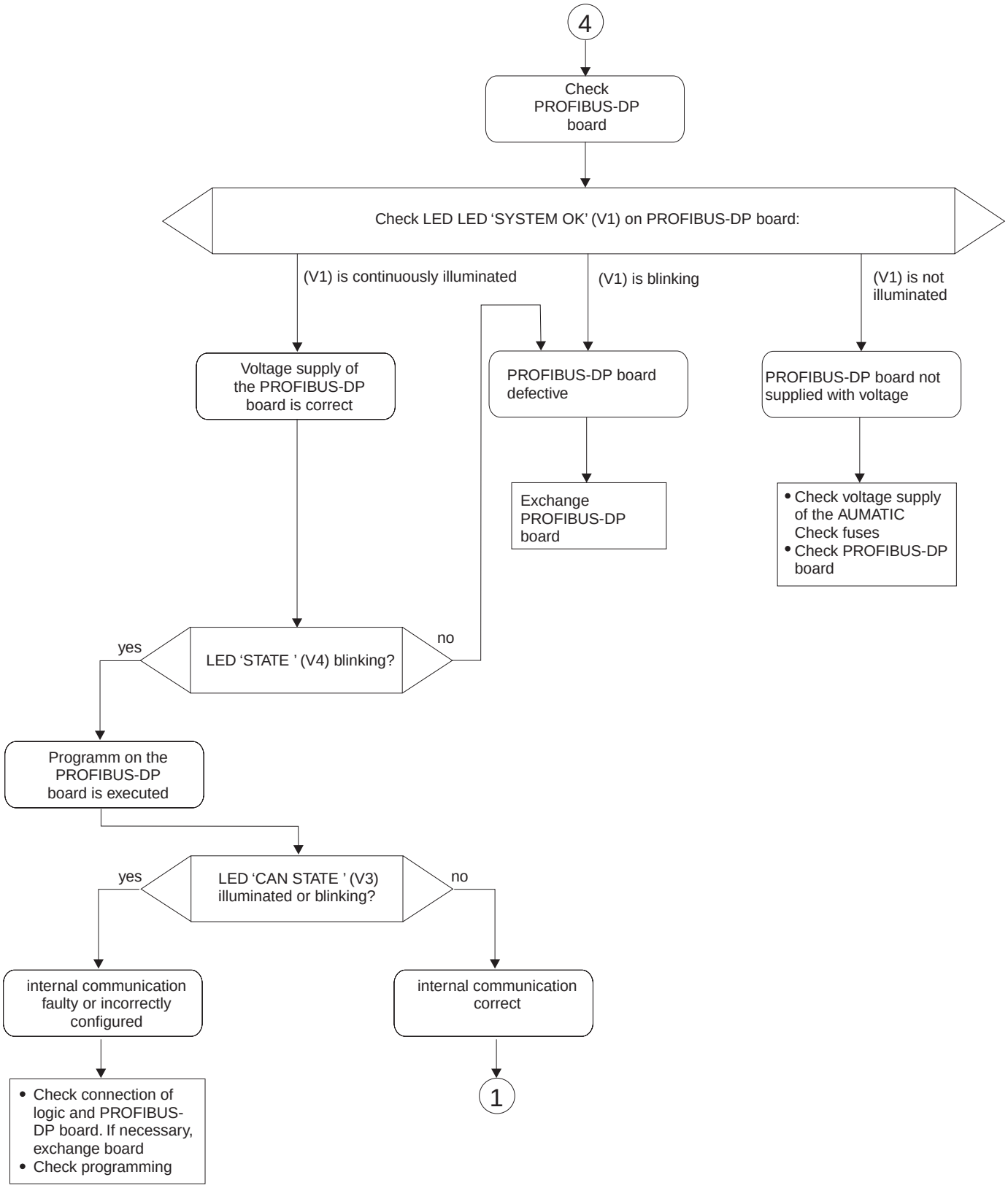
Menu		Abbreviation in display	Note
DC	**DP1 HRDWR.VER.**		Hardware version of the Profibus DP interface 1
DD	**DP1 SFTWR.VER.**		Software version of the Profibus DP interface
DE	**DP1 BUS STATUS** (Status of the Profibus interface 1)		
		BAUD SEARCH	The Profibus DP interface searches a baud rate In case no baud rate was detected: Connect DP cable, check, switch on DP master.
		BAUD CONTROL	The found baud rate is monitored. Hereby the DP watchdog in the master is not activated. In this case the safety function (page 43) is not available.
		DP MODE	DP communication monitored, the DP watchdog in the master is activated Therefore the safety function (page 43) is available.
		WAIT PRM	The Profibus DP interface waits for correct parameter data
		WAIT CFG	The Profibus DP interface waits for correct configuration data
		DATA EX	The Profibus-DP interface is currently exchanging data with the master.
		DP FAULT	The internal status machine has detected a fault Help: Switch AUMATIC off and on.
		GC CLEAR	The Profibus DP interface has received the Global Control Clear telegram and is waiting for the Global Control Operate telegram. In this state the DP communication is completely operative, the actuator can, however, not be operated via the PLC. If the safety function is activated it will be initiated.
		DATA WITH LENGTH 0	The Profibus DP interface receives data telegrams of the length 0.In this state the DP communication is completely operative, the actuator can, however, not be operated via the PLC. If the safety function is activated it will be initiated.
		CHANNEL 2 ACTIVE	The Profibus DP interface communicates via the second channel.
DG	**DP2 HRDWR. VER.**[1)]		Hardware version of the Profibus DP interface 2
DH	**DP2 SFTWR. VER.**[1)]		Software version of the Profibus DP interface 2
DI	**DP2 BUS STATUS**[1)] (Status of the Profibus interface 2)		
	Menu structure and parameter structure identical to Profibus DP interface 1		

1) Option, only available for component redundancy

21.4 Actuator can not be controlled by Profibus DP



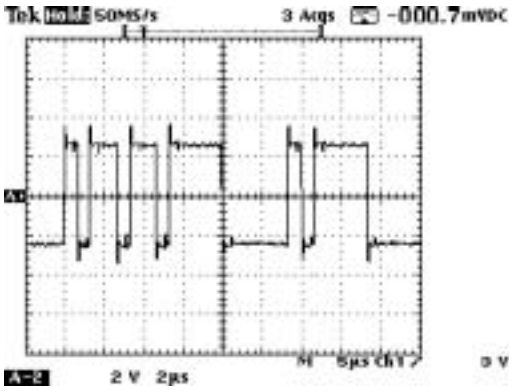

2
Profibus DP communication correct
On diagnosis page DE "GC CLEAR" or "DATA WITH LENGTH 0" is indicated
No
Yes
3
Operation via local controls possible?
Yes
No
Master does not give run command or indirect run command
Check programming of controls
Other faults: Torque, thermal, or internal fault)
• Check logic board, motor controls and motor
• Check Profibus DP board
4
Slave is in Fail Safe state
• Check all other programmed slaves at the Profibus.
• If necessary, switch off Autoclear function in the master.
• Send GC OPERATE telegram


4
Check PROFIBUS-DP board
Check LED LED 'SYSTEM OK' (V1) on PROFIBUS-DP board:
(V1) is continuously illuminated
(V1) is blinking
(V1) is not illuminated
Voltage supply of the PROFIBUS-DP board is correct
PROFIBUS-DP board defective
PROFIBUS-DP board not supplied with voltage
Exchange PROFIBUS-DP board
• Check voltage supply of the AUMATIC Check fuses
• Check PROFIBUS-DP board
yes
LED 'STATE ' (V4) blinking?
no
Programm on the PROFIBUS-DP board is executed
yes
LED 'CAN STATE ' (V3) illuminated or blinking?
no
internal communication faulty or incorrectly configured
internal communication correct
• Check connection of logic and PROFIBUS-DP board. If necessary, exchange board
• Check programming
1

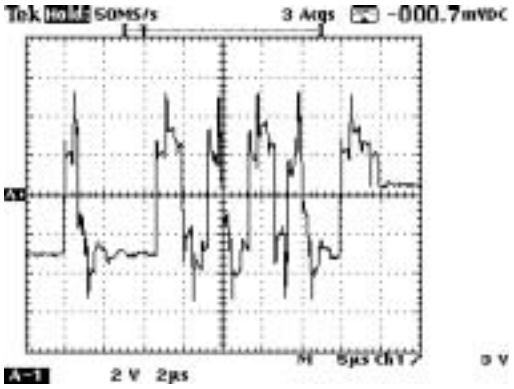
21.5 Measuring of the Profibus signals with an oscilloscope

On the connection board the signal from Profibus channel 1 on plug (X1 Profibus, see page 16) pin 2 (N/A) and pin 1 (P/B) can be checked with a digital oscilloscope.
The off-load voltage between pin 1 (+) and pin 2 (-) must be positive and in the range between 0.8 V and 1.4 V.

Example for a correct Profibus signal:



Example for an incorrect Profibus signal (bus only connected on one side):



22. Appendix A GSD file

The GSD file can be downloaded from the Internet:

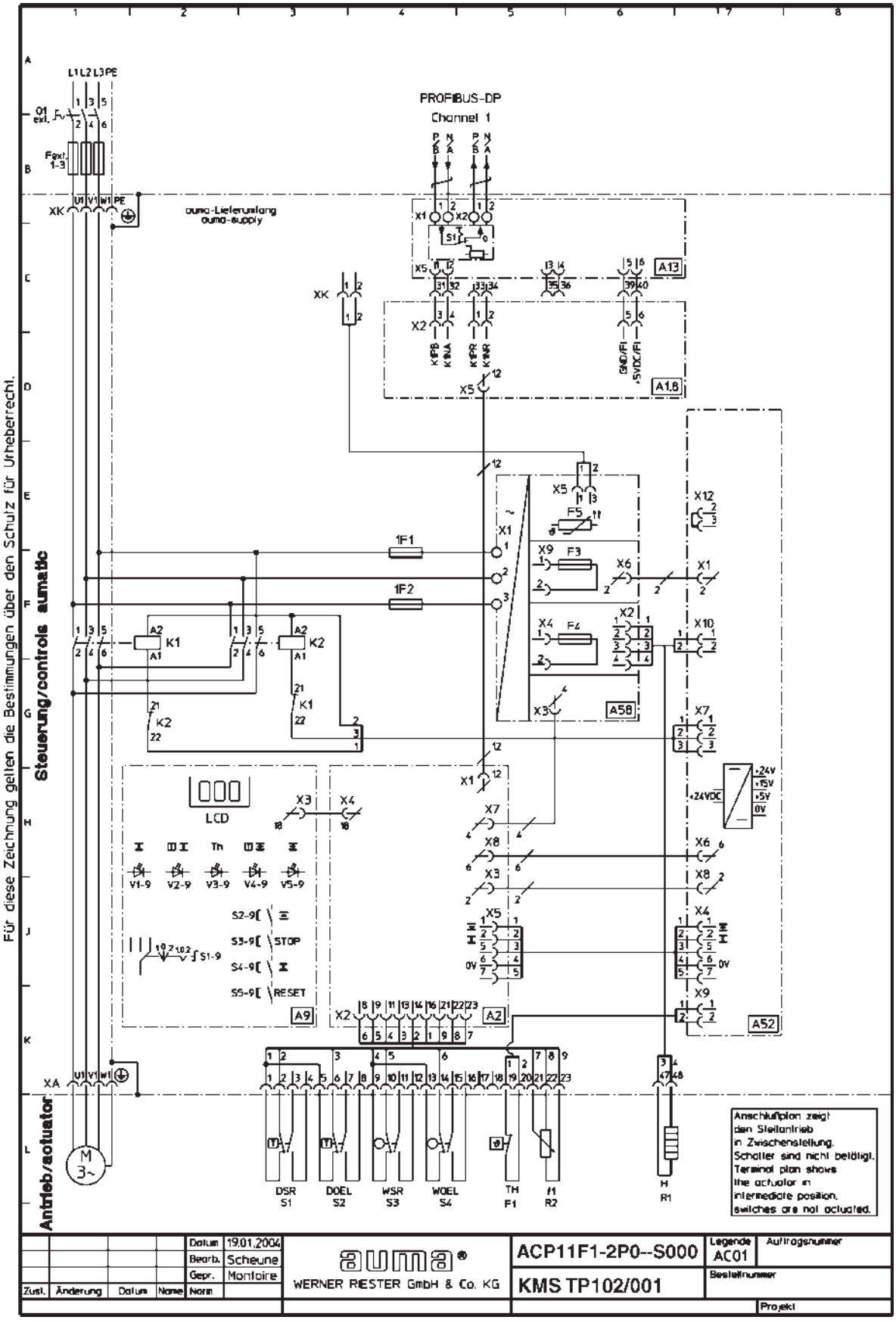
www.auma.com

AUMATIC actuator controls up to the logic software version Z031.922/04-00 have a reduced number of parameters. Therefore, a GSD file with reduced functions is available at www.auma.com (see Readme.txt in AUMATIC_GSD.zip).

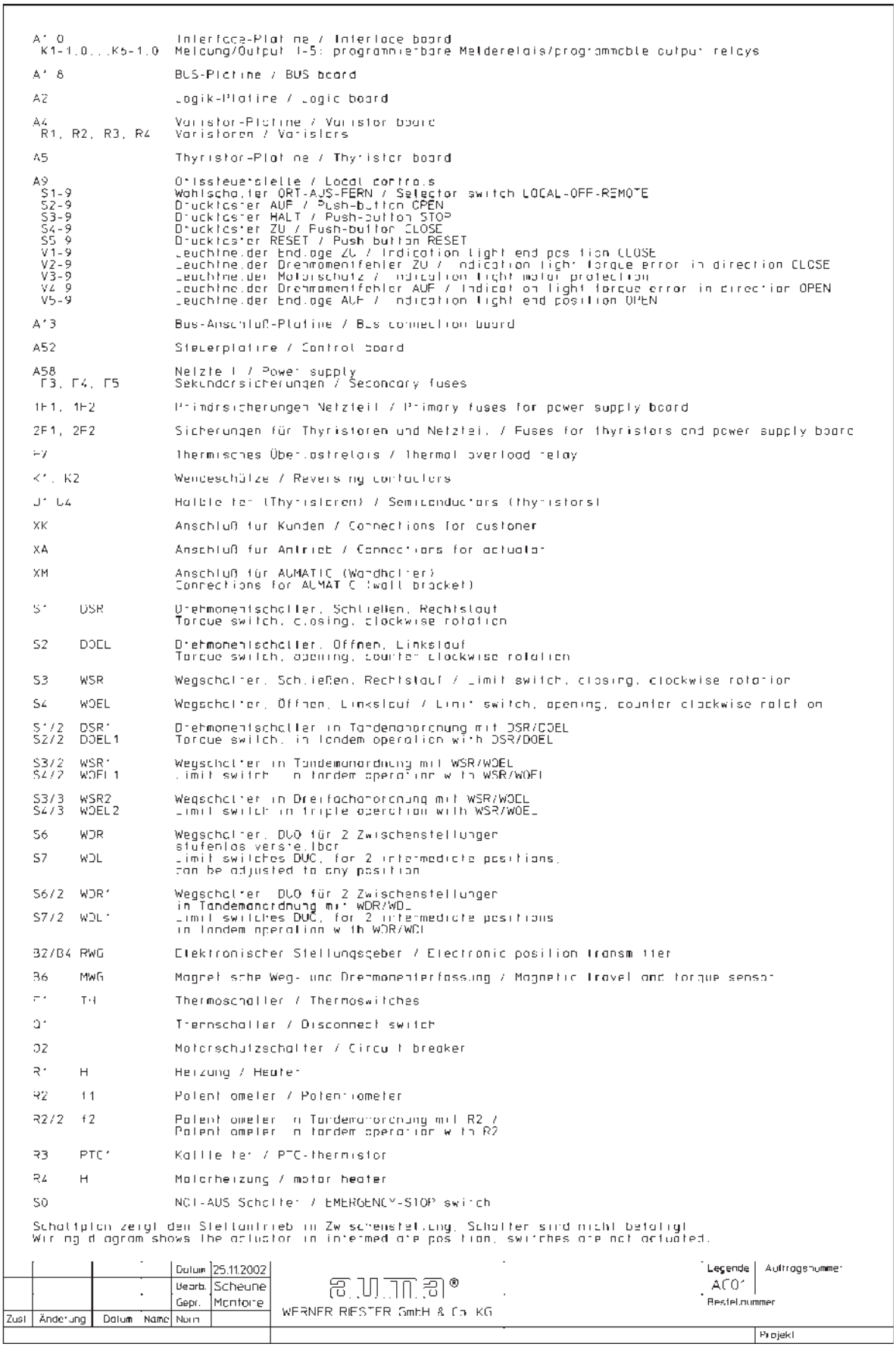
23. Appendix B standard wiring diagram

Legend page 65

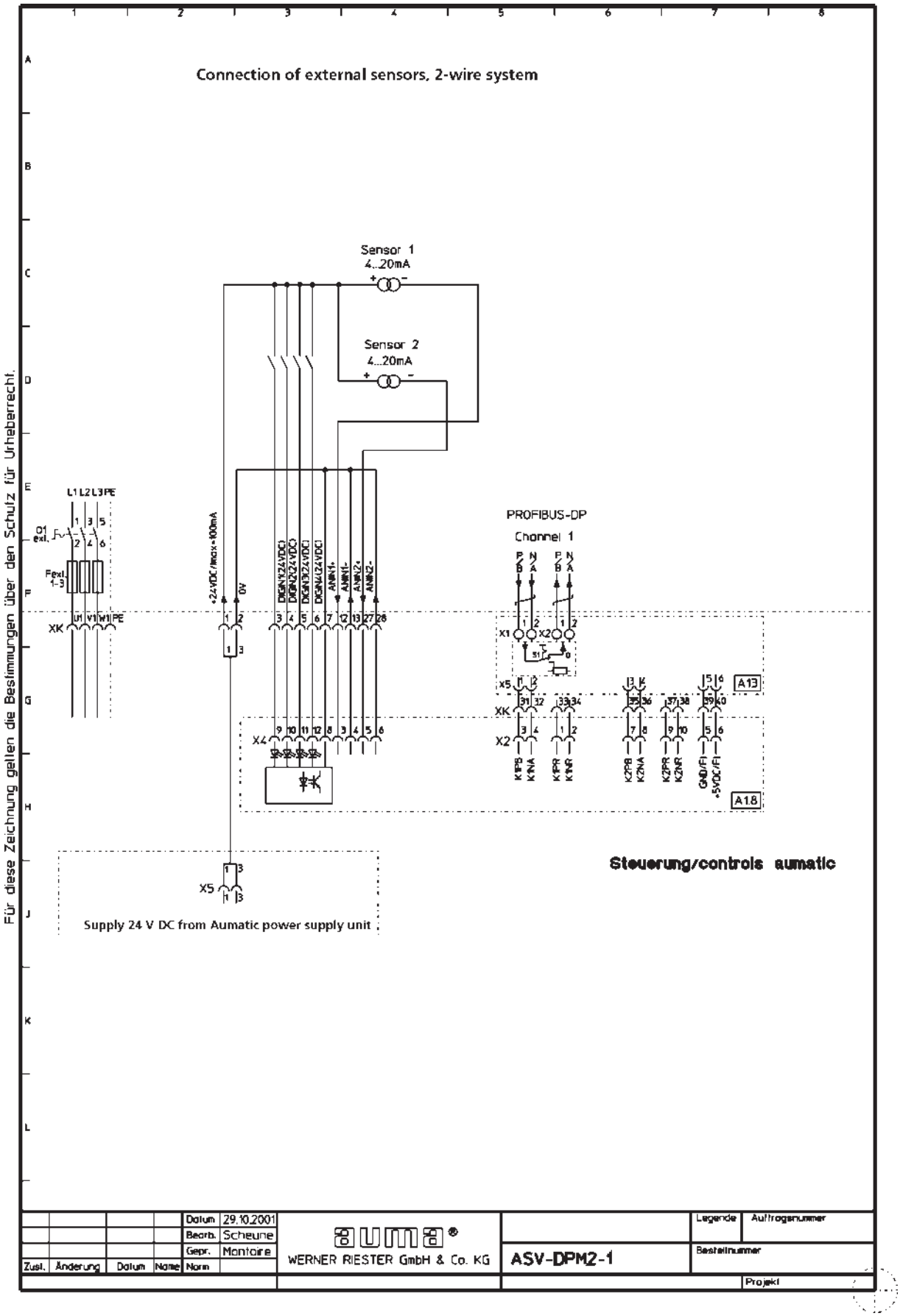
Original wiring diagram and legend are delivered together with the actuator.

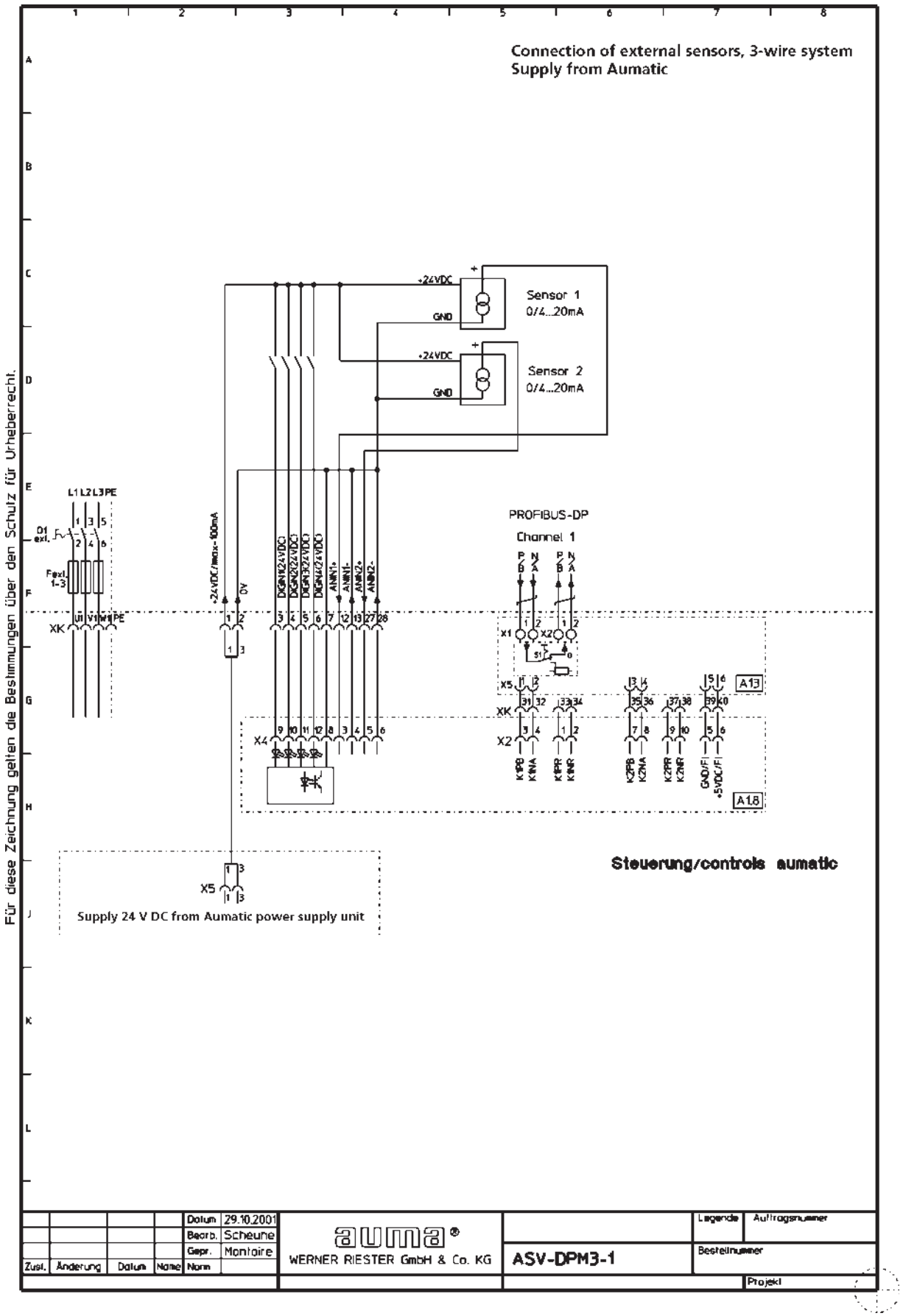


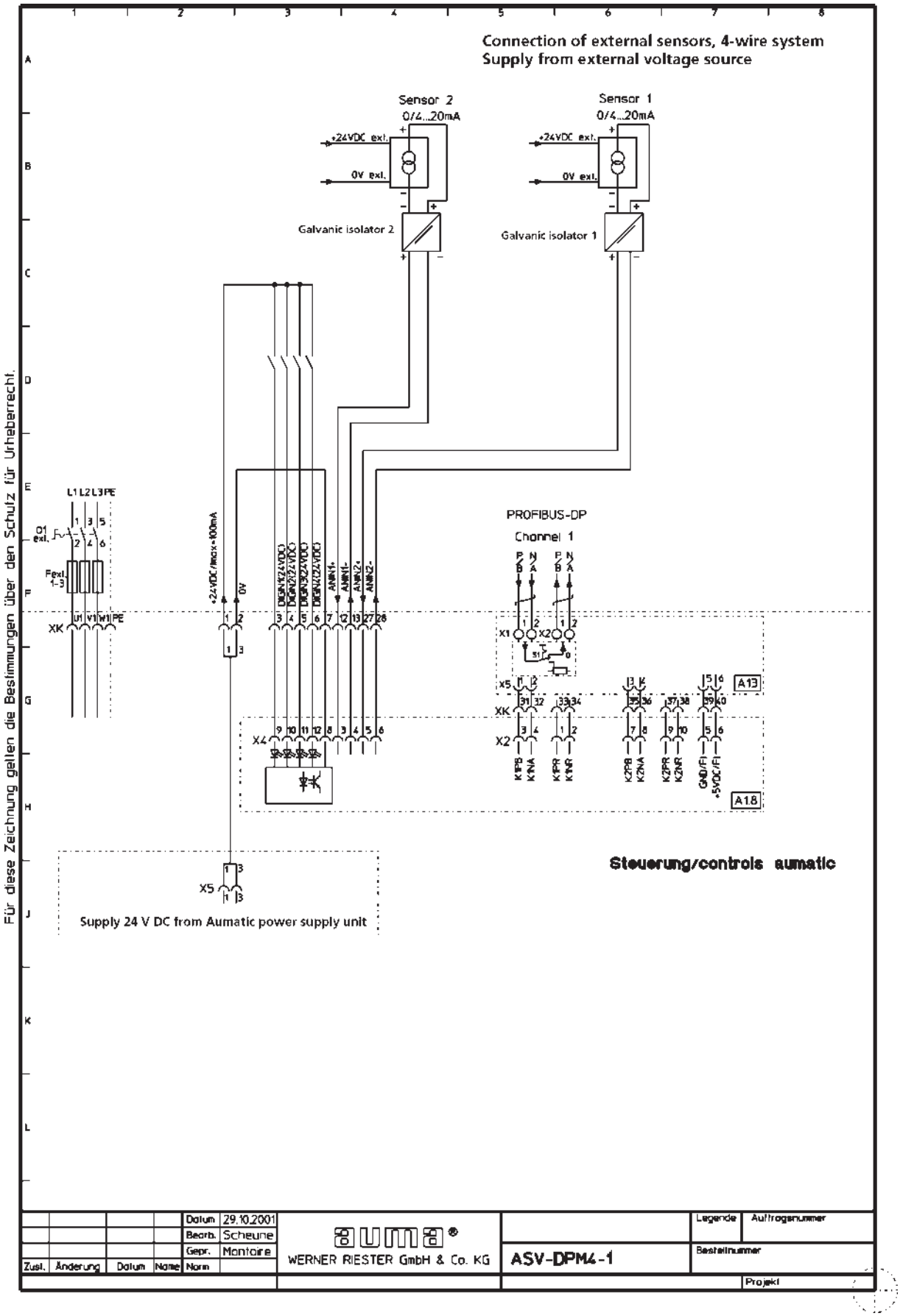
23.1 Legend for standard wiring diagram



24. Appendix C Proposed wiring diagrams




Connection of external sensors, 3-wire system
Supply from Aumatic
Sensor 1
0/4...20mA
Sensor 2
0/4...20mA
+24VDC
GND
PROFIBUS-DP
Channel 1
L1 L2 L3 PE
XK
X1
X2
X4
X5
A13
A18
Supply 24 V DC from Aumatic power supply unit
Steuerung/controls aumatic
Für diese Zeichnung gelten die Bestimmungen über den Schutz für Urheberrecht.
Datum 29.10.2001
Bearb. Scheune
Gepr. Montaire
Norm
Zust. Änderung Datum Name
auma®
WERNER RIESTER GmbH & Co. KG
ASV-DPM3-1
Legende
Auftragsnummer
Bestellnummer
Projekt


Connection of external sensors, 4-wire system
Supply from external voltage source
Sensor 2
0/4...20mA
+24VDC ext.
0V ext.
Galvanic isolator 2
Sensor 1
0/4...20mA
+24VDC ext.
0V ext.
Galvanic isolator 1
L1 L2 L3 PE
Q1 ext.
Fext. 1-3
XK
U1 V1 W1 PE
+24VDC/max.100mA
0V
DIGIN1(24VDC)
DIGIN2(24VDC)
DIGIN3(24VDC)
DIGIN4(24VDC)
ANIN1+
ANIN1-
ANIN2+
ANIN2-
PROFIBUS-DP
Channel 1
P N
B A
X1
X2
X5
XK
X2
A13
A18
X4
KPB KNA KPR KNR
KZPB KZNA KZPR KZNR
GND/FI +5VDC/FI
X5
Supply 24 V DC from Aumatic power supply unit
Steuerung/controls aumatic
Für diese Zeichnung gelten die Bestimmungen über den Schutz für Urheberrecht.
Datum 29.10.2001
Bearb. Scheune
Gepr. Montoire
Norm
Zust. Änderung Datum Name
WERNER RIESTER GmbH & Co. KG
ASV-DPM4-1
Legende
Auftragsnummer
Bestellnummer
Projekt

25. Appendix D Literature references

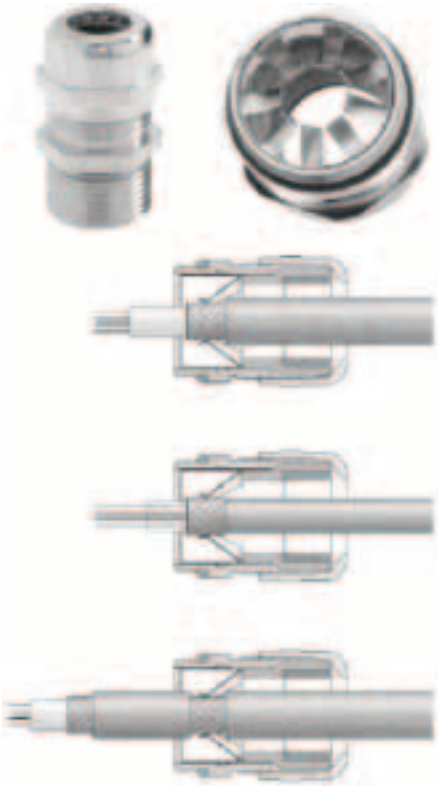
1. As an introduction to Profibus DP:
Manfred Popp: Profibus DP, Principles, Tips and Tricks for Users.
Hüthig Verlag, ISBN 3-7785-2676-6

2. Guidelines for the electrician
Installation guide Profibus DP/FMS order no. 2.111
Available from:
Profibus Nutzerorganisation Haid-und-Neu-Str.7
D - 76131 Karlsruhe
Tel 0721 / 96 58 590
Fax 0721 / 96 58 589
Http:/ www.profibus.com

26. Appendix E Connection of the screen for AUMATIC ACExC 01.1

The screen of the fieldbus cable should be extensively connected with the respective PG-threads.

Recommended threads, e.g. WAZU-EMV/EX by Hugro
(see www.hugro-gmbh.de).



27. PNO certificate

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

AUMA RIESTER GmbH & Co. KG
Renkenrunsstraße 20, D-79379 Müllheim
the Certificate No.: **Z01008** for the following product:

Name: **AUMATIC**
Model: **Stellantrieb**
Revision: **HW: Z031.231/0x; SW: Z031.320/04**
GSD: **AUMA05CD.gsd, Revision 2004-07-12**

This certificate confirms that the device has successfully passed the conformance tests for PROFIBUS DP Slave devices.

The tests were executed in accordance with "Test Specifications for PROFIBUS DP Slaves, Version 2.0, February 2000" based on EN 50170-2 at itm in München which is an authorized test laboratory of PROFIBUS Nutzerorganisation. The detailed test procedure and the test results are recorded in the inspection report itm 228 DP 01/01.

This certificate is granted according to the PNO guideline for testing and certification (PRZ) dated August 1, 1999 and is valid for 3 years, i.e. until August 12, 2007.

Karlsruhe, September 2, 2004

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(Klaus-Peter Lindner)

(Prof. K. Bender)

Index

Information also available on the Internet:

Wiring diagram, inspection records and further actuator information can be downloaded directly from the Internet by entering the order no. or COMM no. (refer to name plate) .
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