auma®

Actuator controls

AUMATIC
AC 01.1
ACExC 01.1
DeviceNet

ISO 14001
TÜV SÜD
ISO 9001
Zertifikat-Registrier-Nr.
12 100/104 4269

Manual

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

Table of contents

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 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 DeviceNet

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.
DeviceNet® was developed by Rockwell Automation as open fieldbus standard, based on the CAN protocol. The first DeviceNet products were introduced in 1995.
The ODVA (Open DeviceNet Vendors Association Inc., refer also to http//www.odva.org) was founded in 1995 as organisation of all DeviceNet users, all rights within the DeviceNet were transferred from Rockwell Automation to ODVA.
DeviceNet is part of the European standard EN 50325-2 and of IEC 62026-3 which is recognised worldwide.
DeviceNet is an open protocol. In this context, “open” means that the specification and the technology are not the property of Rockwell Automation but may be further developed by all members of the ODVA.

The DeviceNet protocol is designed as simple, cost-efficient by but powerful protocol on the lowest fieldbus level. Therefore, DeviceNet is also ideally suited for interconnecting sensors, actuators and the respective controls. The variety of devices that can be connected via DeviceNet ranges from the simple photoelectric barriers right through to complex vacuum pumps for semiconductor production.

4.1 DeviceNet cable

The DeviceNet cable provides both the CAN data signal and the power supply for network and devices. The different system and device requirements are cover by three cable types: Thick Cable, Thin Cable and Flat Cable. The AUMATIC with DeviceNet can both be connected with the Thick Cable and the Thin Cable. All cables consist of four wires for the CAN data signal and the power supply as well as a drain wire for the shield (except for the flat cable which is not shielded). The cables were designed for the use in industrial environments and are therefore very robust.

A DeviceNet cable consists of a total of 5 wires. The meaning and the colour coding of these wires are determined as follows.

Table 1

Colour	Function	Application
Red	V+ (24 V DC)	DeviceNet voltage supply
White	CAN_H	Data cable
Bare	Drain	Screened cable
Blue	CAN_L	Data cable
Black	V– (0 V DC)	DeviceNet voltage supply

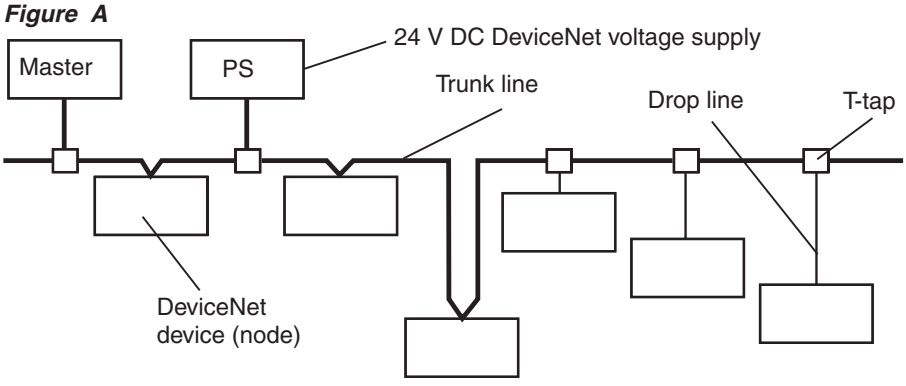
4.2 DeviceNet topology

A DeviceNet network may consist of a trunk line, which runs through the entire system like an aorta, and of drop lines, which connect the devices to the trunk line (figure A).

Table 2

Baud rate	Maximum trunk line length		Maximum accumulated drop line length	Maximum single drop line length
	Thick Cable	Thin Cable		
125 kbit/s	500 m	100 m	156 m	6 m
250 kbit/s	250 m	100 m	78 m	6 m
500 kbit/s	100 m	100 m	39 m	6 m

Figure A



Up to 64 DeviceNet devices (nodes) can be operated within a single DeviceNet network. The baud rates 125 kbit/s, 250 kbit/s and 500 kbit/s are available. The nodes can either be supplied via DeviceNet (max. of 8 A) or have their own powerful power supply.
The AUMATIC with DeviceNet has its own power supply. For the supply of the galvanically isolated network part of the AUMATIC DeviceNet interface, only a standard supply current of approx. 30 mA (for 24 V DC) per AUMATIC is required.
The distinct concept of galvanic separation is also important within this context. Only one earthing point is permitted within the system. Earth looping via non-galvanically isolated devices is not permitted, the user either has to isolate their device accordingly (device designation: non-isolated

node), or, if this is not possible, has to provide a suitable galvanic isolation within the device (device designation: isolated node). The AUMATIC with DeviceNet has a galvanic isolation within the device and can therefore also be called isolated node.
The physical DeviceNet interface of the devices is designed for exchange of the devices during active DeviceNet communication. A mechanism for detecting duplicated DeviceNet addresses as well as a reverse polarity protection for incorrectly connected cables is obligatory.
DeviceNet devices can be configured and programmed via the network which enables the exchange of process data. Commissioning and maintenance of complex systems will therefore by simplified. To this end the system integrator can choose between several powerful tools (e.g. RSNetWorx by Allen-Bradley)

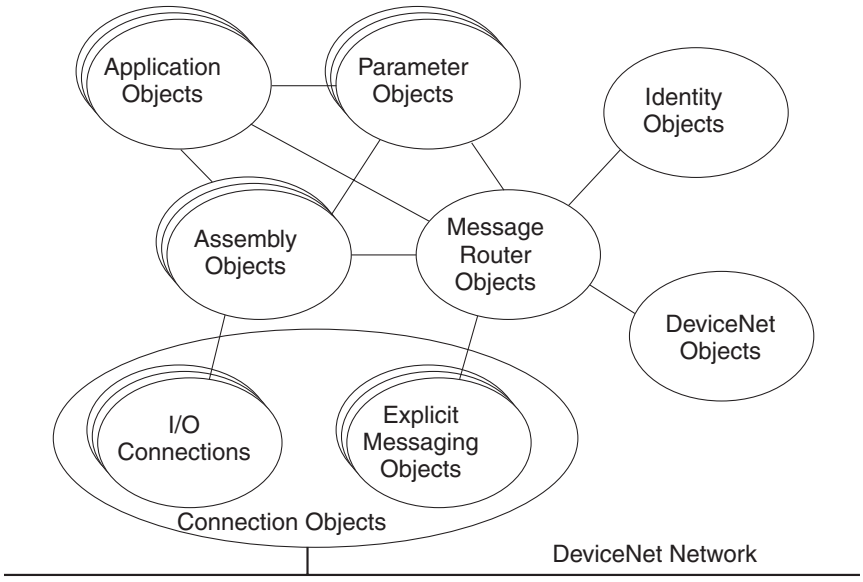
4.3 DeviceNet communication

Just like for other fieldbus protocols, the data exchange among devices or between devices and the respective controls is the major function of the DeviceNet protocol. DeviceNet distinguishes between high-priority I/O messages and low-priority management messages.
DeviceNet uses the data exchange between devices in accordance with the producer-consumer model. A sending DeviceNet device produces data within the network, a receiving DeviceNet device consumes data from the network.
The communication always takes place according to a connection-based communication model, either via a point-to-point or a multicast connection.

4.4 DeviceNet object model

DeviceNet describes all data and functions of the devices according to an object model. This object-based description results in a clear device model since a device can be fully defined by means of the individual objects. The access from the network to the individual objects is exclusively via connection objects. An object stands for the abstract representation of a component within a device. It is determined by its data or attributes, the functions or services it provides and by its defined behaviour.

Figure B: General DeviceNet object model



DeviceNet distinguishes between three types of objects: communication objects, system objects and application specific objects.

- Communication objects define the data exchanged via DeviceNet, they are also called connection objects.
- System objects define general DeviceNet specific data and function which are useful for most DeviceNet devices.
- Application specific objects define device-specific data and functions.

The data and the executed services of an object are addressed via a hierarchical address concept using the following identifiers:

- Device address (MAC ID)
- Class ID
- Instance ID
- Attribute ID
- Service Code

4.5 Protection functions

- All messages are transmitted with Hamming Distance HD = 6.
- Monitoring of the net data transmission at the master
- Programmable failure behaviour of the AUMATIC on loss of communication.

5. Technical data

Table 3: DeviceNet 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	Volt	208
Hz	50	50	50	50	Hz	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

Motor controls

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 DeviceNet interface

DeviceNet interface with additional inputs (options)

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

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

DeviceNet 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.

DeviceNet 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

Component redundancy (option)

AUMATIC is equipped with an additional redundant DeviceNet interface

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 DeviceNet.
- 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

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

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 DeviceNet 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 DeviceNet
	Options:	Process controller, PID[4]: Nominal process value via DeviceNet 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 DeviceNet
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
Electrical connections	Standard:	AUMA plug/socket connector with screw type connection Threads for cable glands: M-threads: 5 x M 25 x 1.5 Pg-threads: 5 x Pg 21 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—E000 KMS TP102/001	

4) Requires position transmitter in the actuator

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 DeviceNet interface	
Setting of the baud rate	Supported baud rates: 125 kbit / 250 kbit / 500 kbit Automatic baud rate recognition or setting of the baud rate via Explicit Messages or via the local controls of the AUMATIC as an alternative
Setting of the DeviceNet address (MAC ID)	Setting of the address via Explicit Messages or via the display of the AUMATIC
Programming via DeviceNet	via EDS file and DeviceNet configuration software (e.g. RSNetWorx)
Programmable process representation	The AUMATIC is capable of exchanging data with the process control system by using different assembly objects: Input data: (Produced Data) — Standard Input, Extended Input, Extended one analogue Input, Extended two analogue Input, Enhanced Input, Process Input Data 1, Process Input Data 2, Process Input Data 3 Output data: (Consumed Data) — Standard Output, Process Output Data 1 Depending on the configuration, the length and content of the data interface changes. The configuration is set in the factory and may be changed via the local controls of the AUMATIC or via Explicit Messages with the parameters Selected Produced Connection Path or Selected Consumed Connection Path respectively.
Commands and signals of the DeviceNet 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
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 DeviceNet	
Communication protocol	DeviceNet according to EN 50325-2 or IEC 62026-3
Network topology	Topology with one trunk line and optional drop lines. Coupling and uncoupling of devices during operation without affecting other devices is possible DeviceNet voltage supply and DeviceNet data signals in one cable.
Transmission medium	Twisted, screened copper cable with one wire pair for signal transmission and one wire pair for the DeviceNet voltage supply
DeviceNet current consumption	approx. 30 mA at + 24 V DC (approx. 50 mA at + 11 V DC)
DeviceNet interface	Based on data transmission via CAN telegrams

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

<table>
<tr><td>Transmission rate</td><td colspan="3">
<table>
<tr><th rowspan="2">Baud rate</th><th colspan="2">Maximum trunk line length</th><th rowspan="2">Minimum accumulated drop line length[6)]</th><th rowspan="2">Maximum single drop line length[6)]</th></tr>
<tr><th>Thick Cable</th><th>Thin Cable</th></tr>
<tr><td>125 kByte</td><td>500 m</td><td>100 m</td><td>156 m</td><td>6 m</td></tr>
<tr><td>250 kByte</td><td>250 m</td><td>100 m</td><td>78 m</td><td>6 m</td></tr>
<tr><td>500 kByte</td><td>100 m</td><td>100 m</td><td>39 m</td><td>6 m</td></tr>
</table>
</td></tr>
<tr><td>Number of devices</td><td colspan="3">Up to 64 DeviceNet devices can be connected</td></tr>
<tr><td>Bus access</td><td colspan="3">Data exchange by polling or via Explicit Messages.</td></tr>
<tr><td>Supported DeviceNet functions</td><td colspan="3">Group 2 only Server
Predefined Master/Slave Connection Set
- Explicit Connection
- I/O Poll Connection
- Fragmentation is supported
Device Heartbeat Message
Device Shutdown Message
Offline Connection Set</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[7)]
Terminal compartment additionally sealed against interior (double sealed)</td></tr>
<tr><td rowspan="2">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>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).
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 (including AUMA plug/ socket connector)</td></tr>
<tr><td colspan="4">Accessories</td></tr>
<tr><td>Wall bracket[8)]</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[9)]</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) The internal drop line length of an AUMATIC is 0.27 m

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

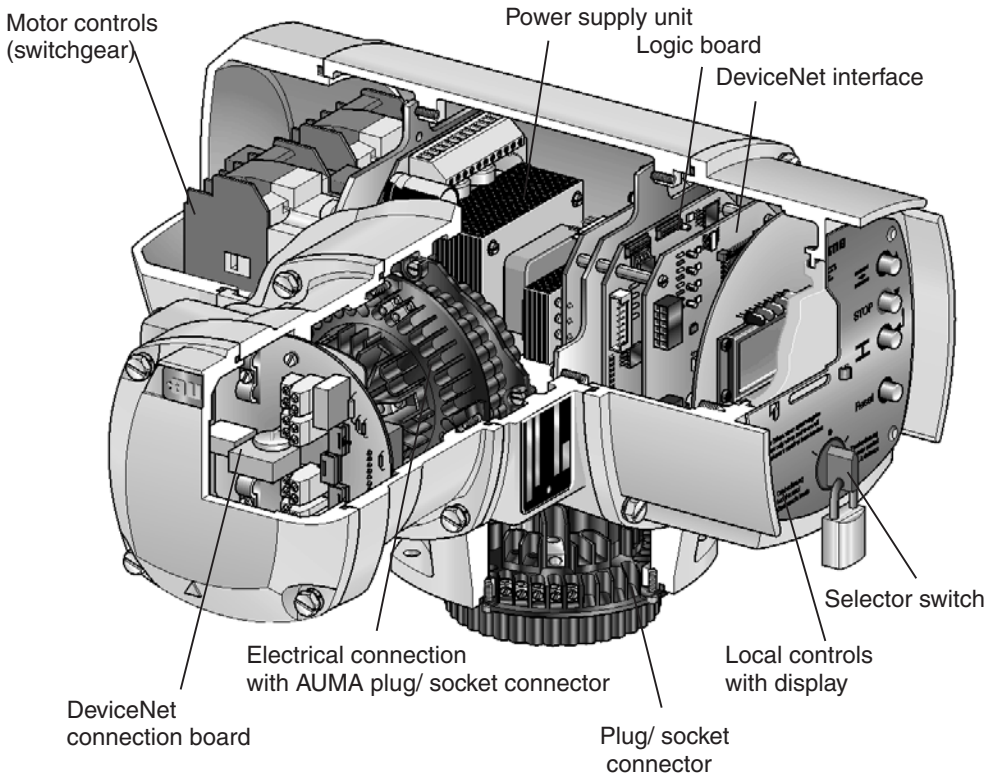
8) Distance between actuator and AUMATIC max. 100 m. Not suitable for version with potentiometer in the actuator. Instead of the potentiometer, a RWG has to be used. Cable length for Non-intrusive version with MWG in the actuator max. 100 m. Requires separate data cable for MWG. If actuator and AUMATIC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

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

6. AUMATIC DeviceNet design

With the AUMATIC DeviceNet, AUMA offers the ideal controls for the connection of multi-turn actuators SA and part-turn actuators SG to DeviceNet.

Figure C: AUMATIC DeviceNet



The integral controls AUMATIC DeviceNet consist of the following modules:

- DeviceNet interface. This links the DeviceNet data with the internal electronics.
- The logic board links the signals of the actuator with the local controls and the DeviceNet 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 DeviceNet on the actuators.
- Motor controls: Reversing contactors or thyristors for motor controls.
- DeviceNet connection board with terminals for the DeviceNet cable and the termination resistor for bus termination.

Actuators which have already been installed can be retrofitted for DeviceNet by exchanging the controls AUMATIC for controls AUMATIC DeviceNet.

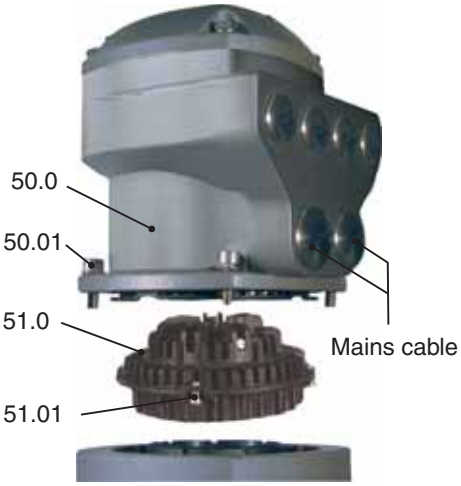
7. Electrical connection

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 DeviceNet 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 17.

Figure D-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 D-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 4: 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 it is necessary to 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)
- Permissible distance between actuator and AUMATIC amounts to a max. of 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 D-2: AUMATIC on wall bracket

Connection 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 crosswise.
- 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 to the actuator (multi-turn actuator SA(R) … / part-turn actuator SG . . . with AUMATIC AC . . .).

7.6 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 . . . with AUMATIC AC . . .).

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

Perform reference operation:

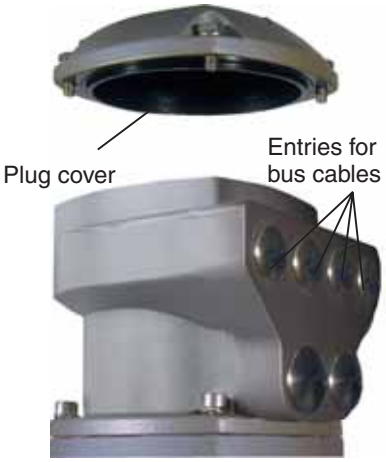
- Run actuator electrically (via the push-buttons OPEN and CLOSE) of the local controls once to the end position OPEN and once to the end position CLOSED.
- If no reference operation is performed after changing the limit switching, the feedback signal via the bus is not correct. The bus signals the missing reference operation as warning (see page 29).

7.7 Bus connection (standard)

For explosion-proof version (type designation: ACExC) see page 17.

Disconnect power before removing the plug cover.

Figure D-3: AUMATIC bus connection



- Loosen and remove plug cover (figure D-3). The connection board (figures D-4, D-5 and D-8) 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. See figures D-4 to D-9.

The termination resistor is switched on with the switch (S1/S2) (figures D-4, D-5 and D-8).
The switch is supplied in position ‘OFF’. The termination resistor may only be switched on if the actuator is the last bus station in the DeviceNet trunk line.

Table 5: Switch position S1/S2

ON	Bus termination switched on
OFF	Bus termination switched off

The max. current load of the pins for the DeviceNet cable in the electrical connection is 2.5 A. This has to be observed when planning the DeviceNet topology (location of the DeviceNet power supply, current consumption of the connected DeviceNet devices).

Figure D-4: Connection board (standard)

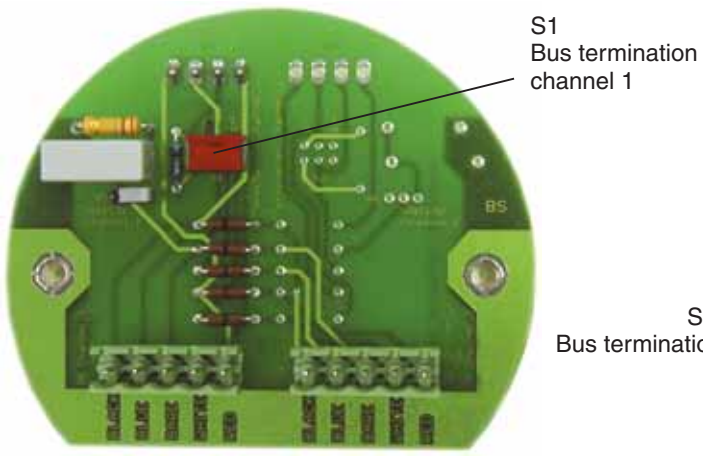


Figure D-5: Connection board (for overvoltage protection)

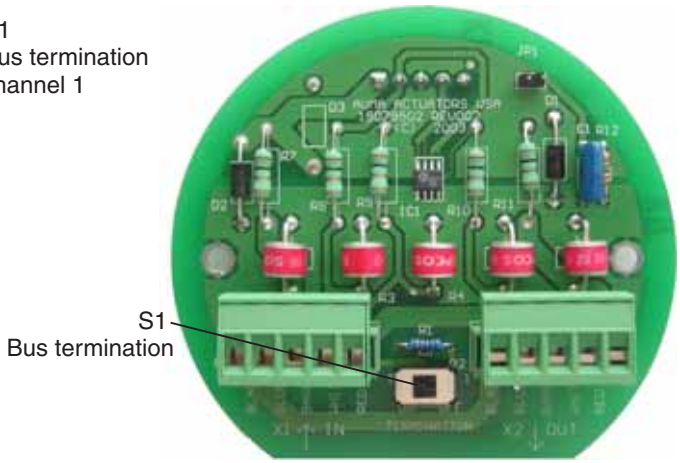


Figure D-6: Connection diagram (standard)

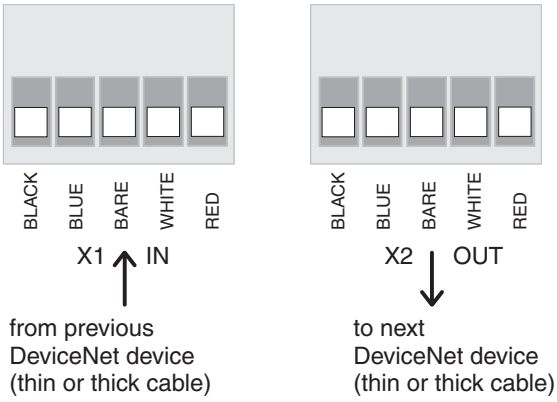


Figure D-7: Connection diagram (for overvoltage protection)

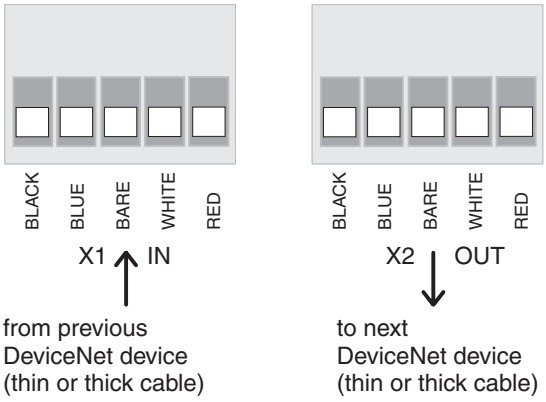


Figure D-8: Connection board (for component redundancy)

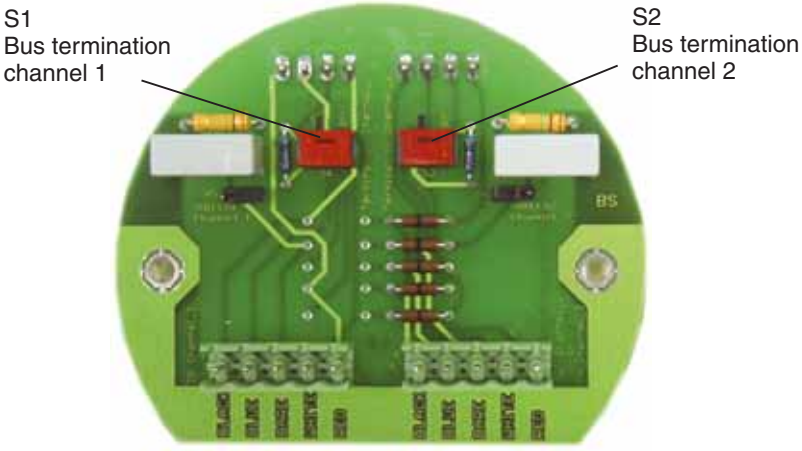
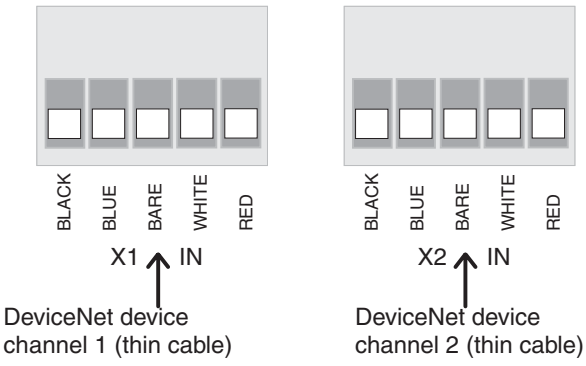


Figure D-9: Connection diagram (for component redundancy)



7.8 Mains and bus connection for explosion-proof version

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-10: Connection

For the Ex-plug/socket connector (figure D-10), 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-10) and remove plug cover.

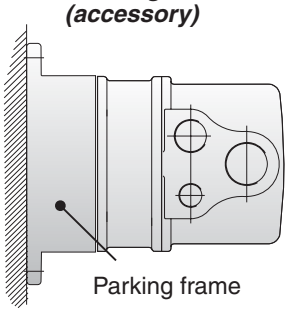
- **Insert cable glands with “EEx e” approval and of size suitable for connecting cables. For the recommended cable glands refer to appendix E, page 65.**
  (The enclosure protection stated on the name plate is only ensured if suitable cable glands are used).
- **Seal cable entries which are not used with suitable plugs.**
- **No more than max. 2 wires with the same cross section may be connected to one terminal.**

Figure D-11: Disconnection from the mains

- 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-13 or D-14).
  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 47 – 37 and 48 – 38 (component redundancy only).
- The termination resistor may only be switched on if the actuator is the last bus station in the DeviceNet trunk line.
- Connect screen largely to the threads. For the recommended cable glands refer to appendix E, page 65.

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-11). 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.

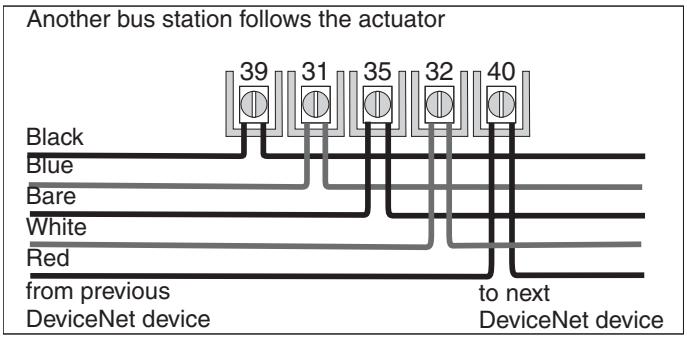
Figure D-12: Parking frame (accessory)



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

A special parking frame (figure D-12) for protection against touching the bare contacts and against environmental influences is available.

Figure D-13: Bus connection for channel 1 (standard)



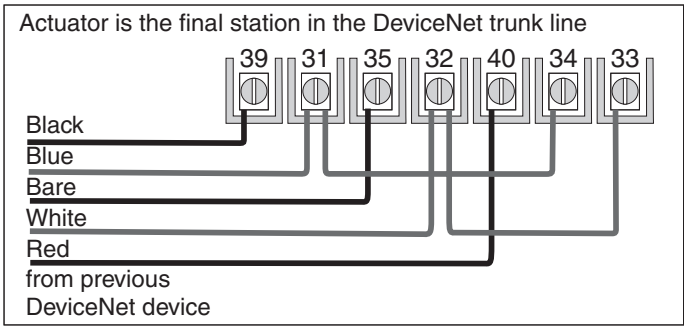
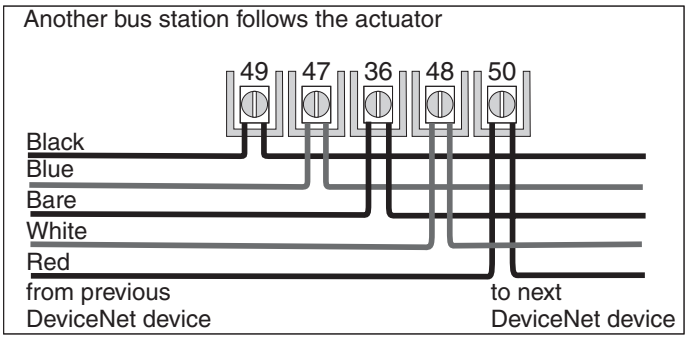


Figure D-14: Bus connection for channel 2 (component redundancy only)



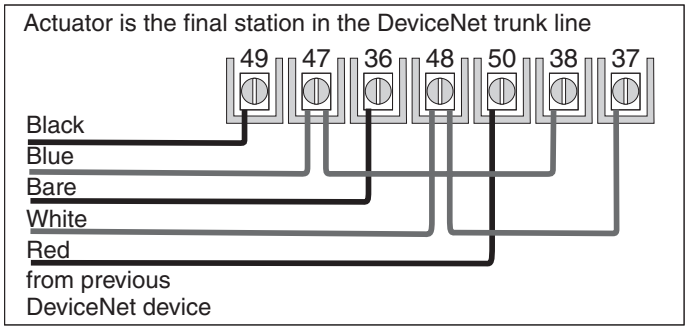


Table 6: Technical data Ex-plug/ socket connector with terminal board for explosion-proof actuators

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 it is necessary to contact AUMA.

7.9 Bus cables

Only cables conforming to the DeviceNet wire specification (www.odva.org) may be used for a DeviceNet network.
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 stations on the DeviceNet (Perform a potential compensation).

Table 7

Baud rate	Maximum trunk line length (thick cable)	Maximum accumulated drop line length	Maximum single drop line length
125 kbit/s	500 m	156 m	6 m
250 kbit/s	250 m	78 m	6 m
500 kbit/s	100 m	39 m	6 m

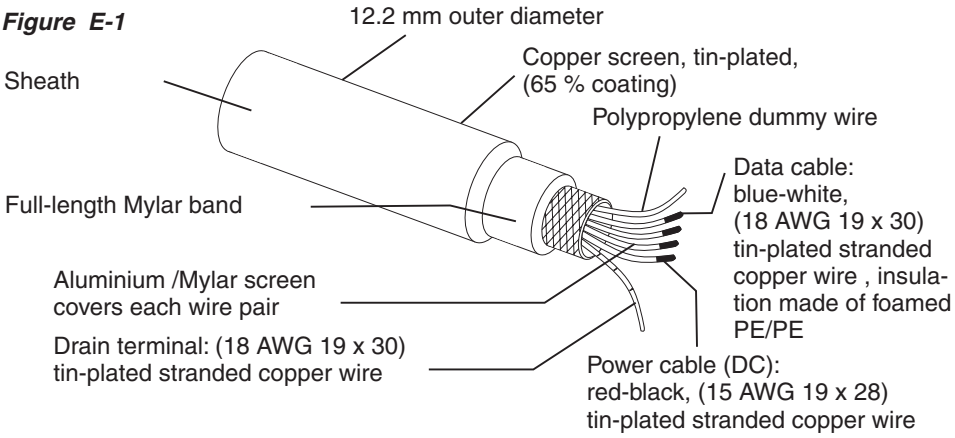
Table 8

Colour	Function	Application
Red	V+ (24 V DC)	DeviceNet voltage supply
White	CAN_H	Data cable
Bare	Drain	Screened cable
Blue	CAN_L	Data cable
Black	V– (0 V DC)	DeviceNet voltage supply

Thick Cable

As a standard, the thick cable is used for the trunk line.

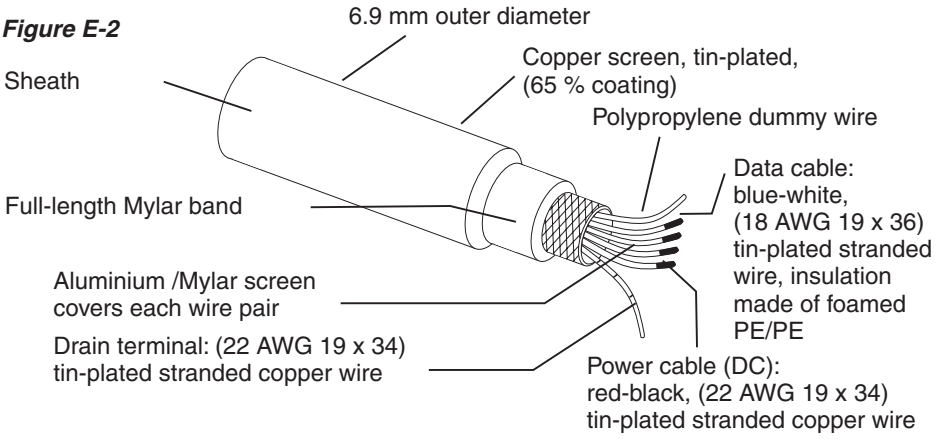
Figure E-1



Thin Cable

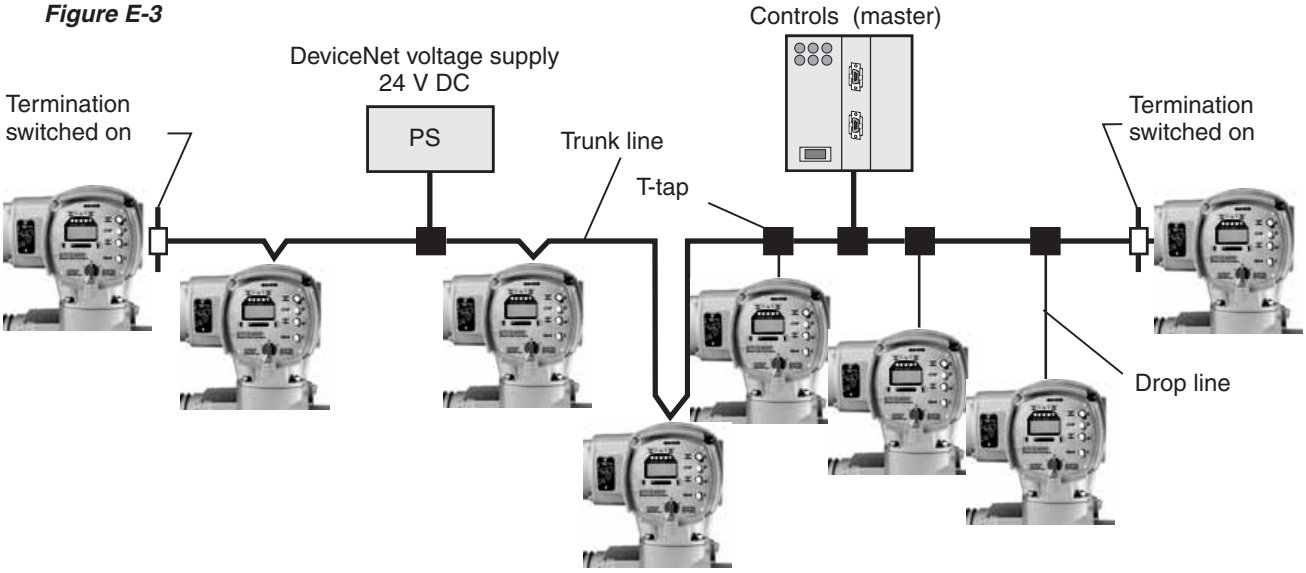
The thin cable is used for the drop lines

Figure E-2



Typical DeviceNet topology

Figure E-3



Features:

- Trunk line with optional drop lines
- AUMA DeviceNet controls can be removed without interrupting the trunk line (the trunk line will remain connected in the bus connection)
- Up to 64 DeviceNet devices can be connected
- DeviceNet data signal and 24 V DC DeviceNet voltage supply in a single cable
- Adjustable transmission rates (125 kbit/s, 250 kbit/s, 500 kbit/s)
- 121 Ω bus termination on both ends of the trunk line

7.10 Setting the DeviceNet address and the baud rate via the local controls

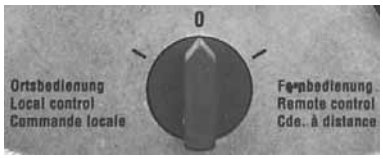
This subclause only describes the setting of the DeviceNet address and the baud rate. For further detailed instructions on the indication, operation and setting of the AUMATIC refer to the operation instructions of the actuator (multi-turn actuator SA(R) … / part-turn actuator SG … with AUMATIC AC ...).
After the address or baud rate setting has been changed, the AUMATIC must be switched off for a short time to activate the settings. As an alternative, you may also disconnect the DeviceNet voltage supply for a short time.

Default setting:

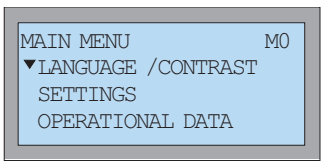
DeviceNet address: 64 (Parameter `MAC ID SW.VALUE` = `64`)
Baud rate: PGM Mode (Parameter `BAUDRATE SW.VALUE` = `PGM MODE`)

- 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

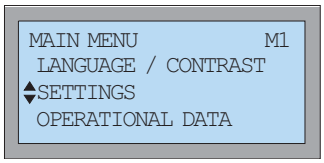


> 2 Sec.



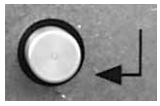
- Select SETTINGS with push-button ▼:

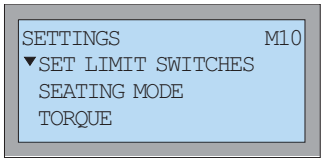
Figure F-2



- Confirm the selection SETTINGS with ↵:

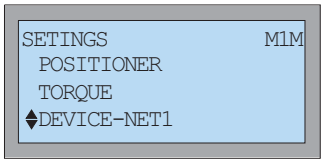
Figure F-3





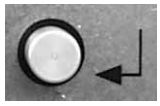
- Select DEVICE-NET1 by pushing ▼ several times:

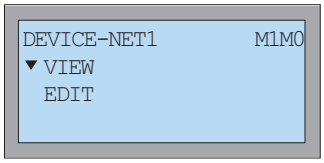
Figure F-4



- Confirm the selection DEVICE-NET1 with ↵:

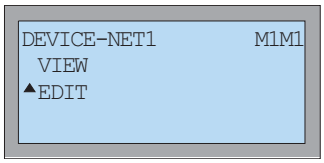
Figure F-5





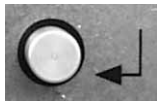
- Select EDIT with push-button ▼:

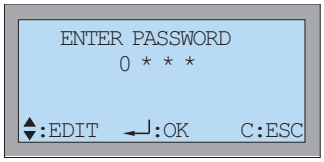
Figure F-6



Confirm the selection EDIT with ↵ :

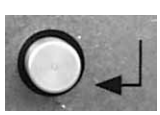
Figure F-7

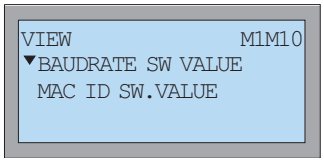




- With the push-buttons ▲ and ▼ the value of the selected position can be changed.
- To accept the input and move to the next digit, press push-button ↵, proceed until all password digits are entered. When accepting the last digit, the entered password is checked (default password: 0000), if it is valid,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

Figure F-8

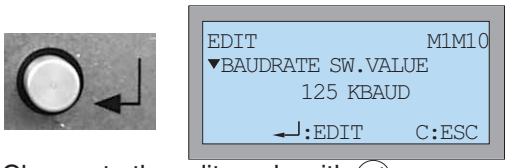




Setting the baud rate:

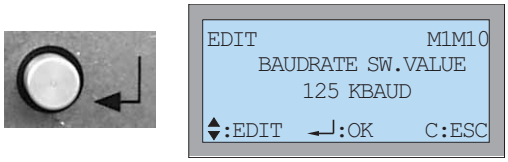
- Confirm BAUDRATE SW.VALUE with push-button ↵:

Figure F-9



- Change to the edit mode with ↵ :

Figure F-10



Now the baud rate settings can be made.
The following settings are possible:

125 KBAUD
The baud rate is set to 125 kbit/s (default setting)

250 KBAUD
The baud rate is set to 250 kbit/s

500 KBAUD
The baud rate is set to 500 kbit/s

PGM MODE
Use PGM MODE to activate the baud rate setting via DeviceNet (in this case the DeviceNet baud rate can be defined via Explicit Messages of the process control system), e.g. with RSNetWorx by Allen-Bradley).

AUTO
AUTO activates the automatic baud rate detection.

- With the push-buttons ▲ and ▼ the value can be changed.
- Pressing the push-button ↵ accepts the input.

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

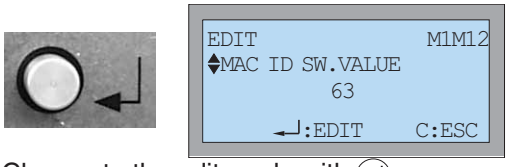
In the AUTO setting the AUMATIC must be switched off for a short time in order to recognize a changed baud rate. As an alternative, you may also disconnect the 24 V DC DeviceNet voltage supply for a short time.

After having changed the baud rate, the AUMATIC must be switched off for a short time. As an alternative, you may also disconnect the 24 V DC DeviceNet voltage supply for a short time.

Setting the actuator address:

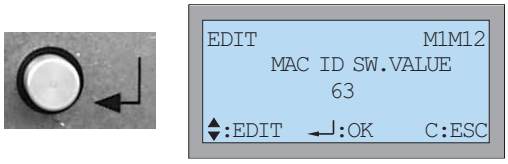
- Press ▼ to select MAC ID SW.VALUE .
- Confirm MAC ID SW.VALUE with push-button ↵.

Figure F-11



- Change to the edit mode with ↵ :

Figure F-12



Now you can use the push-buttons ▲ and ▼ to set the slave address from 0 to 63.

Address 63 (default setting) should not be used since this is the default address for all DeviceNet devices. Use address 64 to activate the MAC ID setting via DeviceNet (in this case the DeviceNet address can be defined via Explicit Messages of the process control system, e.g. with RSNetWorx by Allen-Bradley). Furthermore, the OFFLINE CONNECTION SET is activated (see page 56).

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

After having changed the actuator address, the AUMATIC must be switched off for a short time. As an alternative, you may also disconnect the 24 V DC DeviceNet voltage supply for a short time.

7.11 Further parameters of the DeviceNet interface

The DeviceNet interface of the AUMATIC has further parameters which can be set in the same way:

Configuration of the Poll I/O connections

You can use these parameters to configure the DeviceNet data interface (see also page 49 ff).

Menu structure:

```
MAIN MENU (M)
    SETTINGS (M1)
        DEVICENET 1 (M1M)
            SELECTED CONS.PATH (M1MX5)
            SELECTED PROD.PATH (M1MX6)
```

Standard value:
SELECTED CONS.PATH: PROCESS OUTPUT
SELECTED PROD.PATH: PROCESS INPUT

Behaviour on loss of communication:

The parameter BUS-OFF INTERRUPT determines the reaction of the AUMATIC DeviceNet interface in case of major communication faults. With the setting HOLD IN BUS-OFF, the DeviceNet interface is set to the status UNRECOVERABLE FAULT (see diagnosis indications in the display). The setting FULLY RESET CAN causes an automatic restart of the AUMATIC DeviceNet interface for most of the communication faults.

Menu structure:

```
MAIN MENU (M)
    SETTINGS (M1)
        DEVICENET 1 (M1M)
            BUS-OFF INTERRUPT (M1MX7)
```

Standard value:
BUS-OFF INTERRUPT: HOLD IN BUS-OFF

Setting the DeviceNet Heartbeat Message

The HEARTBEAT INTERVAL parameter determines the interval for sending the Device Heartbeat Message. This message contains the current status of the AUMATIC DeviceNet interface.

Standard value:
HEARTBEAT INTERVAL: 0S
(Device Heartbeat Message deactivated)

8. Commissioning with controls

8.1 Introduction

The DeviceNet specification stipulates a configuration via the network used to exchange net data. A configuration via the network is much more convenient than an individual configuration of each individual device since a configuration tool (e.g. RSNetWorx by Allen-Bradley) can be used for all devices. The parameters of the individual devices can be displayed and controlledly changed.
The configuration is made using an electronic data sheet (EDS file = Electronic Data Sheet, available at www.auma.com).

8.2 Functions of the AUMATIC with DeviceNet

The DeviceNet interface of the AUMATIC supports the following DeviceNet functions:

- Group 2 only Server
- Predefined Master/Slave Connection Set
  - Explicit Connection
  - I/O Poll Connection
  - Fragmentation is supported
- Device Heartbeat Messages
- Device Shutdown Messages
- Offline Connection Set

8.3 Setting of the DeviceNet interface of the AUMATIC

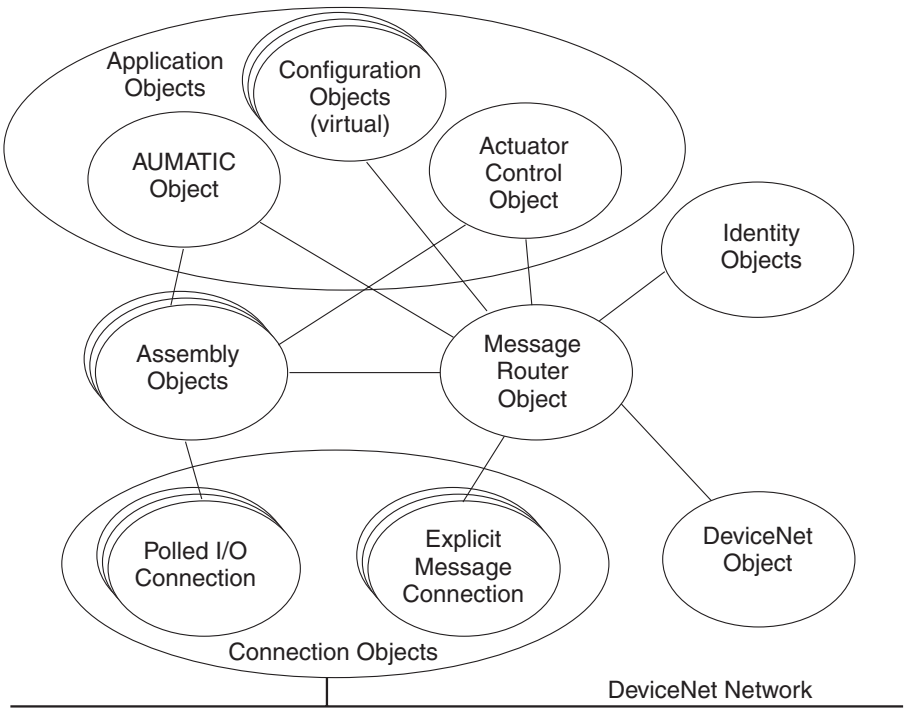
The DeviceNet interface must be set in accordance with the desired bus parameters (baud rate and actuator address). For further instructions please refer to subclause 7.10, page 20.
After the setting was changed, the AUMATIC has to be switched off for a short time. As an alternative, you may also disconnect the 24 V DC DeviceNet voltage supply for a short time.

8.4 Communication model

DeviceNet is based on a connection based communication model. For this, the respective instances of the connection object in the DeviceNet device have to be installed and configured in the same way as in the AUMATIC.

8.5 Object model of the AUMATIC

Figure G: Object model of the AUMATIC



8.5.1 List of objects available in the AUMATIC

Table 9

Object Class	Class ID	Instance IDs	Messages
Identity Object	1	1	Explicit
Message Router Object	2	1	Explicit
DeviceNet Object	3	1	Explicit
Assembly Object	4	100 – 107, 116 – 118	Explicit & I/O
Connection Object	5	1. 2	Explicit
AUMATIC Object	100	1	Explicit
Actuator Control Object	101	1	Explicit
Configuration Object	102 – 199	1	Explicit

8.6 Bus access

8.6.1 Explicit Messages

Explicit Messages are used for general data exchange of two devices via the DeviceNet network. They can be used for the transmission of low priority configuration data, management or diagnosis data. This type of communication always is a point-to-point connection in a client/server system while a request by a client always has to be confirmed by a server (request/response).

8.6.2 Poll I/O connection

The Poll I/O connection implements the classic master-slave communication between controls and a device. The master can use the Poll Command Message to transmit data to a slave and accept data from the slave via the Poll Response Message. In general, a master will cyclically poll the slave within a larger system.
The AUMATIC has been preconfigured in the factory with one of the instances described in chapter 9. (according to the order data).
If required the data interface for the Poll I/O connection can be configured via the local controls of the AUMATIC or with a commercial configuration tool (e.g. RSNetWorx by Allen-Bradley) while using the EDS file of the AUMATIC.

8.6.3 Configuration of the Poll I/O connection via the local controls

The configuration of the local controls is made in the same way as the setting of the baud rate (see page 20 ff) and via the following menus:

Menu structure:

```
MAIN MENU (M)
   SETTINGS (M1)
        DEVICENET 1 (M1M)
             SELECTED CONS.PATH (M1MX5)
             SELECTED PROD.PATH (M1MX6)
```

The setting options are listed in table 10.

8.6.4 Configuration of the Poll I/O connection via the DeviceNet configuration tool

For the configuration of the data interface, a commercial configuration tool (e.g. RSNetWorx by Allen-Bradley) can be used.
During the configuration phase, no Poll I/O connection must be established; a possibly available DeviceNet Master must be deactivated.
The setting options are listed in the following table:

Table 10: Addressing the parameters via configuration tool

Parameters	AUMATIC Display indications		Setting via configuration tool	
	Parameter designation	Parameter value	Value	Address
SELECTED CONSUMED PATH	SELECTED CONS. PATH	STANDARD OUT	1	Class ID 101 (65 hex)
		STANDARD 1 AN. OUT	2	Instance ID 1 (1hex)
		PROCESS OUTPUT	3	Attribute ID 1 (1hex)
SELECTED PRODUCED PATH	SELECTED PROD. PATH	STANDARD INPUT	1	Class ID 101 (65 hex)
		EXTENDED INPUT	2	Instance ID 1 (1hex)
		EXTENDED 1 AN.INPUT	3	Attribute ID 17 (11hex)
		EXTENDED 2 AN.INPUT	4	
		ENHANCED INPUT	5	
		PROCESS INPUT 1	6	
		PROCESS INPUT 2	7	
		PROCESS INPUT 3	8	

9. Poll I/O data interface of the AUMATIC

9.1 Description of the input data

Standard Input

SELECTED PRODUCED PATH = 1
Data length = 4 byte

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 1 (actuator signals)	No external controls	–	–	–	–	–	Anlog In1 DN1 loss	Feedback E2 loss	Local sw. position	Remote sw. position	No thermal fault	No loss of phase	LSO (WOEL)	LSC (WSR)	TSO (DOEL)	TSC (DSR)
Word 2 (E2 Feedback)	E2 Feedback (0 – 1 000 per mil)															

Extended Input

SELECTED PRODUCED PATH = 2
Data length = 6 byte

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 1 (actuator signals)	No external controls	–	–	–	–	–	DN1 Anlog In1 loss	Feedback E2 loss	Local sw. position	Remote sw. position	No thermal fault	No loss of phase	LSO (WOEL)	LSC (WSR)	TSO (DOEL)	TSC (DSR)
Word 2 (E2 Feedback)	E2 Feedback (0 – 1 000 per mil)															
Word 3 (extended)	Running with handwhl	Thermal fault	TSC (DSR)	TSO (DOEL)	–	No reaction	Running CLOSE	Running OPEN	Command o.k.	EMERGENCY MODE	Running CLOSE	Running OPEN	Local sw. position	Remote sw. position	LSC (WSR)	LSO (WOEL)

Extended One Analog Input

SELECTED PRODUCED PATH = 3
Data length = 8 byte

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 1 (actuator signals)	No external controls	—	—	—	—	—	DN1 Anlog In1 loss	Feedback E2 loss	Local sw. position	Remote sw. position	No thermal fault	No loss of phase	LSO (WOEL)	LSC (WSR)	TSO (DOEL)	TSC (DSR)
Word 2 (E2 Feedback)	E2 Feedback (0 – 1 000 per mil)															
Word 3 (extended)	Running with handwhl	Thermal fault	TSC (DSR)	TSO (DOEL)	—	No reaction	Running CLOSE	Running OPEN	Command o.k.	EMERGENCY MODE	Running CLOSE	Running OPEN	Local sw. position	Remote sw. position	LSC (WSR)	LSO (WOEL)
Word 4 (analogue input 1)	Analogue input 1 (0 – 1 000 per mil)[1)]															

1) In word 4 the value of the first additional free analogue current input of the DeviceNet interface is transmitted. The start and end values can be set at the AUMATIC via the push-buttons and the display. 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 ...).
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)

Extended Two Analog Input

SELECTED PRODUCED PATH = 4
Data length = 10 byte

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 1 (actuator signals)	No external controls	—	—	—	—	—	DN1 Anlog In1 loss	Feedback E2 loss	Local sw. position	Remote sw. position	No thermal fault	No loss of phase	LSO (WOEL)	LSC (WSR)	TSO (DOEL)	TSC (DSR)
Word 2 (E2 Feedback)	E2 Feedback (0 – 1 000 per mil)															
Word 3 (extended)	Running with handwhl	Thermal fault	TSC (DSR)	TSO (DOEL)	- -	No reaction	Running CLOSE	Running OPEN	Command o.k.	EMERGENCY MODE	Running CLOSE	Running OPEN	Local sw. position	Remote sw. position	LSC (WSR)	LSO (WOEL)
Word 4 (analogue input 1)	Analogue input 1 (0 – 1 000 per mil)[1)]															
Word 5 (analogue input 2)	Analogue input 2 (0 – 1 000 per mil)[1)]															

1) In word 4 and 5, the values of the analogue current inputs of the DeviceNet interface were transmitted. The start and end values can be set at the AUMATIC via the push-buttons and the display. 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 ...).
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)

Enhanced Input

SELECTED PRODUCED PATH = 5
Data length = 14 byte

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 1 (actuator signals)	No external controls	—	—	—	—	—	DN1 Anlog In1 loss	Feedback E2 loss	Local sw. position	Remote sw. position	No thermal fault	No loss of phase	LSO (WOEL)	LSC (WSR)	TSO (DOEL)	TSC (DSR)
Word 2 (E2 Feedback)	E2 Feedback (0 – 1 000 per mil)															
Word 3 (extended)	Running with handwheel	Thermal fault	TSC (DSR)	TSO (DOEL)	- -	No reaction	Running CLOSE	Running OPEN	Command o.k.	EMERGENCY MODE	Running CLOSE	Running OPEN	Local sw. position	Selector switch in REMOTE	LSC (WSR)	LSO (WOEL)
Wort 4 (analogue input 1)	Analogue input 1 (0 – 1 000 per mil)[1]															
Wort 5 (analogue input 2)	Analogue input 2 (0 – 1 000 per mil)[1]															
Word 6	Reserved															
Word 7	Reserved															

1) In word 4 and 5, the values of the analogue current inputs of the DeviceNet interface were transmitted. The start and end values can be set at the AUMATIC via the push-buttons and the display. 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 ...).
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)

Process Input Data 1

SELECTED PRODUCED PATH = 6
Data length = 8 byte

Bit	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0
Byte 1 (Logical signals)	Fault ind.[1]	Warning ind.[1]	Running CLOSE	Running OPEN	Not ready ind.[1]	Setpoint position	Closed position	Open position	**Byte 2 (Actuator signals)**	TSC (DSR)	TSO (DOEL)	LSC (WSR)	LSO (WOEL)	Local sw. position	Remote sw. position	Loss of phase	Thermal fault
Byte 3 E2 (Feedback)	E2 Feedback 1 (0 – 1 000 per mil) high byte								**Byte 4 E2 (Feedback)**	E2 Feedback 1 (0 – 1 000 per mil) low byte							
Byte 5 (Physical operation)	Running LOCAL	Running REMOTE	Running with handwheel	Actuator moving[1]	—	Stepping mode	—	Phys.drive break	**Byte 6 (Options part 1)**	DN1 dig.in 4	DN1 dig.in 3	DN1 dig.in 2	DN1 dig.in 1	Intermed. pos. 4	Intermed. pos. 3	Intermed. pos. 2	Intermed. pos. 1
Byte 7 (Analogue input 1)	Analogue input 1 (0 – 1 000 per mil) high byte[2]								**Byte 8 (Analogue input 1)**	Analogue input 1 (0 – 1 000 per mil) low byte[2]							

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

2) Byte 7 and byte 8 transmit the value of the first additional free analogue current input of the DeviceNet interface. The start and end values can be set at the AUMATIC via the push-buttons and the display. 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 ...).
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)

Process Input Data 2

SELECTED PRODUCED PATH = 7
Data length = 14 byte

Bit	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0
Byte 1 (Logical signals)	Fault ind.[1]	Warning ind.[1]	Running CLOSE	Running OPEN	Not ready ind.[1]	Setpoint position	Closed position	Open position	**Byte 2 (Actuator signals)**	TSC (DSR)	TSO (DOEL)	LSC (WSR)	LSO (WOEL)	Local sw. position	Remote sw. position	Loss of phase	Thermal fault
Byte 3 E2 (Feedback)	E2 Feedback 1 (0 – 1 000 per mil) high byte								**Byte 4 (E2 Feedback)**	E2 Feedback 1 (0 – 1 000 per mil) low byte							
Byte 5 (Physical operation)	Running LOCAL	Running REMOTE	Running with handwheel	Actuator moving[1]	—	Stepping mode	—	Phys.drive break	**Byte 6 (Options part 1)**	DN1 dig.in 4	DN1 dig.in 3	DN1 dig.in 2	DN1 dig.in 1	Intermed. pos. 4	Intermed. pos. 3	Intermed. pos. 2	Intermed. pos. 1
Byte 7 (Analogue input 1)	Analogue input 1 (0 – 1 000 per mil) high byte[2]								**Byte 8 (Analogue input 1)**	Analogue input 1 (0 – 1 000 per mil) low byte[2]							
Byte 9 (Not ready ind.)	External control	(reserved)	EMERGENCY MODE	EMCY STOP active	—	(reserved)	Selector not REMOTE	Wrong command	**Byte 10 (Fault signals)**	—	Internal fault	Torque fault (CLOSE)	Torque fault (OPEN)	Phase-fault	Thermal fault	—	Configuration faulty
Byte 11 (Warning signals part 1)	Warning oper. time	Starts/run	Internal feedback	Internal warning	Anlog In2 I/O1 loss	Anlog In1 I/O1 loss	—	P.-Feedback E4 loss	**Byte 12 (Warnings signals part 2)**	DN1 Analog In1 loss	DN1 Analog In2 loss	—	—	Setpoint E1 loss	Feedback E2 loss	(reserved)	Torque E6 loss
Byte 13 (Torque)	Torque value 1 (0 – 1 000 per mil) high byte[3]								**Byte 14 (Torque)**	Torque value 1 (0 – 1 000 per mil) low byte[3]							

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

2) Byte 7 and byte 8 transmit the value of the first additional free analogue current input of the DeviceNet interface. The start and end values can be set at the AUMATIC via the push-buttons and the display. 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 ...).
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)

3) Byte 13 and byte 14 transmit the current torque of the actuator (only if an MWG is installed in the actuator).
The value transmitted is the current torque in per mil of the nominal torque of the actuator. The torque zero point is at 500, for 100.0 % of the actuator torque in direction OPEN the value 1000 is transmitted, for 100.0 % of the torque in direction CLOSE the value 0 is transmitted.

Process Input Data 3

SELECTED PRODUCED PATH = 8
Data length = 17 byte

Bit	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0
Byte 1 (Logical signals)	Fault ind.[1]	Warning ind.[1]	Running CLOSE	Running OPEN	Not ready ind.[1]	Setpoint position	Closed position	Open position	**Byte 2 (Actuator signals)**	TSC (DSR)	TSO (DOEL)	LSC (WSR)	LSO (WOEL)	Local sw. position	Remote sw. position	Loss of phase	Thermal fault
Byte 3 E2 (Feedback)	E2 Feedback 1 (0 – 1 000 per mil) high byte								**Byte 4 E2 (Feedback)**	E2 Feedback 1 (0 – 1 000 per mil) low byte							
Byte 5 (Physical operation)	Running LOCAL	Running REMOTE	Running with handwheel	Actuator moving[1]	—	Stepping mode	—	Phys.drive break	**Byte 6 (options)**	DN1 dig.in 4	DN1 dig.in 3	DN1 dig.in 2	DN1 dig.in 1	Intermed. pos. 4	Intermed. pos. 3	Intermed. pos. 2	Intermed. pos. 1
Byte 7 (Analogue input 1)	Analogue input 1 (0 – 1 000 per mil) high byte[2]								**Byte 8 (Analogue input 1)**	Analogue input 1 (0 – 1 000 per mil) low byte[2]							
Byte 9 (Not ready ind.)	External control	(reserved)	EMERGENCY MODE	EMCY STOP active	—	(reserved)	Selector not REMOTE	Wrong command	**Byte 10 (Fault signals)**	—	Internal fault	Torque fault (CLOSE)	Torque fault (OPEN)	Loss of phase	Thermal fault	—	Configuration faulty
Byte 11 (Warning signals part 1)	Warning oper. time	Starts/run	Internal feedback	Internal warning	I/O1 Analog In2 loss	I/O1 Analog In1 loss	—	P-Feedback E4 loss	**Byte 12 (Warnings signals part 2)**	DN1 Analog In1 loss	DN1 Analog In2 loss	—	—	Setpoint E1 loss	Feedback E2 loss	(reserved)	Torque E6 loss
Byte 13 (Torque)	Torque value 1 (0 – 1 000 per mil) high byte[3]								**Byte 14 (Torque)**	Torque value 1 (0 – 1 000 per mil) low byte[3]							
Byte 15 (Analogue input 2)	Analogue input 2 (0 – 1 000 per mil) high byte[4]								**Byte 16 (Analogue input 2)**	Analogue input 2 (0 – 1 000 per mil) low byte[3]							
Byte 17 (Additional data)	In intermed. position	—	—	—	Intermed. pos. 8	Intermed. pos. 7	Intermed. pos. 6	Intermed. pos. 5									

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

2) In bytes 7, 8, 15 and 16 the values of the analogue current inputs of the interface are transmitted.
The start and end values can be set at the AUMATIC via the push-buttons and the display. 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 ...).
If the measuring values are 0.3 mA below the initial value a loss of signal is indicated.

3) Byte 13 and byte 14 transmit the current torque of the actuator (only if an MWG is installed in the actuator).
The value transmitted is the current torque in per mil of the nominal torque of the actuator. The torque zero point is at 500, for 100.0 % of the actuator torque in direction OPEN the value 1000 is transmitted, for 100.0 % of the torque in direction CLOSE the value 0 is transmitted.

9.1.1 Detailed description of the input data

The input data are described below in alphabetical order.

Designation	**Description** (if there is no further explanation in the text, the description for bit value = 1 applies)
Actuator moving	Collective signal: contains the result of a disjunction (or operation): Running LOCAL, Running REMOTE, Running with handwheel
CLOSED position, (torque seating in end position CLOSED)	Torque switch and limit switch in direction CLOSE operated.
CLOSED position, (limit seating in end position CLOSED)	Limit switch in direction CLOSE operated
Command o.k.	There is no wrong command (“Wrong command” signal negated)
Config. fault	Value = 1: Indicates a faulty configuration, i.e. the current setting of the AUMATIC is not valid, the precise cause can be viewed via a diagnosis indication (D4) on the display. Value = 0: AUMATIC has been correctly configured
DN1 Analog In1 loss	Signal loss of the analogue input 1 at the DeviceNet interface 1
DN1 Analog In2 loss	Signal loss of the analogue input 2 at the DeviceNet interface 1
DN1 dig.in 1	A 24 V signal is present at the digital input 1.
DN1 dig.in 2	A 24 V signal is present at the digital input 2.
DN1 dig.in 3	A 24 V signal is present at the digital input 3.
DN1 dig.in 4	A 24 V signal is present at the digital input 4.
EMCY STOP active	The EMERGENCY STOP button (option) has been operated (see page 45).
EMERGENCY MODE	Emergency mode is active
External control	External operation (option). Is set as soon as the BUS/REMOTE input is supplied with 24 V DC (optional 115 V AC). Thus, the AUMATIC only reacts to operation commands of the I/O interface or the external inputs bus (OPEN – STOP – CLOSE or MODE and 0/4 – 20 mA) (see page 42 ff).
Fault ind.	Value = 1: Collective signal: Contains the result of a disjunction (OR-operation) of all bits of the byte 10 (Fault signals) Value = 0: No faults are active. All bits in byte 10 (Fault signals) are cleared.
Feedback E2 loss	A loss of signal has occurred in the actual position.
I/O1 Analog In1 loss	Loss of signal of the analogue input 1 of the parallel interface (only for DeviceNet in combination with parallel interface).
I/O1 Analog In2 loss	Loss of signal of the analogue input 2 of the parallel interface (only for DeviceNet in combination with parallel interface).
In intermed. position	If set if the actuator does not execute an operation command and is neither in end position OPEN nor in end position CLOSED
Intermed. pos. 1	Intermediate position 1 is signalled
Intermed. pos. 2	Intermediate position 2 is signalled
Intermed. pos. 3	Intermediate position 3 is signalled
Intermed. pos. 4	Intermediate position 4 is signalled
Intermed. pos. 5	Intermediate position 5 is signalled.
Intermed. pos. 6	Intermediate position 6 is signalled.
Intermed. pos. 7	Intermediate position 7 is signalled.
Intermed. pos. 8	Intermediate position 8 is signalled.
Internal fault	The internal diagnostics of the AUMATIC have detected a fault (the exact cause can be viewed on diagnosis page D2 and DQ of the display).
Internal warning	The internal diagnostics of the AUMATIC have detected a warning (the exact cause can be determined via diagnosis page D3 of the display).
Local sw. position	Selector switch in position LOCAL
Loss of phase	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.
LSC (WSR)	Limit switch CLOSE right operated.
LSO (WOEL)	Limit switch OPEN left operated.
No external controls	There is no external operation (“External controls” signal negated)

Designation	**Description** (if there is no further explanation in the text, the description for bit value = 1 applies)
No internal feedback	Indicates that the position transmitter has not been adjusted to the limit end positions yet. To adjust the actuator: Move the actuator manually to the end positions OPEN or CLOSED via the push-buttons on the local controls.
No loss of phase	There is no loss of phase (“Loss of phase” signal negated)
No reaction	Is set if the reaction monitoring of the AUMATIC has detected a fault.
No thermal fault	There is no thermal fault (“Thermal fault” signal negated)
Not ready ind.	Value = 1: Collective signal: Contains the result of a disjunction (OR-operation) of all bits of the byte 9 (Not ready ind.). Value = 0: No signal is active in byte 9 “Not ready ind.”.
OPEN position, (limit seating in end position OPEN)	Limit switch in direction OPEN operated.
OPEN position, (torque seating in end position OPEN)	Torque switch and limit switch in direction OPEN operated.
Operation pause	Passing of operation pauses (reversing prevention time, dead time, pause times in stepping mode)
P.-Feedback E4 loss	Loss of signal of the actual process value E4 (only if PID controller is available and active).
Remote sw. position	Selector switch in position REMOTE
Running CLOSE	Value = 1: Operation command (CLOSE or SETPOINT) from DeviceNet or local controls 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. Value = 0: No operation is carried out via DeviceNet
Running LOCAL	Indicates the movement of the output drive during electrical operation from LOCAL
Running OPEN	Value = 1: Operation command (OPEN or SETPOINT) from DeviceNet or local controls 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. Value = 0: No operation is carried out via DeviceNet.
Running REMOTE	Indicates the movement of the output drive during electrical operation from REMOTE
Running with handwheel	Movement at the output drive without electrical operation command
Selector not remote	The selector switch in not in position REMOTE (either LOCAL or OFF, signal “REMOTE sw. position” negated)
Setpoint E1 loss	A loss of signal has occurred in the nominal position.
Setpoint position	The setpoint is within max. error variable (outer dead band). Signal occurs only if DeviceNet master has set the Remote SETPOINT bit.
Starts/run	Indicates an exceeding of the set limits of the starts/run monitoring, indication is deleted automatically.
Stepping mode	Indicates that the actuator has entered the set stepping range while in stepping mode
Thermal fault	A thermal fault (motor protection) has occurred. Help: Cool down, wait or perform cool-down after a reset with push-button “Reset” of the local controls. Check fuse F4.
Torque E6 loss	A fault has occurred in the torque measuring.
Torque fault (CLOSE)	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.
Torque fault (OPEN)	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.
TSC (DSR)	Torque switch CLOSE right operated (storing).
TSO (DOEL)	Torque switch OPEN left operated (storing).
Warning ind.	Collective signal: Contains the result of a disjunction (OR-operation) of all bits of the bytes 11 and 12 “Warning signals”.
Warning oper. time	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.
Wrong command	Value = 1: Indicates the fact that several operation commands were received simultaneously via DeviceNet (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). Value = 0: Operation commands are o.k.

9.2 Description of the output data

Standard Output

SELECTED CONSUMED PATH = 1
Data length = 4 byte

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 1 (commands)1)												Remote SETPOINT			Remote CLOSE	Remote OPEN
Word 2 (E1 setpoint)2)	E1 setpoint (0 – 1 000 per mil)															

1) With the bits 0, 1 and 4, the operation commands are transmitted to the actuator. Only one of these bits may be set at any given time. If SETPOINT (remote nominal) is set, the value of the nominal position (byte 3 and byte 4) is used.
The **other bits** are reserved for future extensions and **must remain set to 0**.

2) The nominal position has to be transmitted as a value between 0 to 1,000 per mil. When these limits are exceeded the actuator stops and signals the fault "WRONG COMMAND".

Standard One Analog Output

SELECTED CONSUMED PATH = 2
Data length = 6 byte

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 1 (commands)1)												Remote SETPOINT			Remote CLOSE	Remote OPEN
Word 2 (E1 setpoint)2)	E1 setpoint (0 – 1 000 per mil)															
Word 3	Reserved															

1) With the bits 0, 1 and 4, the operation commands are transmitted to the actuator. Only one of these bits may be set at any given time. If SETPOINT (remote nominal) is set, the value of the nominal position (byte 3 and byte 4) is used.
The **other bits** are reserved for future extensions and **must remain set to 0**.

2) The nominal position has to be transmitted as a value between 0 to 1,000 per mil. When these limits are exceeded the actuator stops and signals the fault "WRONG COMMAND".

Process Output

SELECTED CONSUMED PATH = 3
Data length = 8 byte

Bit	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0
Byte 1 (Commands)1)					Reset	Remote SETPOINT	Remote CLOSE	Remote OPEN	**Byte 2 (Commands)1)**								
Byte 3 (E1 setpoint)2)	E1 Setpoint 1 (0 – 1 000 per mil) high byte								**Byte 4 (E1 setpoint)2)**	E1 Setpoint 1 (0 – 1 000 per mil) low byte							

1) With the bits 0 - 2 of byte 1, the operation commands are transmitted to the actuator. Only one of these bits may be set at any given time. If SETPOINT (remote nominal) is set, the value of the nominal position (byte 3 and byte 4) is used.
Bits 4 - 7 of byte 1 are reserved for future extensions and all bits of byte 2 must remain set to 0.

2) The nominal position has to be transmitted as a value between 0 to 1,000 per mil. When these limits are exceeded the actuator stops and signals the fault "WRONG COMMAND".

Continued on the next page

Continuation of Process Output

Byte 5 (Additional commands)	–	–	CHANNEL 2 3)	CHANNEL 1 3)	–	Local sw. position 4)	OFF sw. position 4)	Remote sw. position 4)	**Byte 6 (reserved)**	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Byte 7	Reserved								**Byte 8**	Reserved						

3) See external change-over of the communication channel (page 48)

4) See release function of the local controls (page 41)

9.2.1 Detailed description of the output data

The output data (consumed data) are described below in alphabetical order.

Designation	**Description** (if there is no further explanation in the text, the description for bit value = 1 applies)
REMOTE MODE	Run OPEN
REMOTE SETPOINT	Run to setpoint can only be set if a position transmitter e.g. potentiometer / RWG / MWG (options) is available; the value for E1 Setpoint has to be transmitted at the same time
Remote CLOSE	Run CLOSE
OFF sw. position	Value = 1: OFF sw. position is released. Value = 0: OFF sw. position is disabled (only available if the function “Enable local controls” is activated)
Remote sw. position	Value = 1: REMOTE sw. position is disabled (only available if the function “Enable local controls” is activated) Value = 0: Selector switch position REMOTE is locked
Local sw. position	Value = 1: LOCAL sw. position is released Value = 0: LOCAL sw. position is disabled (only available if the function “Enable local controls” is activated)
CHANNEL 1	Value = 1: There is a change-over to DeviceNet communication channel 1 (only available, if 2 DeviceNet interfaces are installed, see page 47, clause 17.) Value = 0: No change-over
CHANNEL 2	Value = 1: There is a change-over to DeviceNet communication channel 2 (only available, if 2 DeviceNet interfaces are installed, see page 47, clause 17.) Value = 0: No change-over
RESET	Certain indications of the AUMATIC can be reset using this signal (e.g. PTC tripping device and torque faults). The function of this bit equals the push-button Reset of the local controls in selector switch position LOCAL.

10. Operation parameters of the actuator

Explicit Messages are used for programming the AUMATIC via DeviceNet.

With the EDS file (Electronic Data Sheet), the AUMATIC offers access to the following parameters via DeviceNet:

Parameter access to the DeviceNet net data (the meaning of the parameters is described in detail in the operation instructions to the actuator "Multi-turn actuators SA .../part-turn actuators SG ... with AUMATIC AC")

ID in EDS file	Description	Class ID	Instance ID	Attribute ID	Note
					Signals from the actuator:
7	Actuator Status	101	1	100	Word 1 (actuator signals) see page 26
8	Actuator Extended Status	101	1	101	Word 3 (extension), see page 26
9	Actuator Position	101	1	102	Word 2 (E2 feedback), see page 27
12	Analog Input 1	101	1	105	Word 4 (analogue input 1), see page 27
13	Analog Input 2	101	1	106	Word 5 (analogue input 2), see page 27
					Operation command to actuator:
10	Command Word	101	1	103	Word 1 (commands)[1)], see page 33
11	Setpoint	101	1	104	Word 2 (E1 setpoint)[1)], see page 33

Parameters, which may only be viewed, have a grey background

1) These data can only be read, use Poll I/O Messages to issue operation commands

DeviceNet specific parameters (the meaning of the parameters is described in detail in the operation instructions to the actuator "Multi-turn actuators SA .../part-turn actuators SG ... with AUMATIC AC")

ID in EDS file	Description	Class ID	Instance ID	Attribute ID	Note
1	Select Produced Connection Path	101	1	1	Selection of the configuration of actuator signals 1 = Standard Input 2 = Extended Input 3 = Extended One Analogue Input 4 = Extended Two Analogue Input 5 = Enhanced Input 6 = Process Input 1 7 = Process Input 2 8 = Process Input 3
2	Select Consumed Connection Path	101	1	17	Selection of the configuration for operation commands to the actuator: 1 = Standard Output 2 = Standard One Analogue Output 3 = Process Output Data 1
21	DN1 MAC_ID Switch Value	103	1	60	0 - 63; 64 = PGM Mode
22	DN1 Baudrate Switch Value	103	1	59	Setting of the baud rate: 0 = 125 kbit/s 1 = 250 kbit/s 2 = 500 kbit/s 3 = PGM Mode 4 = AUTO
27	DN2 MAC_ID Switch Value	103	1	64	0 - 63; PGM Mode (redundant interface)
28	DN2 Baudrate Switch Value	103	1	63	Setting of the baud rate (redundant interface): 0 = 125 kbit/s 1 = 250 kbit/s 2 = 500 kbit/s 3 = PGM Mode 4 = AUTO

Parameter s for setting the application functions of the AUMATIC (the meaning of the parameters is described in detail in the operation instructions to the actuator "Multi-turn actuators SA .../part-turn actuators SG ... with AUMATIC AC")

ID in EDS file	Description	Class ID	Instance ID	Attribute ID	Note
23	DN1 Analogue Input 1 Begin	103	1	51	Parameters for setting the analogue 0 – 20 mA inputs of the DeviceNet interface
24	DN1 Analogue Input 1 End	103	1	52	
25	DN1 Analogue Input 2 Begin	103	1	53	
26	DN1 Analogue Input 2 End	103	1	54	
33	Failure Behaviour	102	1	5	Parameters for setting the safety behaviour
34	Delay Time	102	1	6	
35	Failure Position	102	1	7	
36	Preset Position	102	1	8	
37	Failure Source	102	1	24	
38	Open Position	102	1	41	Parameters for setting the type of seating in the end positions
39	Closed Position	102	1	51	
40	Monitor Triggers	102	1	42	Parameters for setting the monitoring functions
41	Max. Starts/Hour	102	1	35	
42	Max. Duty Cycle	102	1	36	
43	Max. Run time	102	1	37	
44	Adaptive Behaviour	102	1	87	Parameters for setting the positioner
45	Dead Time	102	1	10	
46	Opening Stop Band	102	1	11	
47	Closing Stop Band	102	1	12	
48	Outer Dead Band	102	1	13	
49	Intermed. Position	102	1	85	Parameters for setting the intermediate positions
50	Pos.1	102	1	68	
51	Pos.1 Behaviour	102	1	69	
52	Pos.1 Selector Switch	102	11	70	
53	Pos.1 Control	102	1	71	
54	Pos.2	102	1	72	
55	Pos.2 Behaviour	102	1	73	
56	Pos.2 Selector Switch	102	1	74	
57	Pos.2 Control	102	1	75	
58	Pos.3	102	1	76	
59	Pos.3 Behaviour	102	1	77	
60	Pos.3 Selector Switch	102	1	78	
61	Pos.3 Control	102	1	79	
62	Pos.4	102	1	80	
63	Pos.4 Behaviour	102	1	81	
64	Pos.4 Selector Switch	102	1	82	
65	Pos.4 Control	102	1	83	
66	Pos.5	103	1	19	
67	Pos.5 Behaviour	103	1	20	
68	Pos.5 Selector Switch	103	1	21	
69	Pos.5 Control	103	1	22	
70	Pos.6	103	1	23	
71	Pos.6 Behaviour	103	1	24	
72	Pos.6 Selector Switch	103	1	25	
73	Pos.6 Control	103	1	26	
74	Pos.7	103	1	27	
75	Pos.7 Behaviour	103	1	28	
76	Pos.7 Selector Switch	103	1	29	
77	Pos.7 Control	103	1	30	
78	Pos.8	103	1	31	

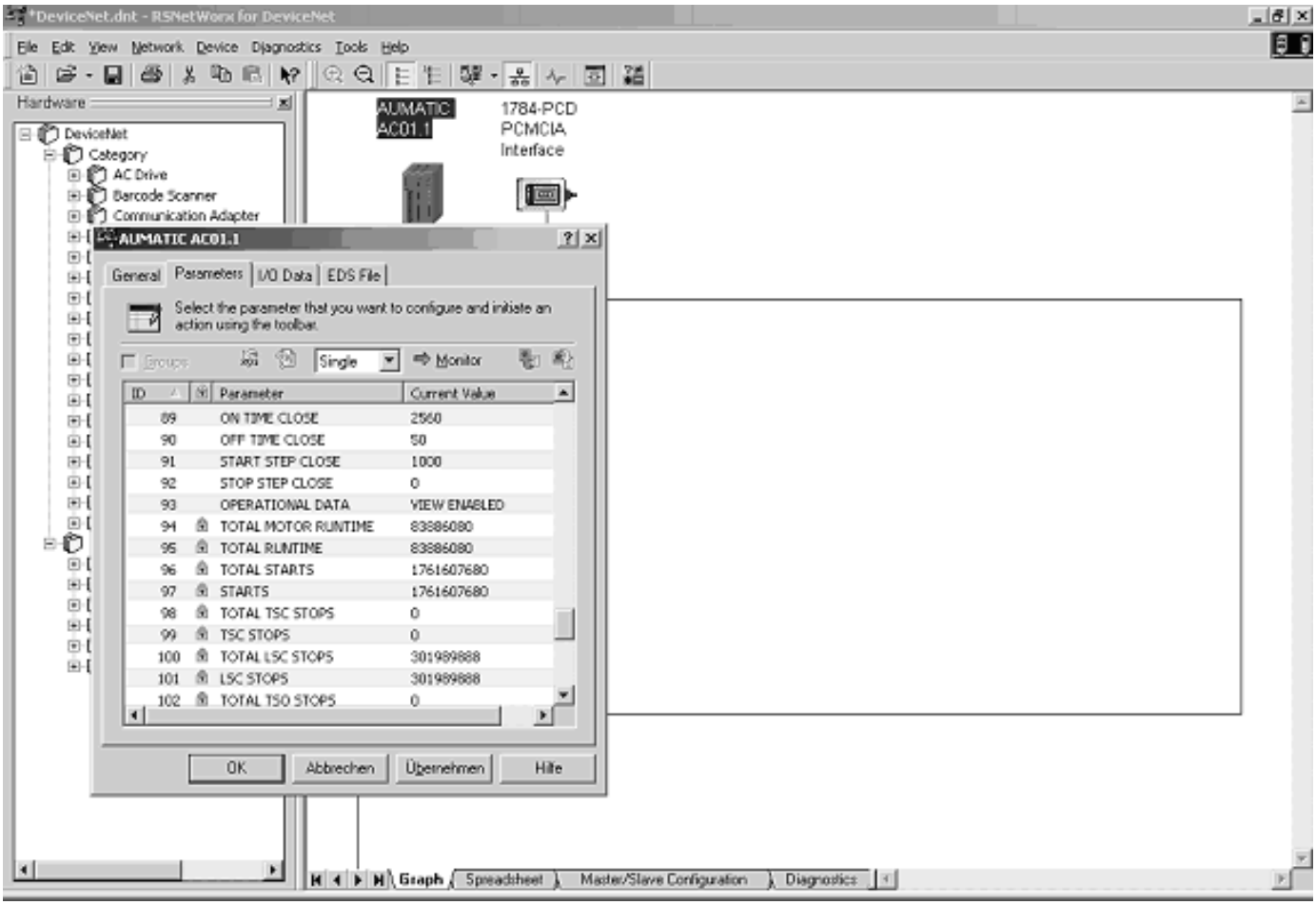
ID in EDS file	Description	Class ID	Instance ID	Attribute ID	Note
79	Pos.8 Behaviour	103	1	32	
80	Pos.8 Selector Switch	103	1	33	
81	Pos.8 Control	103	1	34	
82	Stepping Mode	102	1	84	Parameters for setting the stepping mode
83	Direction Open	102	1	25	
84	On Time Open	102	1	26	
85	Off Time Open	102	1	27	
86	Start Step Open	102	1	28	
87	Stop Step Open	102	1	29	
88	Direction Close	102	1	30	
89	On Time Close	102	1	31	
90	Off Time Close	102	1	32	
91	Start Step Close	102	1	33	
92	Stop Step Close	102	1	34	
93	Operational Data	102	1	62	Logging of operating data
94	Total Motor Runtime	102	1	100	
95	Motor Runtime	102	1	101	
96	Total Starts	102	1	102	
97	Starts	102	1	103	
98	Total TSC Stops	102	1	104	
99	TSC Stops	102	1	105	
100	Total LSC Stops	102	1	106	
101	LSC Stops	102	1	107	
102	Total TSO Stops	102	1	108	
103	TSO Stops	102	1	109	
104	Total LSO Stops	102	1	110	
105	LSO Stops	102	1	111	
106	Total No. Power On	102	1	122	
107	No. Power On	102	1	123	
108	Total TSC Faults	102	1	112	
109	TSC Faults	102	1	113	
110	Total TSO Faults	102	1	114	
111	TSO Faults	102	1	115	
112	Total Thermal Flt.	102	1	116	
113	Thermal Faults	102	1	117	
114	Total PE Faults	102	1	118	
115	PE Faults	102	1	119	
116	Tot. Wrn.Starts/Run1	102	1	120	
117	Wrn.Starts/Run1	102	1	121	
118	Tot.Wrn.Starts/Run2	102	1	124	
119	Wrn.Starts/Run2	102	1	125	

Parameters, which may only be viewed have a grey background.

Access to the parameters of the AUMATIC AC 01.1 via Explicit DeviceNet Messages is usually gained using the EDS file (Electronic Data Sheet) in combination with a configuration tool, e.g. RSNetWorx by Allen-Bradley.

In the EDS file, the parameters are defined with their Class ID, Instance ID and Attribute ID as well as the permissible minimum and maximum values. This enables easier access to the parameters.

Figure H: View of the parameterization of the AUMATIC AC 01.1 via RSNetWorx by Allen-Bradley



11. Description of actuator functions

11.1 Operation commands for OPEN / CLOSE operation

Operation commands are determined by operation command bits and the nominal value (setpoint) of the data 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).
Occurring faults (thermal faults, phase failure, torque faults) 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 final position CLOSED is reached (limit switch LSC (WSR) for limit seating or LSC (WSR) and TSC (DSR) for torque seating). Occurring faults (thermal faults, phase failure, torque faults) 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 has to be set in ‰.
Occurring faults (thermal faults, phase failure, torque faults) stop the operation via the positioner.

With a setpoint of 0 ‰ the actuator runs to the end position CLOSED
With a setpoint of 1000 ‰ the actuator runs to the end position OPEN. In case the setpoint is more than 1,000 ‰ , no operation is performed and the fault signal WRONG COMMAND is given.

11.2 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 positioner refer to the operation instructions to the actuator (multi-turn actuator SA(R) … / part-turn actuator SG . . . with AUMATIC AC . . .).

11.3 Stepping mode

Stepping mode requires a position transmitter (option).
The stepping mode extends the operating time for a part or the whole travel.
For further information stepping mode refer to the operation instructions to the actuator (multi-turn actuator SA(R) … / part-turn actuator SG . . . with AUMATIC AC ...).

12. Safety function

The Poll connection is subject to an adjustable time monitoring within the device. Within this time, a Poll command has to be received, otherwise the connection changes to the timeout state. In case an I/O connection fails, the AUMATIC can activate the safety function.

The time monitoring of the connection is defined via the value of the Expected Packet Rate (EPR) attribute of the Connection Objects (Class ID = 5, Instance ID = 2, Attribute ID = 9).

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 to the actuator (multi-turn actuator SA(R) . . . / part-turn actuator SG . . . with AUMATIC AC ...).

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 approach the set safety position 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 function:

- The connection to the master is interrupted.
- The master changes to the IDLE mode and sends a POLL IDLE command.

As soon as the cause for triggering the safety function is eliminated (connection restored, POLL IDLE command is reset), the operation commands from the DeviceNet master can be executed again.

The AUMATIC can only detect the failure of an I/O connection and activate the safety function if the time monitoring was activated via the Expected Packet Rate (EPR).

The default setting of the time monitoring is deactivated (EPR = 0); only if the master has changed this attribute to a value not equal 0, a time monitoring of the connection is executed with the accordingly defined time.

If the failure of the Poll connection was determined with this function, the actuator will stop even if the safety function is not activated.

13. 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 “Process Output” table, page 33)
This makes it possible to release (enable) or disable a certain selector switch position from REMOTE via the DeviceNet. 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 11: 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	DeviceNet communication to the master		DeviceNet 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 LOCAL 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.

14. Additional control inputs (option)

The digital and analogue input signals of the DeviceNet 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:

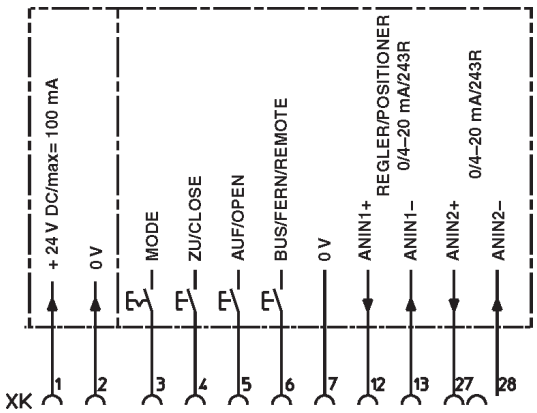
STANDARD

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 MODULATING DUTY

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

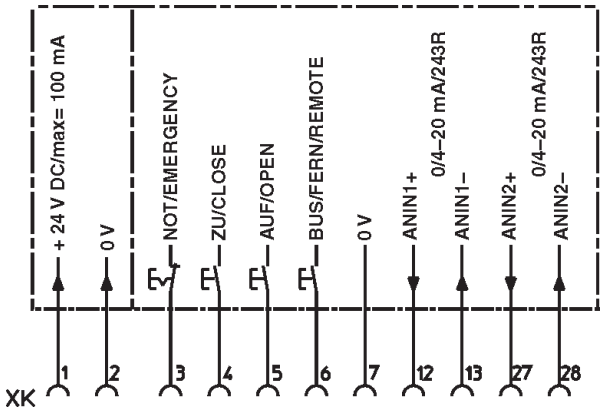


As soon as the ‘BUS/REMOTE’ input (figure J-1) is supplied with 24 V DC (or optional 115 V AC), the AUMATIC will only react to operation commands which are read in via these digital inputs (OPEN-CLOSE or MODE and 0/4 – 20 mA nominal value). Self-retaining is not available for the OPEN – CLOSE commands.
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 page 40) can be tripped in case a signal loss of this 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 DeviceNet.
The EMERGENCY function is set via the parameters for the operation mode EMERGENCY. Refer to the operation instructions to 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 DeviceNet are immediately executed, while OPEN/CLOSE operation commands which are present at the additional control inputs are deleted and have to be reapplied.

Figure J-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-EMERGENCY). 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 setpoint signal.
For this function, the selector switch must be in position “REMOTE”.

Feedback signals via AUMATIC display or via DeviceNet

Feedback signals on the display			DeviceNet	Note
S3	NOT READY IND.	EXTERNAL CONTROL	Bit 13.7 = 1 (page 34)	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 34)	Emergency mode is active (the EMERGENCY function is active and 0 V are applied at the EMERGENCY input).

15. 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:

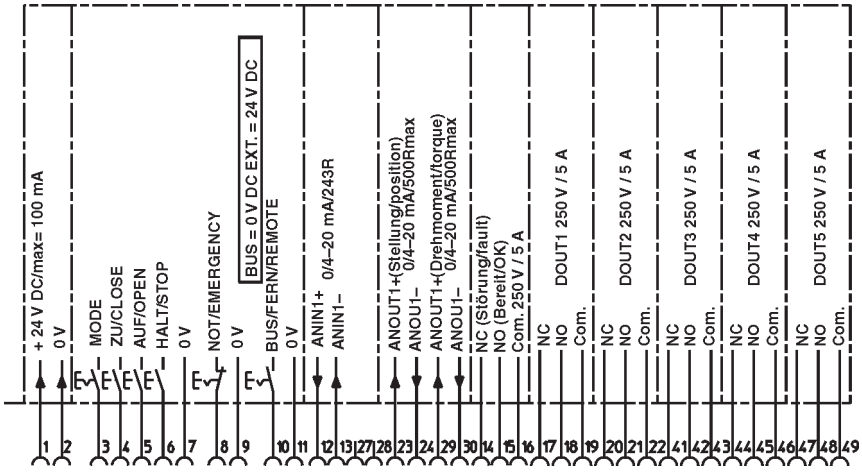
Menu structure

```
MAIN MENU (M)
   SETTINGS (M1)
        I/O 1 (M14)
        DEVICENET 1 (M1M)
```

Standard application:

Generally, the bus communication has priority, i.e. in case of unconnected conventional inputs 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 J-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 I/O (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 position signal. If the safety behaviour is accordingly programmed (see page 40), a safety position can be approached, in case of interruption of the nominal value signal (parameter: `FAILURE SOURCE = NOMINAL VALUE 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 to 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 DeviceNet 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 in case of an interruption of the bus communication does not exist!

Feedback signals via AUMATIC display or via DeviceNet

Feedback signals on the display			DeviceNet	Note
S3	NOT READY IND.	EXTERNAL CONTROL	Bit 13.7 = 1 (page 29)	Operation via parallel interface (i.e. BUS/REMOTE on 24 V DC or optional 115 V AC)
		EMERGENCY MODE	Bit 13.5 = 1 (page 29)	Emergency mode is active (the EMERGENCY function is active and 0 V are applied at the EMERGENCY input).

16. EMERGENCY STOP function (option)

As an option, the AUMATIC can also be equipped with an EMERGENCY STOP push-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
(enclosure protection IP 67 or IP 68).

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 9 – Not ready ind., bit 4 – Emcy 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 via DeviceNet

Feedback signals on the display			DeviceNet	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 29)	

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.
This signal can be cancelled by unlocking the EMERGENCY STOP button.

17. Redundant bus connection with component redundancy (option)

The AUMATIC can be equipped with a second (redundant) DeviceNet interface. In this version, communication to the actuator can be established simultaneously through both DeviceNet interfaces. If one of the DeviceNet components fails, e. g. through cable break, the operation commands are executed which are sent via the other DeviceNet component.
If there is a communication to the master available via both DeviceNet 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 15 ff.

17.1 Settings for the redundant DeviceNet interface 2 (component redundancy)

The redundant DeviceNet component 2 is set in the same way as the setting for the DeviceNet component 1 (see page 20 ff) and via the following menus:

Menu structure

```
MAIN MENU (M)
   SETTINGS (M1)
        DEVICENET 2 (M1M)
             BAUDRATE SW.VALUE (M1NX0)
             MAC ID SW.VALUE (M1NX2)
             SELECTED CONS.PATH (M1NX5)
             SELECTED PROD.PATH (M1NX6)
             BUS-OFF INTERRUPT (M1NX7)
             HEARTBEAT INTERVAL (M1NX9)
```

After the address or baud rate setting has been changed, the AUMATIC must be switched off for a short time to activate the settings. As an alternative, you may also disconnect the DeviceNet voltage supply for a short time.

17.2 External change-over of the communication channels

A certain communication channel can be selected externally via the change-over bits channel 1 and channel 2 in the process representation output (page 34).

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.

17.2.1 Details of the change-over

- The change-over is only 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 DeviceNet interfaces communicate with the master.

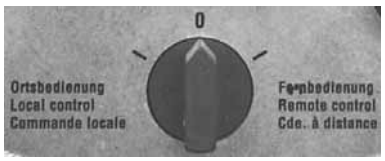
18. Indication and programming of the AUMATIC

18.1 Software parameters of the DeviceNet interface

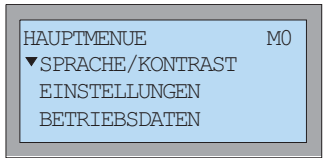
To go to the display indications and the software parameters:

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

Figure M



> 2 Sec.



- 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 . . .).

18.1.1 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**						
M1L	DEVICENET GENERAL	VENDOR ID	M1L00	129			Manufacturer ID
		DEVICE TYPE	M1L01				Device type
		PROD. NAME	M1L02				Product name
		PRODUCT CODE	M1L01	1			Product version
		MAJOR REVISION	M1L03	1			Major revision of the DeviceNet interface
		MINOR REVISION	M1L04	1			Minor revision of the DeviceNet interface
		CONFIG. CONS.VALUE	M1L05	0			Parameter showing changes of the DeviceNet programming. Each change of value of one parameter of the DeviceNet interface increments the value of the parameter by 1, i.e. it is therefore possible to determine changes of the programming, preset to 0 in the factory

	Subgroup	Parameter name	Sub menu	Standard value	Min/ Max	Valuetext	Note
M1M	DEVICE-NET 1	BAUDRATE SW.VALUE	M1MX0	3	0	125KBAUD	Baud rate; change via local controls possible, use PGM MODE to activate the baud rate setting via DeviceNet (in this case, the DeviceNet baud rate can be defined via the Explicit Messages of the process control system). AUTO activates the automatic baud rate detection. In order to detect a new baud rate, the AUMATIC has to be switched off for a short time. As an alternative, you may also disconnect DeviceNet power supply[1].
					1	250KBAUD	
					2	500KBAUD	
					3	PGM MODE	
					4	AUTO	
		MAC ID SW. VALUE	M1MX2	64	0- 64	0 - 64	Actuator address; changes possible via local controls. Address 63 must not be used since this is the default address for all DeviceNet devices. Use address 64 to enable the MAC ID setting via DeviceNet (in this case the DeviceNet address can be defined via Explicit Messages of the process control system); in addition, the OFFLINE CONNECTION SET is activated. This can be used to reconnect a DeviceNet device after a COMMUNICATION FAULT STATE (due to a duplicate MAC ID or a bus-off status) to the DeviceNet network[1].
		SELECTED CONSUMED PATH	M1M05	3	1	STANDARD OUTPUT	Connection path for data which are 'consumed' by the actuator (refer also to above description of the output data, page 33).
					2	STANDARD 1.AN OUT	
					3	PROCESS OUTPUT	

1) After having changed this parameter, the AUMATIC must be switched off for a short time. As an alternative, you may also disconnect the 24 V DC DeviceNet voltage supply for a short time.

	Subgroup	Parameter name	Sub menu	Standard value	Min/ Max	Valuetext	Note
M1	DEVICE-NET 1	SELECTED PRO-DUCED PATH	M1M06	6	1	STANDARD INPUT	Connection path for data which are 'produced' by the actuator (refer also to above description of the input data, page 26).
					2	EXTENDED INPUT	
					3	EXTENDED 1 AN.INPUT	
					4	EXTENDED 2 AN.INPUT	
					5	ENHANCED INPUT	
					6	PROCESS INPUT 1	
					7	PROCESS INPUT 2	
					8	PROCESS INPUT 3	
		BUS-OFF INTERRUPT	M1M07	0	0	HOLD IN BUS-OFF	Selection of the Bus Off Interrupt (BOI) behaviour[1]
					1	FULLY RESET CAN	
		SERIAL NUMBER	M1M08				Serial number of the DeviceNet interface
		HEARTBEAT INTERVAL	M1M09	0	0-255	0-255 S	Interval of the DeviceNet Heart-beat Message[1]
M1N	DEVICENET 2	Menu and parameter structure identical to DEVICENET 1 (option, only available for component redundancy)					
M4	**CONFIGURATION**						
M41	SETUP	DN1 AN IN1 START	M41xj	0	0 - 200	0.0 mA - 20.0 mA	DeviceNet Analogue input 1 Start
		DN1 AN IN1 END	M41xk	200	0 - 200	0,0 mA - 20.0 mA	DeviceNet Analogue input 1 End
		DN1 AN IN2 START	M41xl	0	0 - 200	0,0 mA - 20.0 mA	DeviceNet Analogue input 2 Start
		DN1 AN IN2 END	M41xm	200	0 - 200	0.0 mA - 20.0 mA	DeviceNet Analogue input 2 End

1) After having changed this parameter, the AUMATIC must be switched off for a short time. As an alternative, you may also disconnect the 24 V DC DeviceNet voltage supply for a short time.

19. Description via DeviceNet interface

Figure N: DeviceNet interface

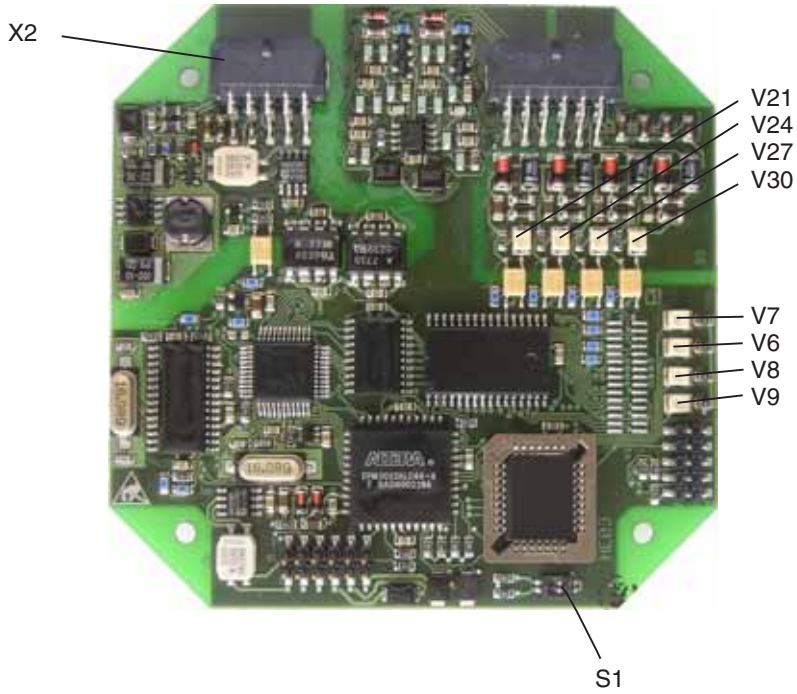


Table 12: DIP switch S1: Configuration of the DeviceNet interface

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

V21, V24, V27, V30 LEDs of the digital customer inputs (option); they are illuminated when + 24 V are applied to the inputs.

V6, V7, V8, V9 Description see page 54.

19.1 Assignment of the customer inputs of the DeviceNet interface (option)

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

Table 13: Digital inputs (galvanically isolated)

Pin	Description	LED
9	R1: digital input 1	V 21
10	R2: digital input 2	V 24
11	R3: digital input 3	V 27
12	R4: digital input 4	V 30
8	0 V	

These signals are freely available inputs, which the microcontroller transmits to the Process Input Data 1 – 3 assembly object. 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 14: Analogue inputs

Pin	Description
3	AN1: Analogue signal (0 – 20 mA)
4	GND (Systemground)
5	AN2: Analogue signal (0 – 20 mA)
6	GND (Systemground)

Via these inputs, external 0/4 – 20mA sensors for transmitting the measured values through the DeviceNet 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 51, CONFIGURATION).

19.2 DeviceNet connection assignment

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 DeviceNet board, are connected.

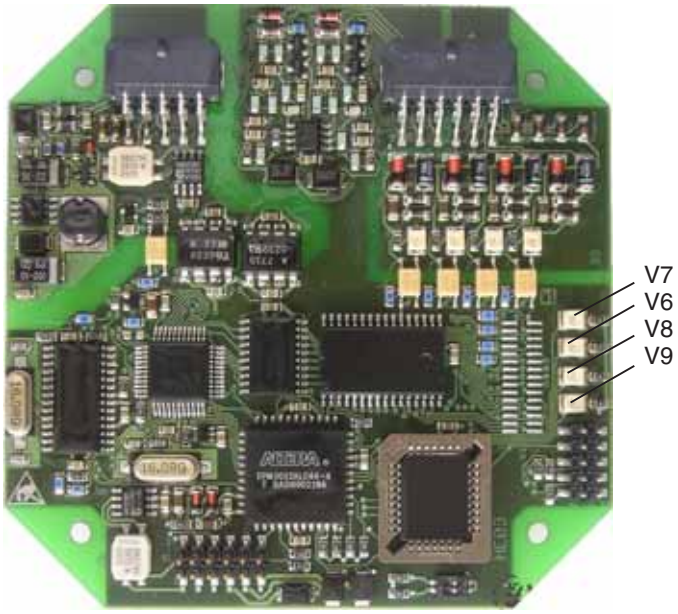
Table 15: Pin assignment X2

Pin	Description
1	Bus termination
2	Bus termination
3	CAN-L, BLUE
4	CAN-H, WHITE
5	V– (0 V DC), BLACK
6	v+ (24 V DC), RED

20. Trouble shooting and corrective actions

20.1 Optical signals during operation

Figure O: DeviceNet interface



LED 'SYSTEM OK' (V7)(green) Shows the correct voltage supply to the DeviceNet board.

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

LED 'DATA EX' (V6) (green) When LED is illuminated, the DeviceNet interface has entered 'Data Exchange' state (see page 55). Only in this state can the actuator be controlled by the DeviceNet master and the status of the actuator can be read.

LED 'CAN STATE' (V8) (red)

Continuously illuminated:	DeviceNet interface is in initialisation phase.
Blinking once per second:	(500 ms ON, 500 ms OFF) The internal CAN communication with logic (still) not o.k, e.g. missing connection monitoring or data transfer not yet active.
Fast blinking:	(5 times per second: 100 ms ON, 100 ms OFF) The internal CAN communication to the logic has detected transmission problems (e.g. failures, short-circuit, interrupted cable, etc.). The blinking may continue for several seconds even after corrective actions until a sufficient number of correct telegrams have been received.
Off:	The internal CAN communication is o.k,

LED 'STATE' (V9) (green)

Illuminated or Off:	DeviceNet interface is not ready for operation (e.g. DeviceNet software is overloaded or inoperable).
Blinking once per second:	(500 ms OFF, 500 ms ON) DeviceNet Software is working correctly.
Blinking twice per second:	(700 ms OFF, 100 ms ON, 100 ms OFF, 100 ms ON). The DeviceNet software is working correctly, however the 24 V DC DeviceNet voltage is not present.

Regular blinking of the LED during operation indicates correct function of the DeviceNet interface.

20.2 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.

20.3 DeviceNet 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. In the subgroup DR, DS, DT, DU, DV status information can be requested of DeviceNet.

To go to the DeviceNet diagnosis indications:

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

Figure P

- 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 the display	Note
DR	**DN1 HRDWR. VER.**		Hardware version of the DeviceNet interface 1
DS	**DN1 SFTWR.VER.**		Softwareversion of the DeviceNet interface 1
DT	**DN1 BUS STATUS**		Status of the DeviceNet interface 1
		POLL IDLE	POLL IDLE connection is available
		DATA EXCHANGE	POLL connection established
DU	**DN1 NET STATUS**		Network status of the DeviceNet interface 1
		NO POWER/ NOT ONLINE	AUMATIC is not online: - Dup_MAC_ID Test not yet finished - possibly no DeviceNet voltage supply available
		ONL.+NOT CONNECTED	AUMATIC is online, but there is no connection - AUMATIC has been submitted to the Dup_MAC_ID test, is online, but there is no connection to another device. - The actuator is not assigned to any master
		LINK OK	AUMATIC is online (optimum status)
		CONNECTION TIMEOUT	One or more I/O connections are in the Time-Out status
		CRITICAL LINK FAILURE	Unsuccessful communication. The actuator has detected a fault and has disabled the communication to the network (Duplicate MAC ID or Bus-off). Possibly fault assignment via Offline CONNECTION SET possible
		COMMUNICATION FAULT	Communication fault: AUMATIC has detected a network access fault and is in the communication fault status.

Menu		Abbreviation in the display	Note
DV	**DN1 MODULE STATUS**		Module status of the DeviceNet interface 1
		NOT POWERED	No DeviceNet voltage supply available
		DEVICE OPERATIONAL	AUMATIC is in the normal operation status (optimum status)
		DEVICE IN STANDBY	AUMATIC is in the standby status and requires a new DeviceNet interface configuration due to missing, incomplete or incorrect settings.
		MINOR FAULT	AUMATIC has detected a fault which can be eliminated
		UNRECOVERABLE FAULT	AUMATIC has detected a fault which cannot be eliminated and has to be restarted (either disconnect AUMATIC or DeviceNet voltage supply; there may be a Duplicate MAC ID, the master must possibly be restarted or reconfigured).
		DEVICE SELF TESTING	AUMATIC is in the internal diagnosis status.
DW	**DN1 CURRENT VALUES**		Current values of the baud rate and the MAC ID of DeviceNet interface 1
DX	**DN2 HRDWR. VER.**[1)]		Hardware version of the DeviceNet interface 2
DY	**DN2 SFTWR.VER.**[1)]		Software version of the DeviceNet interface 2
DZ	**DN2 BUS STATUS**[1)]		Status of the DeviceNet interface 2; contents identical to that of DeviceNet interface 1
Da	**DN1 NET STATUS**[1)]		Network status of the DeviceNet interface 2; contents identical to that of DeviceNet interface 1
Db	**DN2 MODULE STATUS**[1)]		Module status of the DeviceNet interface 2; contents identical to that of DeviceNet interface 1
Dc	**DN2 CURRENT VALUE**[1)]		Current values of the baud rate and the MAC ID of DeviceNet interface 2

1) Option, only available for component redundancy

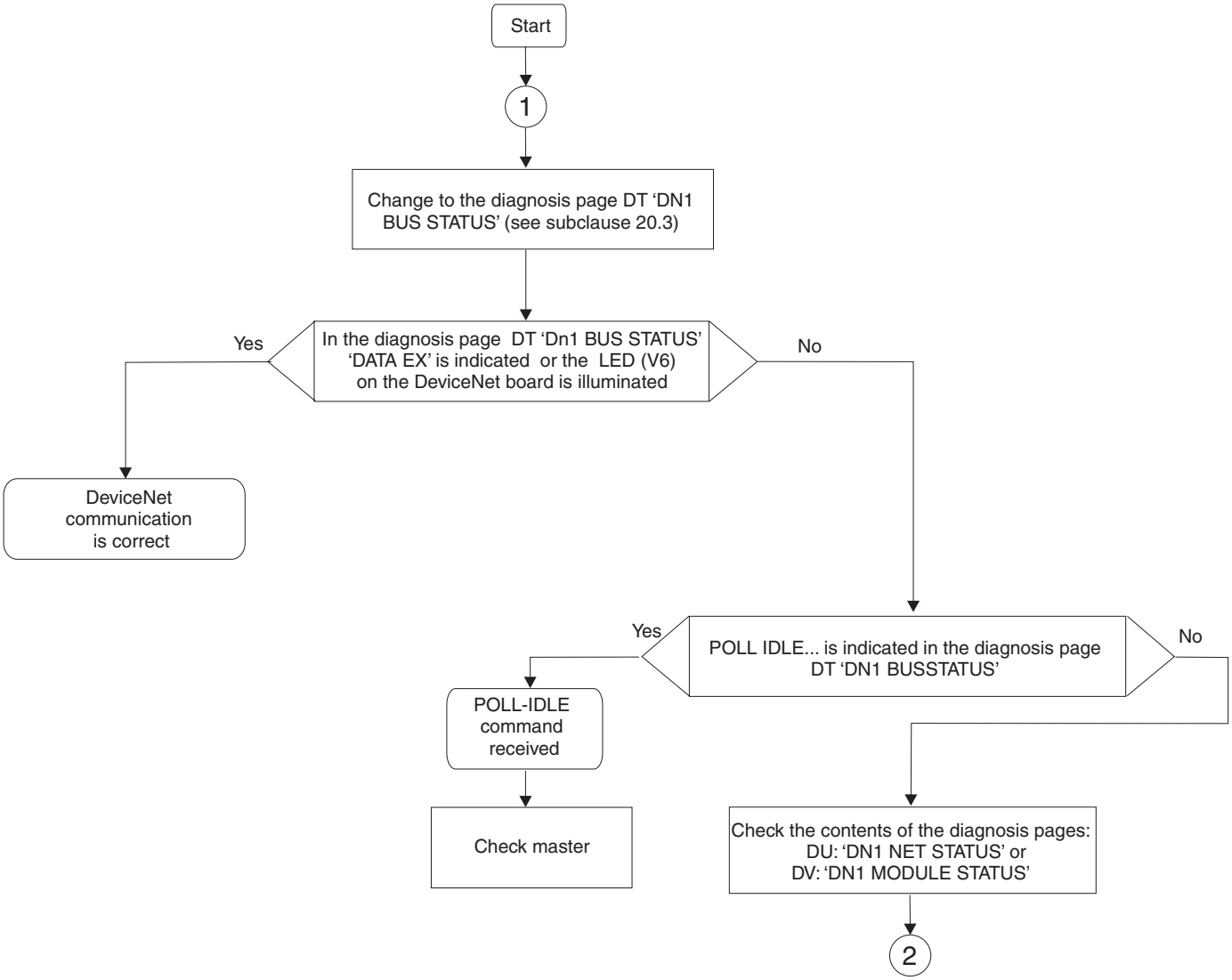
20.4 Offline Connection Set of the AUMATIC

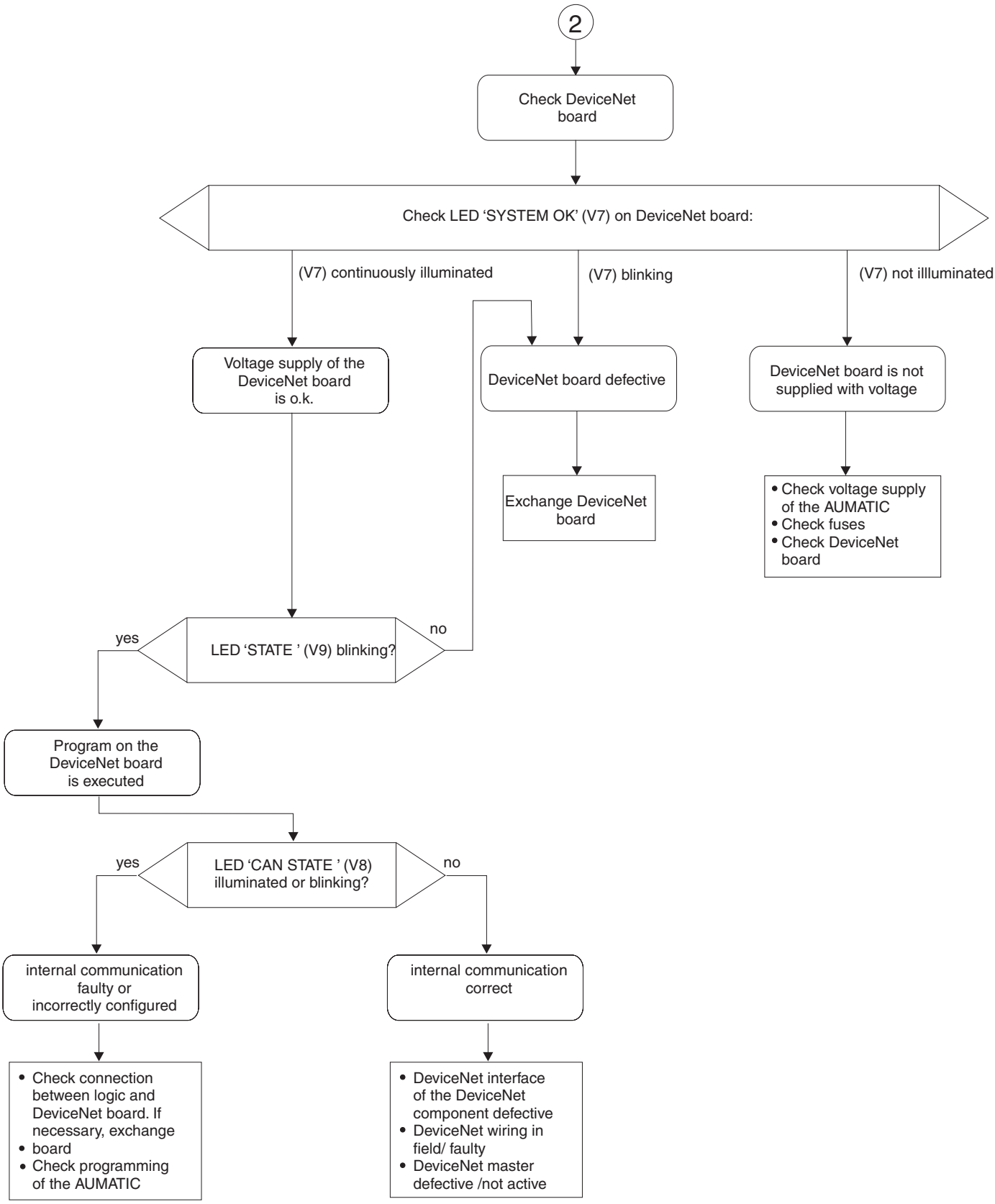
The Offline Connection Set can be used to reconnect a DeviceNet node after a COMMUNICATION FAULT STATE (due to a duplicate MAC ID or a bus-off status) to the DeviceNet network.
The user first has to secure access to the Offline Connection Set using the Offline Ownership Messages. Afterwards, the faulty AUMATIC can be visually identified via the Point to Point Identify Request Message. The visual identification is ensured by blinking of all LEDs of the local controls.

20.5 Reset of the AUMATIC to the factory settings

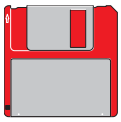
By means of the Reset service (Service Code 05hex) of the Identify Object (Class ID 01hex), the AUMATIC can be reset to the default settings (out of the box defaults) (Reset Type = 1).

20.6 Actuator can not be controlled via DeviceNet




2
Check DeviceNet board
Check LED 'SYSTEM OK' (V7) on DeviceNet board:
(V7) continuously illuminated
(V7) blinking
(V7) not illluminated
Voltage supply of the DeviceNet board is o.k.
DeviceNet board defective
DeviceNet board is not supplied with voltage
Exchange DeviceNet board
• Check voltage supply of the AUMATIC
• Check fuses
• Check DeviceNet board
yes
LED 'STATE ' (V9) blinking?
no
Program on the DeviceNet board is executed
yes
LED 'CAN STATE ' (V8) illuminated or blinking?
no
internal communication faulty or incorrectly configured
internal communication correct
• Check connection between logic and DeviceNet board. If necessary, exchange
• board
• Check programming of the AUMATIC
• DeviceNet interface of the DeviceNet component defective
• DeviceNet wiring in field/ faulty
• DeviceNet master defective /not active

21. Appendix A EDS file

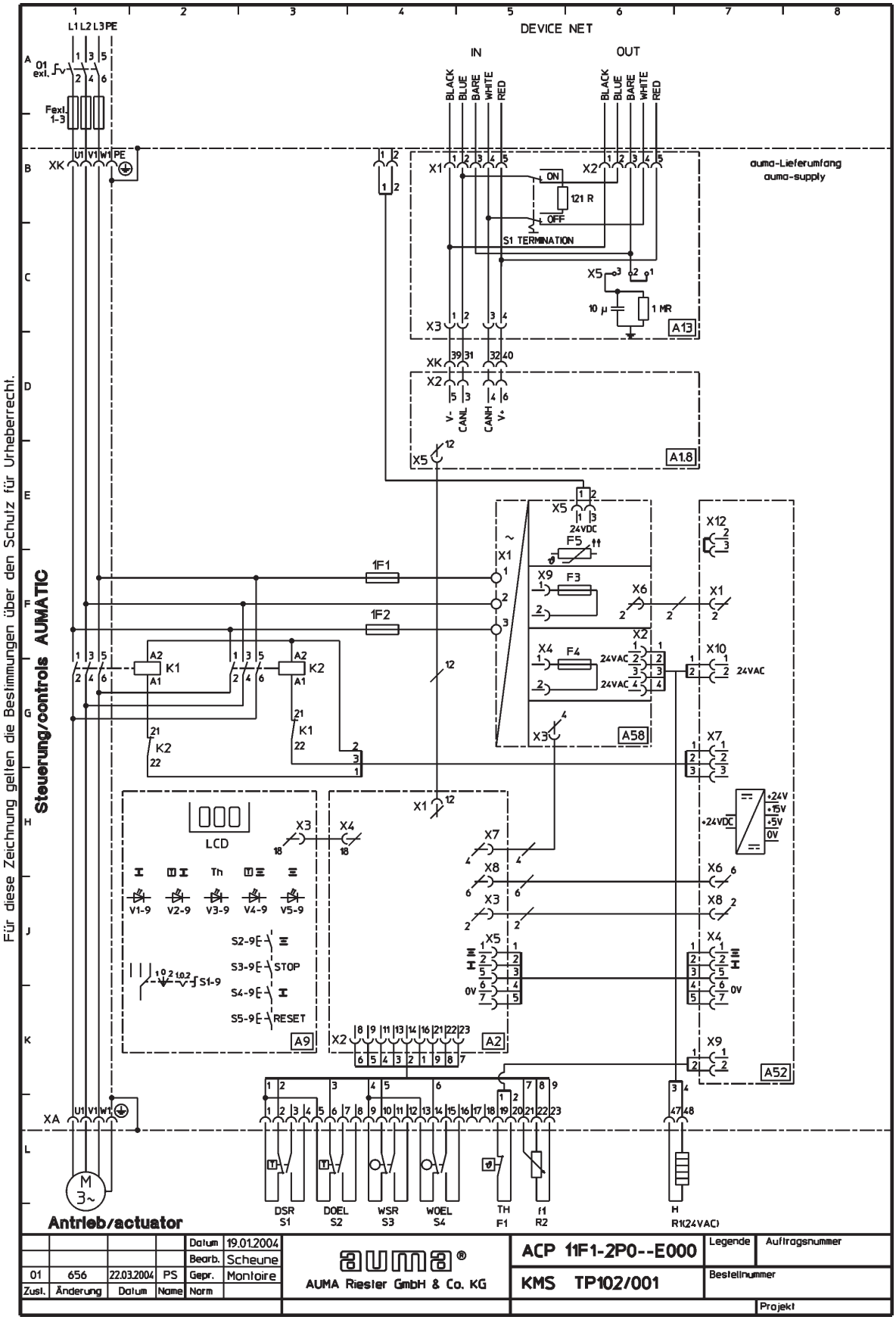


The EDS file can be downloaded from the Internet:
www.auma.com

22. Appendix B standard wiring diagram

Legend page 61

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



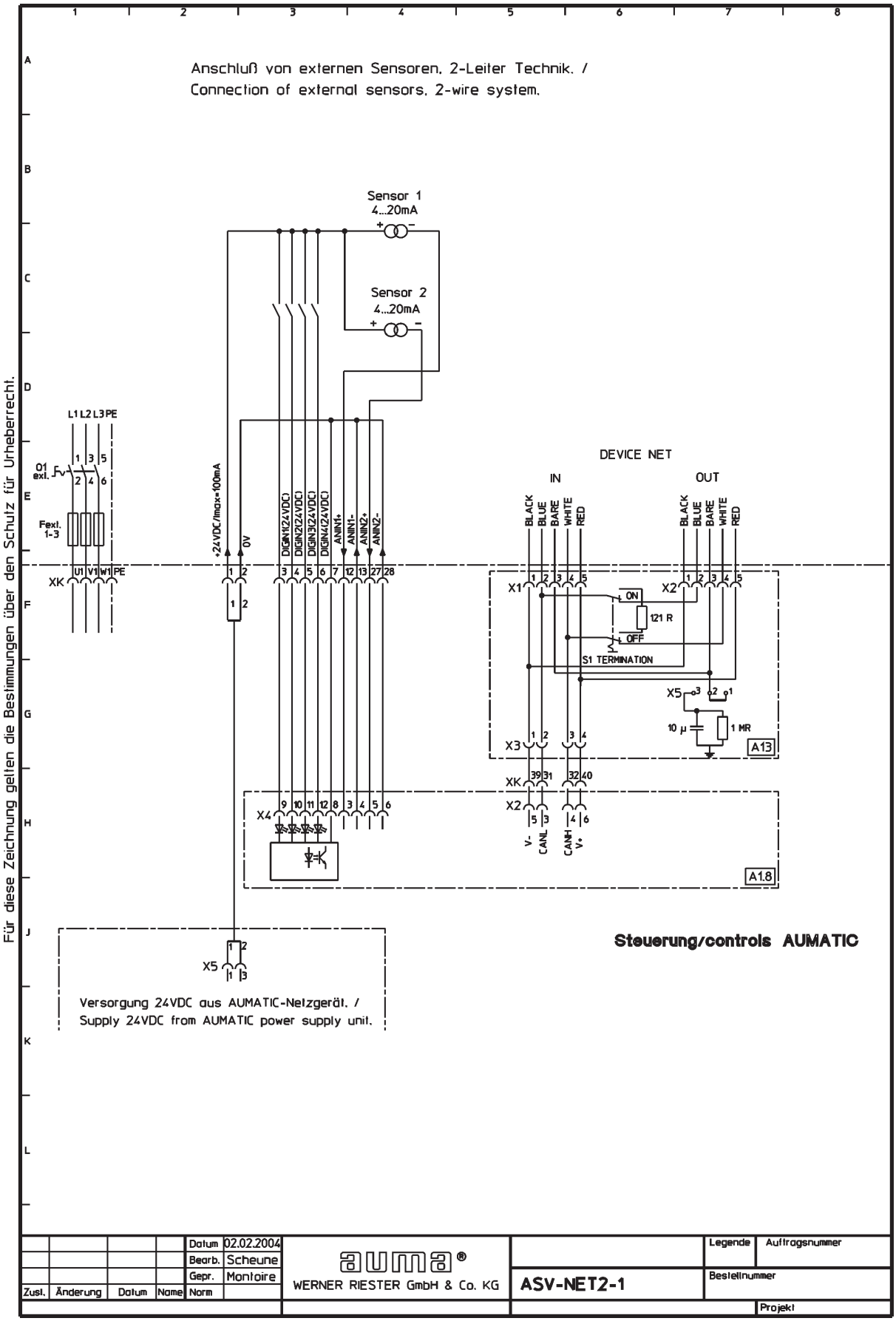
22.1 Legend to standard wiring diagram

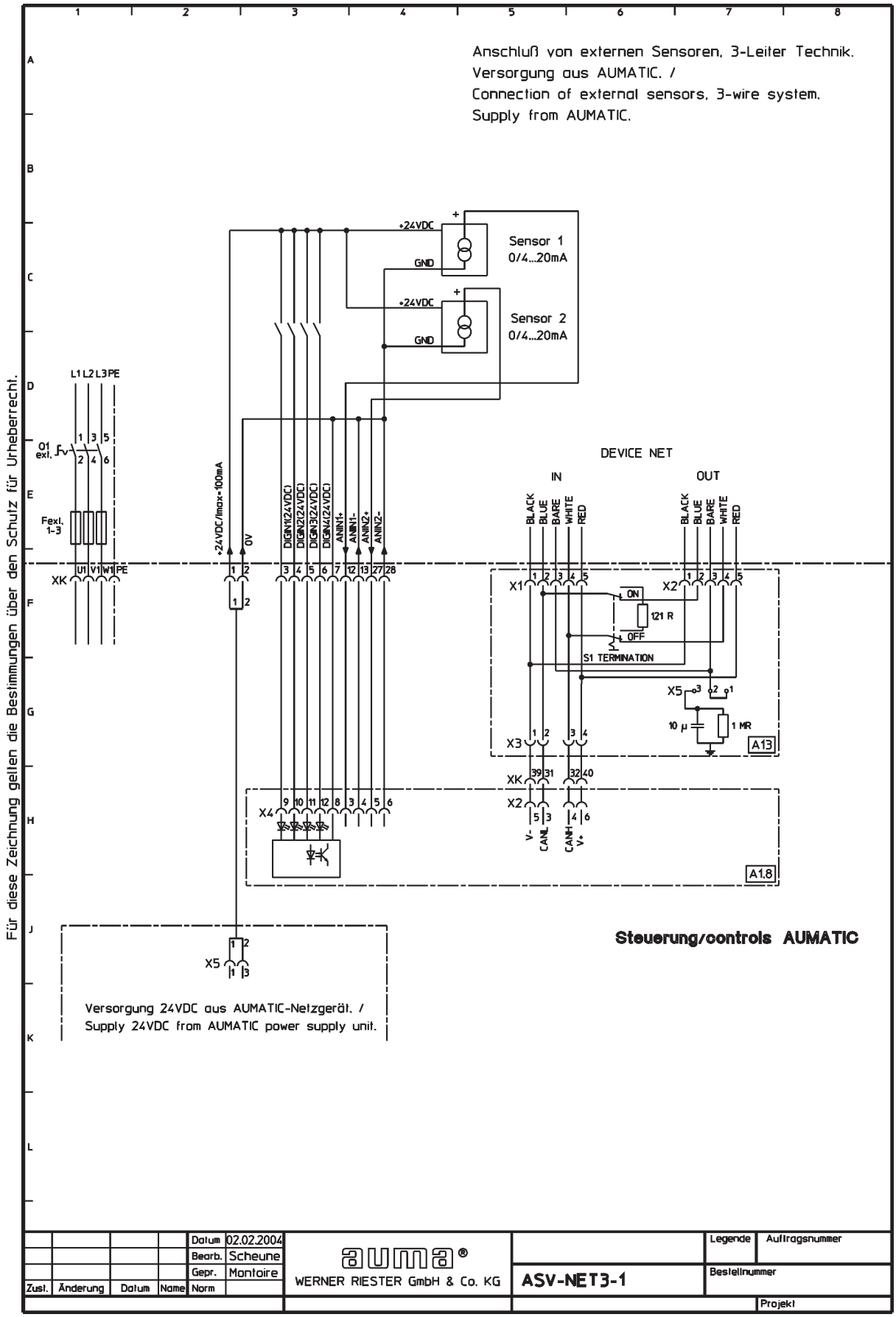
A1.0		Interface-Platine / Interface board
K1-1.0...K6-1.0		Meldung/Output 1-5: programmierbare Melderelais/programmable output relays
A1.8		BUS-Platine / BUS board
A2		Logik-Platine / Logic board
A4		Varistor-Platine / Varistor board
R1, R2, R3, R4		Varistoren / Varistors
A5		Thyristor-Platine / Thyristor board
A9		Ortssteuerstelle / Local controls
S1-9		Wahlschalter ORT-AUS-FERN / Selector switch LOCAL-OFF-REMOTE
S2-9		Drucktaster AUF / Push-button OPEN
S3-9		Drucktaster HALT / Push-button STOP
S4-9		Drucktaster ZU / Push-button CLOSE
S5-9		Drucktaster RESET / Push-button RESET
V1-9		Leuchtmelder Endlage ZU / Indication light end position CLOSE
V2-9		Leuchtmelder Drehmomentfehler ZU / Indication light torque error in direction CLOSE
V3-9		Leuchtmelder Motorschutz / Indication light motor protection
V4-9		Leuchtmelder Drehmomentfehler AUF / Indication light torque error in direction OPEN
V5-9		Leuchtmelder Endlage AUF / Indication light end position OPEN
A13		Bus-Anschluß-Platine / Bus connection board
A52		Steuerplatine / Control board
A58		Netzteil / Power supply
F3, F4, F5		Sekundärsicherungen / Secondary fuses
1F1, 1F2		Primärsicherungen Netzteil / Primary fuses for power supply board
2F1, 2F2		Sicherungen für Thyristoren und Netzteil / Fuses for thyristors and power supply board
F7		Thermisches Überlastrelais / Thermal overload relay
K1, K2		Wendeschütze / Reversing contactors
U1-U4		Halbleiter (Thyristoren) / Semiconductors (thyristors)
XK		Anschluß für Kunden / Connections for customer
XA		Anschluß für Antrieb / Connections for actuator
XM		Anschluß für AUMATIC (Wandhalter) Connections for AUMATIC (wall bracket)
S1	DSR	Drehmomentschalter, Schließen, Rechtslauf Torque switch, closing, clockwise rotation
S2	DOEL	Drehmomentschalter, Öffnen, Linkslauf Torque switch, opening, counter-clockwise rotation
S3	WSR	Wegschalter, Schließen, Rechtslauf / Limit switch, closing, clockwise rotation
S4	WOEL	Wegschalter, Öffnen, Linkslauf / Limit switch, opening, counter-clockwise rotation
S1/2	DSR1	Drehmomentschalter in Tandemanordnung mit DSR/DOEL
S2/2	DOEL1	Torque switch, in tandem operation with DSR/DOEL
S3/2	WSR1	Wegschalter in Tandemanordnung mit WSR/WOEL
S4/2	WOEL1	Limit switch, in tandem operation with WSR/WOEL
S3/3	WSR2	Wegschalter in Dreifachanordnung mit WSR/WOEL
S4/3	WOEL2	Limit switch in triple operation with WSR/WOEL
S6	WDR	Wegschalter, DUO für 2 Zwischenstellungen stufenlos verstellbar
S7	WDL	Limit switches DUO, for 2 intermediate positions, can be adjusted to any position
S6/2	WDR1	Wegschalter, DUO für 2 Zwischenstellungen in Tandemanordnung mit WDR/WDL
S7/2	WDL1	Limit switches DUO, for 2 intermediate positions in tandem operation with WDR/WDL
B2/B4	RWG	Elektronischer Stellungsgeber / Electronic position transmitter
B6	MWG	Magnetische Weg- und Drehmomenterfassung / Magnetic travel and torque sensor
F1	TH	Thermoschalter / Thermoswitches
Q1		Trennschalter / Disconnect switch
Q2		Motorschutzschalter / Circuit breaker
R1	H	Heizung / Heater
R2	f1	Potentiometer / Potentiometer
R2/2	f2	Potentiometer in Tandemanordnung mit R2 / Potentiometer in tandem operation with R2
R3	PTC1	Kaltleiter / PTC-thermistor
R4	H	Motorheizung / motor heater
S0		NOT-AUS Schalter / EMERGENCY-STOP switch

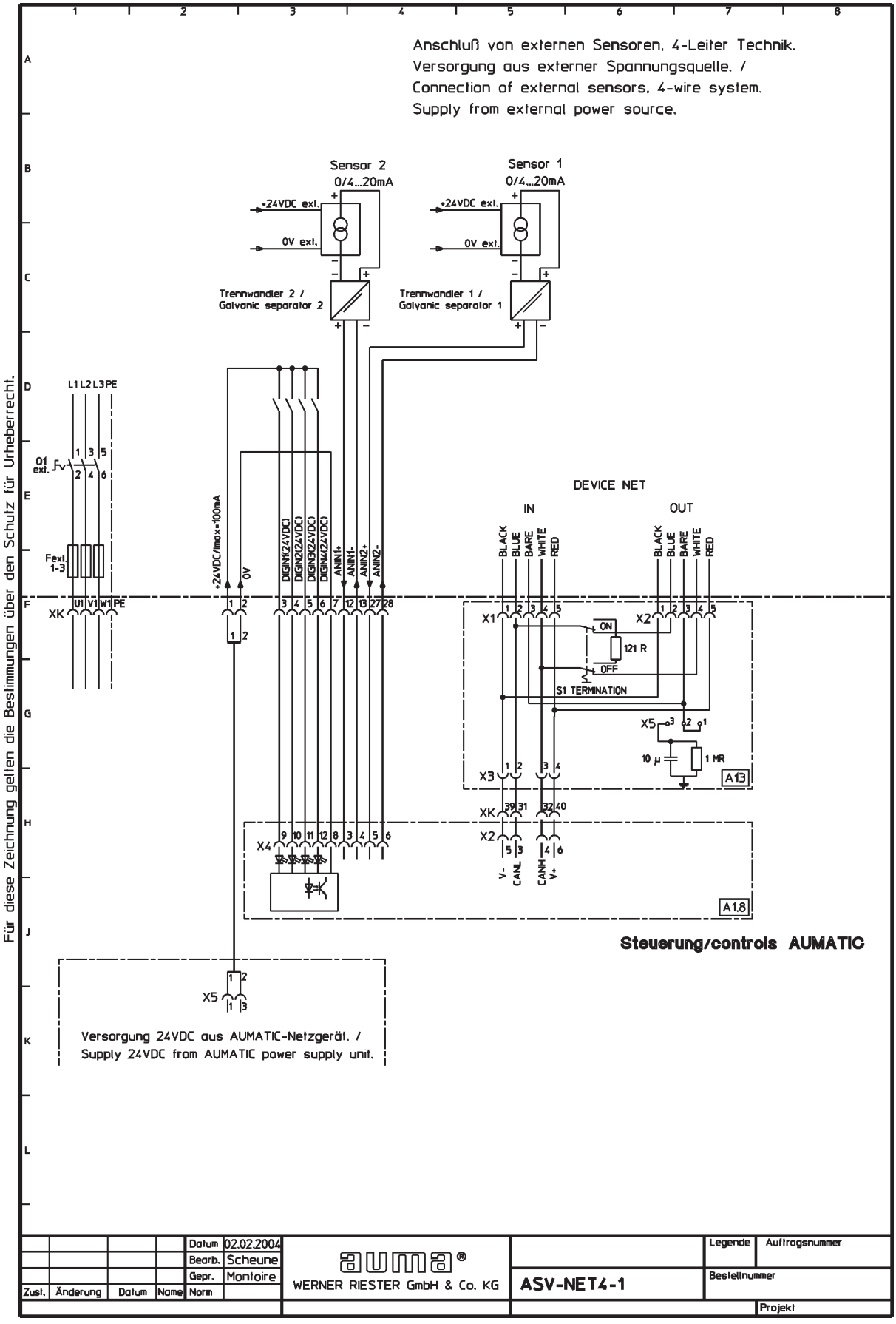
Schaltplan zeigt den Stellantrieb in Zwischenstellung, Schalter sind nicht betätigt.
Wiring diagram shows the actuator in intermediate position, switches are not actuated.

				Datum	25.11.2002		Legende	Auftragsnummer
				Bearb.	Scheune	auma®	AC01	
				Gepr.	Montoire		Bestellnummer	
Zust.	Änderung	Datum	Name	Norm		WERNER RIESTER GmbH & Co. KG		
							Projekt	

23. Appendix C Proposed wiring diagrams




Anschluß von externen Sensoren, 3-Leiter Technik.
Versorgung aus AUMATIC. /
Connection of external sensors, 3-wire system.
Supply from AUMATIC.
Für diese Zeichnung gelten die Bestimmungen über den Schutz für Urheberrecht.
Sensor 1
0/4...20mA
Sensor 2
0/4...20mA
+24VDC
GND
L1 L2 L3 PE
Q1
Fexl. 1-3
XK
U1 V1 W1 PE
+24VDC/Imax=100mA
0V
DIGIN1(24VDC)
DIGIN2(24VDC)
DIGIN3(24VDC)
DIGIN4(24VDC)
ANIN1+
ANIN2+
ANIN2-
DEVICE NET
IN
OUT
BLACK
BLUE
BARE
WHITE
RED
X1
X2
ON
121 R
OFF
S1 TERMINATION
X5
10 µ
1 MR
A13
X3
XK
X4
V-
CAN_L
CAN_H
V+
A1.8
Steuerung/controls AUMATIC
X5
Versorgung 24VDC aus AUMATIC-Netzgerät. /
Supply 24VDC from AUMATIC power supply unit.
Datum 02.02.2004
Bearb. Scheune
Gepr. Montoire
Zust. Änderung Datum Name Norm
auma®
WERNER RIESTER GmbH & Co. KG
ASV-NET3-1
Legende
Auftragsnummer
Bestellnummer
Projekt


Anschluß von externen Sensoren, 4-Leiter Technik.
Versorgung aus externer Spannungsquelle. /
Connection of external sensors, 4-wire system.
Supply from external power source.
Sensor 2
0/4...20mA
Sensor 1
0/4...20mA
+24VDC ext.
0V ext.
Trennwandler 2 /
Galvanic separator 2
Trennwandler 1 /
Galvanic separator 1
L1 L2 L3 PE
Q1
Fexl. 1-3
XK
U1 V1 W1 PE
+24VDC/max.100mA
0V
DIGIN1(24VDC)
DIGIN2(24VDC)
DIGIN3(24VDC)
DIGIN4(24VDC)
ANIN1+
ANIN1-
ANIN2+
ANIN2-
DEVICE NET
IN
OUT
BLACK
BLUE
BARE
WHITE
RED
X1
X2
ON
121 R
OFF
S1 TERMINATION
X5
10 µ
1 MR
A13
X3
XK
X2
V-
CAN_L
CAN_H
V+
X4
A1.8
Steuerung/controls AUMATIC
X5
Versorgung 24VDC aus AUMATIC-Netzgerät. /
Supply 24VDC from AUMATIC power supply unit.
Für diese Zeichnung gelten die Bestimmungen über den Schutz für Urheberrecht.
Datum 02.02.2004
Bearb. Scheune
Gepr. Montoire
Norm
Zust. Änderung Datum Name
auma®
WERNER RIESTER GmbH & Co. KG
ASV-NET4-1
Legende
Auftragsnummer
Bestellnummer
Projekt

24. Appendix D Literature references

1. DeviceNet Specification Volume I,
Release 2.0, Errata 5, March 31, 2002

2. DeviceNet Specification Volume II,
Release 2.0, Errata 5, March 31, 2002

3. Controller Area Network
Grundlagen, Protokolle, Bausteine, Anwendungen
3. aktualisierte Auflage, Hanser Verlag
ISBN 3-446-21776-2

4. Open DeviceNet Vendors Association ODVA
www.odva.org

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

The screen of the fieldbus cable should be largely connected with the respective threads.

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

Notes

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).
Our website: **http://www.auma.com**

auma®

Solutions for a world in motion.

Europe

AUMA Riester GmbH & Co. KG
Factory Müllheim
DE-79373 Müllheim
Tel +49 7631 809 - 0
Fax +49 7631 809 - 250
riester@auma.com
www.auma.com

Factory Ostfildern-Nellingen
DE-73747 Ostfildern
Tel +49 711 34803 - 3000
Fax +49 711 34803 - 3034
riester@wof.auma.com

Service Centre Cologne
DE-50858 Köln
Tel +49 2234 20379 - 00
Fax +49 2234 20379 - 99
Service@sck.auma.com

Service Centre Magdeburg
DE-39167 Niederndodeleben
Tel +49 39204 759 - 0
Fax +49 39204 759 - 19
Service@scm.auma.com

Service Centre Bavaria
DE-85748 Garching-Hochbrück
Tel +49 89 329885 - 0
Fax +49 89 329885 - 18
Riester@scb.auma.com

North Office, Ship building sector
DE-21079 Hamburg
Tel +49 40 791 40285
Fax +49 40 791 40286
Stephan.Dierks@auma.com

North Office, Industry
DE-29664 Walsrode
Tel +49 5167 504
Fax +49 5167 565
Erwin.Handwerker@auma.com

East Office
DE-39167 Niederndodeleben
Tel +49 39204 75980
Fax +49 39204 75989
Claus.Zander@auma.com

West Office
DE-45549 Sprockhövel
Tel +49 2339 9212 - 0
Fax +49 2339 9212 - 15
Karlheinz.Spoede@auma.com

SoutheWest Office
DE-69488 Birkenau
Tel +49 6201 373149
Fax +49 6201 373150
Dieter.Wagner@auma.com

Württemberg Office
DE-73747 Ostfildern
Tel +49 711 34803 80
Fax +49 711 34803 81
Siegfried.Koegler@wof.auma.com

Baden Office
DE-76764 Rheinzabern
Tel +49 7272 76 07 - 23
Fax +49 7272 76 07 - 24
Wolfgang.Schulz@auma.com

Power plant sector
DE-79373 Müllheim
Tel +49 7631 809 192
Fax +49 7631 809 294
Klaus.Wilhelm@auma.com

Büro Bavaria
DE-93356 Teugn/Niederbayern
Tel +49 9405 9410 24
Fax +49 9405 9410 25
Mathias.Jochum@auma.com

AUMA Armaturenantriebe GmbH
AT-2512 Tribuswinkel
Tel +43 2252 82540
Fax +43 2252 8254050
office@auma.at

AUMA (Schweiz) AG
CH-8965 Berikon
Tel +41 566 400945
Fax +41 566 400948
RettichP.ch@auma.com

AUMA Servopohony spol. s.r.o.
CZ-10200 Praha 10
Tel +420 272 700056
Fax +420 272 704125
auma-s@auma.cz

OY AUMATOR AB
FI-02270 Espoo
Tel +35 895 84022
Fax +35 895 8402300
auma@aumator.fi

AUMA France
FR-95157 Taverny Cédex
Tel +33 1 39327272
Fax +33 1 39321755
stephanie.vatin@auma.fr
www.auma.fr

AUMA ACTUATORS Ltd.
GB- Clevedon North Somerset BS21 6QH
Tel +44 1275 871141
Fax +44 1275 875492
mail@auma.co.uk

AUMA ITALIANA S.R.L.
IT-20023 Cerro Maggiore Milano
Tel +39 0331-51351
Fax +39 0331-517606
info@auma.it
www.auma.it

AUMA BENELUX B.V.
NL-2314 XT Leiden
Tel +31 71 581 40 40
Fax +31 71 581 40 49
office@benelux.auma.com

AUMA Polska
PL-41-310 Dabrowa Górnicza
Tel +48 32 26156 68
Fax +48 32 26148 23
R.Ludzien@auma.com.pl
www.auma.com.pl

AUMA Priwody OOO
RU-141400 Moscow region
Tel +7 095 221 64 28
Fax +7 095 221 64 38
aumarussia@auma.ru
www.auma.ru

ERICHS ARMATUR AB
SE-20039 Malmö
Tel +46 40 311550
Fax +46 40 945515
info@erichsarmatur.se
www.erichsarmatur.se

GRØNBECH & SØNNER A/S
DK-2450 København SV
Tel +45 33 26 63 00
Fax +45 33 26 63 21
GS@g-s.dk
www.g-s.dk

IBEROPLAN S.A.
ES-28027 Madrid
Tel +34 91 3717130
Fax +34 91 7427126
iberoplan@iberoplan.com

D. G. Bellos & Co. O.E.
GR-13671 Acharnai Athens
Tel +30 210 2409485
Fax +30 210 2409486
info@dgbellos.gr

SIGURD SØRUM A. S.
NO-1301 Sandvika
Tel +47 67572600
Fax +47 67572610
post@sigurd-sorum.no

INDUSTRA
PT-2710-297 Sintra
Tel +351 2 1910 95 00
Fax +351 2 1910 95 99
jpalhares@tyco-valves.com

MEGA Endüstri Kontrol Sistemieri Tic. Ltd. Sti.
TR-06460 Övecler Ankara
Tel +90 312 472 62 70
Fax +90 312 472 62 74
megaendustri@megaendustri.com.tr

CTS Control Limited Liability Company
UA-02099 Kiyiv
Tel +38 044 566-9971, -8427
Fax +38 044 566-9384
v_polyakov@cts.com.ua

Africa

AUMA South Africa (Pty) Ltd.
ZA-1560 Springs
Tel +27 11 3632880
Fax +27 11 8185248
aumasa@mweb.co.za

A.T.E.C.
EG- Cairo
Tel +20 2 3599680 - 3590861
Fax +20 2 3586621
atec@intouch.com

America

AUMA ACTUATORS INC.
US-PA 15317 Canonsburg
Tel +1 724-743-AUMA (2862)
Fax +1 724-743-4711
mailbox@auma-usa.com
www.auma-usa.com

AUMA Chile Respresentative Office
CL- La Reina Santiago de Chile
Tel +56 2 821 4108
Fax +56 2 281 9252
aumachile@adsl.tie.cl

LOOP S. A.
AR-C1140ABP Buenos Aires
Tel +54 11 4307 2141
Fax +54 11 4307 8612
contacto@loopsa.com.ar

Asvotec Termoindustrial Ltda.
BR-13190-000 Monte Mor/ SP.
Tel +55 19 3879 8735
Fax +55 19 3879 8738
atuador.auma@asvotec.com.br

TROY-ONTOR Inc.
CA-L4N 5E9 Barrie Ontario
Tel +1 705 721-8246
Fax +1 705 721-5851
troy-ontor@troy-ontor.ca

MAN Ferrostaal de Colombia Ltda.
CO- Bogotá D.C.
Tel +57 1 4 011 300
Fax +57 1 4 131 806
dorian.hernandez@manferrostaal.com
www.manferrostaal.com

PROCONTIC Procesos y Control Automático
EC- Quito
Tel +593 2 292 0431
Fax +593 2 292 2343
info@procontic.com.ec

IESS DE MEXICO S. A. de C. V.
MX-C.P. 02900 Mexico D.F.
Tel +52 55 55 561 701
Fax +52 55 53 563 337
informes@iess.com.mx

Multi-Valve Latin America S. A.
PE- San Isidro Lima 27
Tel +511 222 1313
Fax +511 222 1880
multivalve@terra.com.pe

PASSCO Inc.
PR-00936-4153 San Juan
Tel +18 09 78 77 20 87 85
Fax +18 09 78 77 31 72 77
Passco@prtc.net

Suplibarca
VE- Maracaibo Estado, Zulia
Tel +58 261 7 555 667
Fax +58 261 7 532 259
suplibarca@intercable.net.ve

Asia

AUMA (INDIA) PRIVATE LIMITED
IN-560 058 Bangalore
Tel +91 80 2839 4655
Fax +91 80 2839 2809
info@auma.co.in
www.auma.co.in

AUMA JAPAN Co., Ltd.
JP-210-0848 Kawasaki-ku, Kawasaki-shi Kanagawa
Tel +81 44 329 1061
Fax +81 44 366 2472
mailbox@auma.co.jp

AUMA ACTUATORS (Singapore) Pte Ltd.
SG-569551 Singapore
Tel +65 6 4818750
Fax +65 6 4818269
sales@auma.com.sg
www.auma.com.sg

AUMA Middle East Rep. Office
AE- Dubai
Tel +971 4 3682720
Fax +971 4 3682721
auma@emirates.net.ae

PERFECT CONTROLS Ltd.
HK- Tsuen Wan, Kowloon
Tel +852 2493 7726
Fax +852 2416 3763
joeip@perfectcontrols.com.hk

DW Controls Co., Ltd.
KR-153-803 Seoul Korea
Tel +82 2 2113 1100
Fax +82 2 2113 1088/1089
sichoi@actuatorbank.com
www.actuatorbank.com

AL-ARFAJ Eng. Company W. L. L.
KW-22004 Salmiyah
Tel +965 4817448
Fax +965 4817442
arfaj@qualitynet.net

BEHZAD Trading Enterprises
QA- Doha
Tel +974 4433 236
Fax +974 4433 237
behzad@qatar.net.qa

Sunny Valves and Intertrade Corp. Ltd.
TH-10120 Yannawa Bangkok
Tel +66 2 2400656
Fax +66 2 2401095
sunnyvalves@inet.co.th

Top Advance Enterprises Ltd.
TW- Jhonghe City Taipei Hsien (235)
Tel +886 2 2225 1718
Fax +886 2 8228 1975
support@auma-taiwan.com.tw
www.auma-taiwan.com.tw

AUMA Beijing Representative Office
CN-100029 Beijing
Tel +86 10 8225 3933
Fax +86 10 8225 2496
mailbox@auma-china.com
www.auma-china.com

Australia

BARRON GJM Pty. Ltd.
AU-NSW 1570 Artarmon
Tel +61 294361088
Fax +61 294393413
info@barron.com.au
www.barron.com.au

2005-09-06

auma® auma®

AUMA Riester GmbH & Co. KG
P. O. Box 1362
D - 79373 Müllheim
Tel +49 (0)7631/809-0
Fax +49 (0)7631/809 250
riester@auma.com
www.auma.com

AUMA Riester GmbH & Co. KG
P. O. Box 1151
D - 73747 Ostfildern
Tel +49 (0)711 / 34803 0
Fax +49 (0)711 / 34803 34
riester@wof.auma.com
www.auma.com

ISO 14001 TÜV SÜD ISO 9001
Zertifikat-Registrier-Nr.
12 100/104 4269

For detailed information on AUMA products refer to the Internet:
www.auma.com

Y003.247/003/en/1.05a