Hygrophil Z, type 1701-41

Operating instructions

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Contents	page	issue date

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1 System description

1.1 Function and applications

Function

HYGROPHIL Z 1701-41 is a probe for measuring the level of humidity in gases.

The monitoring and control of gas humidity is essential in many processes in order to ensure products of consistently high quality, the economical use of energy, and compliance with permissible emission values.

The measuring principle is based on a special zirconium oxide sensor notable for its exceptional long-term stability and accuracy. The sensor delivers reliable measurement results, even under dust and dirt charged conditions and is suitable for gas temperatures up to 300°C.

Using a dual element sensor it is possible to eliminate the influence of foreign gases.

Beside of measuring the humidity the probe can optionally determine the content of oxygen in the process air. In many applications there is no need, therefore, to provide an additional instrument for this purpose.

Applications

As there is no need of any maintenance the process hygrometer HY-GROPHIL Z 1701-41 is suitable for continuous duty in industrial processes. Application examples:

- Textile tenter dryers
- Baking ovens
- Drying hoods
- Hot air tunnels
- Ceramics dryers
- Food industry
- Animal feed dryers
- Roasting plants
- Calcining furnaces
- Plasterboard dryers
- Rotary kilns and the like

Instruction of corrosive gas

SO_X, H_2S and vapor of silicone and adhesives will damage the performance of the sensor.

1.2 Technical data

Technical data	
Device-specific data	
Calibration temperature	100 °C, 200 °C, 300 °C
Useful measurement ranges of sensor	0.2...95 Vol% H2O; 0...98 °C DT*; 1...1000 g/kg MH; 0.2...25 Vol% O2; *additional computing error for DT: 20 °C<DT<50 °C: ±2 °C DT; 50 °C<DT<100 °C: ±0,5 °C DT
Programming via DIL switches	Output: 0/4...20 mA Measurement ranges: [0...25 % 02] 0...100 °C DT, 0...25% H2O; 0...50% H2O; 0...100% H2O; 0...250 g/kg MH; 0...500 g/kg MH; 0...1000 g/kg MH specific measurement ranges on request
Reproducibility	±0.2 Vol% H2O
Measurement error limits	1 Vol% H2O
Temperature effect of electronics	Max. 0,025%/K
Response time	t63 =25 s (for air in movement)
Warm-up time	approx. 10 min after a cold start and a power failure
Electrical data	
Auxiliary energy	AC/DC 24V +10%,-15%, 35 VA; PG 9, screw-type terminals (Top/Top)
Interfaces	CAN bus
Output	Isolated analog output, 0/4...20 mA; 12 bit resolution; load max. 500 Ω; PG 9, screw-type terminals (Top/Top)
Mechanical data	
Case	Die-cast aluminium case, 160 x 160 x 91 mm Protection type: IP 65
Sensor	Installation diameter/standard length see drawing! Special lengths on request Material: stainless steel (material no..: 1.4305)
Weight	2.8 kg
Dimensions of standard sensor	

2 Safety precautions

2.1 General information

These systems are built with due consideration to the regulations currently in force. They leave the factory in perfect condition after undergoing thorough inspection.

• Have the installation and maintenance of these systems carried out by qualified specialists only.
• Make sure that the data and operating conditions specified by BARTEC are observed.
• Study the operating instructions before installing and starting up the system. If you have questions concerning any particular aspects, contact our Customer Service for expert advice.
• Instruct your operating and maintenance personnel thoroughly and provide them with all essential information.
• The system's internal error messages are no replacement for safety devices in the larger facility in which the system is integrated.
• It is imperative to observe all the regulations which govern the operation of your facility.

2.2 Handling the humidity sensor

The life expectancy of the ZrO_2 sensor can be increased if you observe the following mounting and operating instructions:

• If condensation should form on the sensor as the result of a temperature shock (condensate on the shaft, etc.), you must keep the sensor in storage under ambient conditions until the condensation has dried. Storage in a dry, warm place (e.g. near a radiator) accelerates the drying process.
• The sensor must be warmed up before you bring it into contact with the moist atmosphere at the point of measurement.
 When using the sensor for the first time, wait for the "WARM-UP" phase to end (analog output current approx. 10min at error level; see also 4.3), before you mount the sensor at the point of measurement. During operation it is also important to make sure that moist gas (DT > 15 °C) does not come in touch with the sensor until the sensor is warm.
 The sensor should be switched on before all other parts of the facility.
• The sensor's life expectancy can be increased if it is switched on and off as rarely as possible. Ideally, the sensor should remain activated throughout its working life.
• The sensor has an operating temperature of up to 300 °C; contaminants are vaporised, therefore, provided the sensor does not come into contact with condensing substances (resins and the like) when cool.
 Clean the sensor only when it is dry. Remove dust or soot deposits with a brush or compressed air up to 3 bar.

The internal temperature of the sensor may reach local peaks of up to 500 °C during operation.
Never touch the sensor with your bare hands!
Never bring the sensor into contact with inflammable or liquescent materials!

2.3   Mounting instructions

- Mount the equipment so that the stipulated climatic values and temperatures are not exceeded.
- If at all possible, mount the equipment where it is unaffected by shocks and vibrations.
- Install a separate power supply line for the equipment.
- Avoid influences caused by electromagnetic fields, e.g. from motors, transformers and the like.
- If at all possible, keep the humidity transmitter away from contactor circuits. Where inductive consumers such as contactors, solenoid valves, large heaters etc. are installed in the vicinity, the contactor coil should be interference-suppressed with an RC element. All manufacturers of such devices are familiar with the problem and can supply suitable RC elements. If you have any questions on the electric installation anf the mounting site, contact our staff. For damages caused by yourself, you lose your warranty claims.

Metallic surfaces which can be touched (flange, probe shaft) must not exceed a temperature of 55 °C!
The fitter is responsible for keeping this instruction by using adequate safety measures (sheet metal shields, cover plates)

2.4   Electrical installation instructions

- Before connecting the auxiliary power, make sure that the equipment's operating voltage (24V, see the rating plate) matches the actual supply voltage.
- Have trained specialists do the wiring work.
- The wiring of the mains connections and the choice of conductor material must comply with the regulations laid down in VDE 0100 or with your local regulations as well as with the specifications listed in the Technical Data.
- All sensor and signal lines have to be laid away from control and mains voltage lines (separate, independent cable ducts).
- Shielded measurement and signal lines provided by the customer are to be earthed at one end only on the equipment.

2.5   Operating instructions

- Voltage fluctuations are permitted only within the specified tolerances.
- After a power failure the transmitter will start automatically with a "warm up" phase. Measurements are then available again after approx. 10 min.
- If there are reasons for suspecting that the equipment can no longer be operated safely (e.g. due to visible damage), shut down the equipment and secure it against being restarted.

⚠

Combustible gases
Use of the zirconium oxide sensor in explosive gases is prohibited. Temperatures inside the sensor can rise as high as 500 °C!

Pollution gases
The sensor's life expectancy may be shortened if sulphur oxides, hydrogen sulphides or halogens get into the measurement gas!

Dust and oil
Remove dust and oil deposits from the filters from time to time according to the degree of soiling.

Water
Drip water and hose water can destroy the sensor. Use filters or guard plates to protect the sensor from water. Ask us for advice if necessary.

2.6 Maintenance and repair instructions

- Live parts are uncovered when the humidity transmitter is opened. Be sure to disconnect the equipment from the voltage supply before you open any of these parts, e.g. for wiring or repair purposes.
- All repair or calibration work which requires the equipment to be open and the supply voltage to be activated must be performed only by specialists who are acquainted with the hazards involved.

Disclaimer

BARTEC accepts no liability for any damage resulting from non-observance of the safety regulations or from non-compliance with the operating instructions or operating conditions. This applies likewise to consequential damage in the facility as a whole.

2.7 Inspection and recalibration

✋

Since the zirconium-sensors can be subjected to a drift depending on demand, we recommend an annual inspection and/or recalibration.
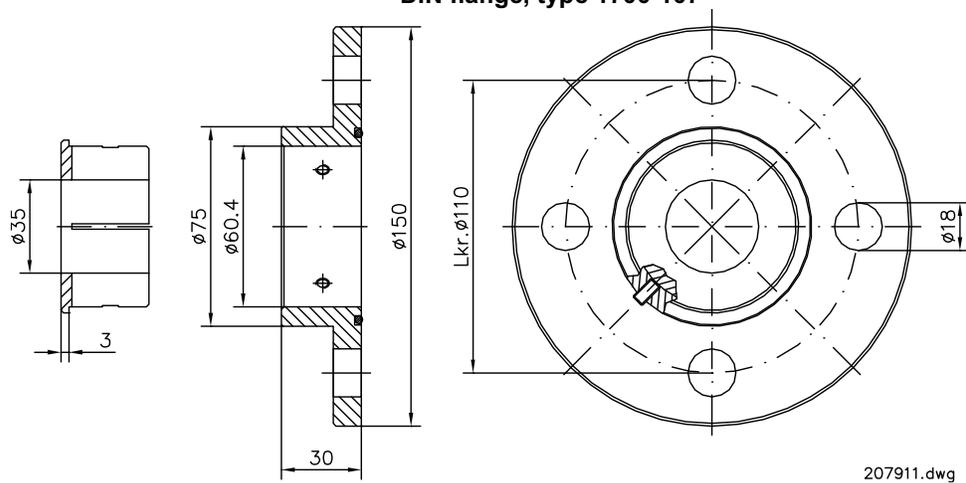
3   Installation

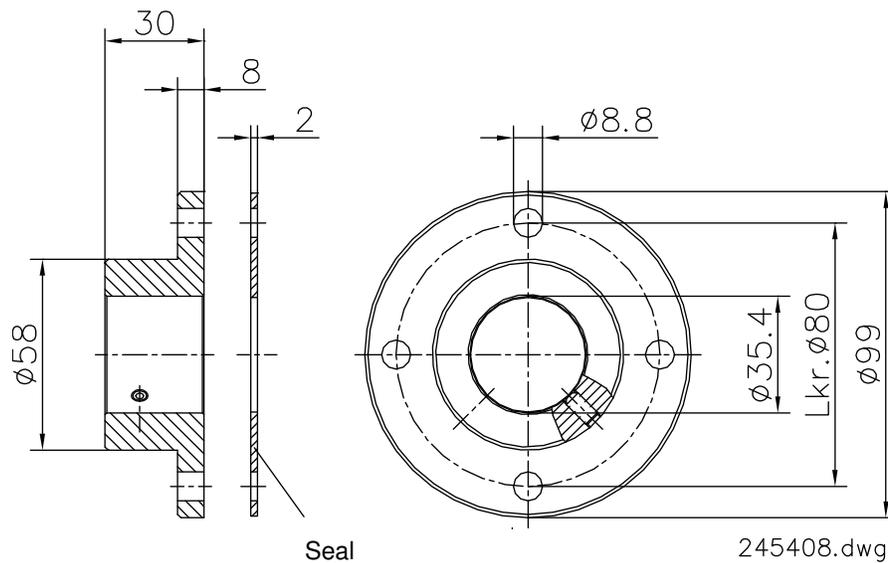The humidity sensor can be mounted in any position according to the direction of flow.

The following description is based on mounting the sensor with the flange available as an accessory.

If a different solution is used, proceed accordingly.

DIN flange, type 1700-107

207911.dwg

Mounting flange, type 1700-110

Seal

245408.dwg

Sensor with mounting flange

241306.dwg
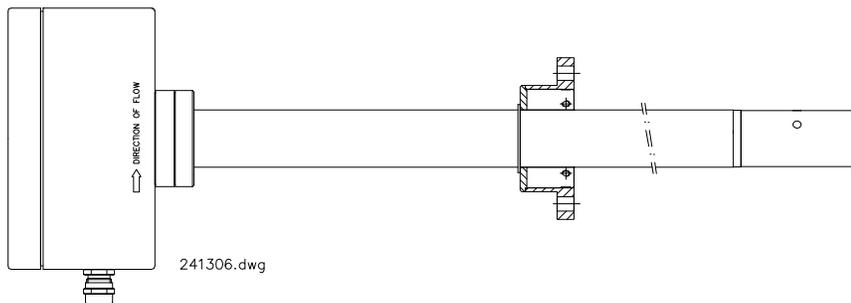
- Mount the flange for the humidity sensor at the point of measurement.
- Undo the four screws in the case lid and take off the lid.
- Make the electrical connections as indicated on the cover in the case. Wire up the connections of the auxiliary energy and the analog output (also CAN connections if required).
- Put on the lid and fasten it with screws.

CH   CL   +24V   OV   S

DC+24V oder ~AC24V~   -   + Analog output 0/4 – 20 mA -   CH   CL   +24V   OV   S
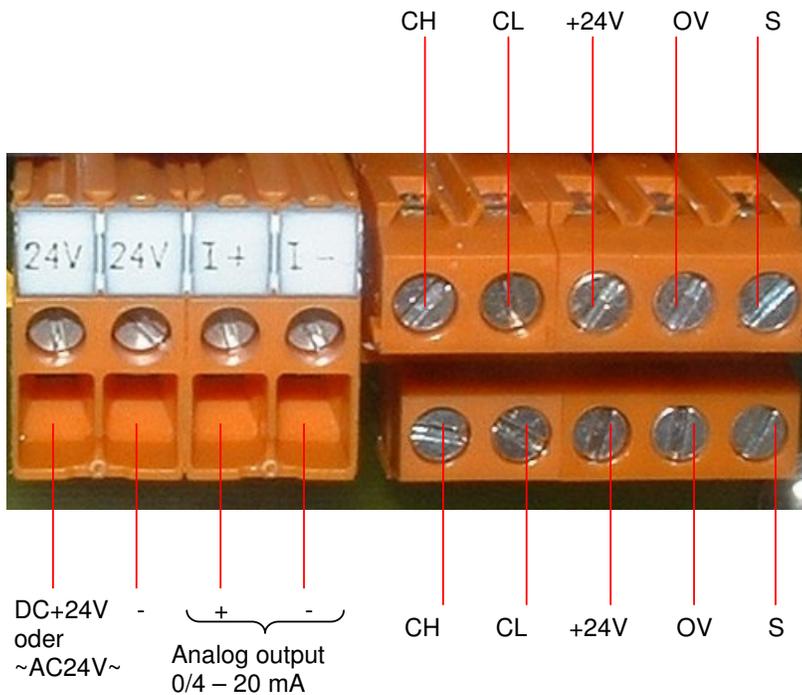
S   = Shield
CH = CAN High
CL = CAN Low
+24V
0V

Clamps only serve to loop through the supply voltage for CAN devices with no own supply terminals.

Before you install the sensor, make sure that its rated temperature is suitable for the measurement gas temperature in question.
The quoted level of accuracy and a satisfactory life span are only possible if the temperature of the measurement gas does not exceed the permissible sensor temperature.

- Observe the instructions set out in the Section "Safety precautions" when installing the sensor!
- The sensor can be mounted in any position provided you observe the direction of flow.
- Protect the measuring cell area from drip water and hose water, e.g. by using guard plates.
- If you install a baffle plate, be sure to allow for the direction of gas flow!

Under no circumstances is the sensor to be struck by drip water or hose water.

- Do not install the sensor at the point of measurement until the warm-up phase is over.
  A cold, unwarmed sensor may be installed only if it is certain that no condensation will form.
- If any filters, guard plates or air current reducers are required, fit them before you install the sensor. Use the arrow on the transmitter case to check the position of installation. The arrow indicates the "DIRECTION OF FLOW".
- Insert the sensor far enough into the flange for the actual measuring cell (the first 20 cm at the front) to be sufficiently immersed in the measurement gas. Be sure to keep a minimum distance of 100 mm from the chamber wall.
- Use the mark "DIRECTION OF FLOW" on the side of the case to check the position of installation.
- Fasten the sensor in the flange by tightening the screw of the clamping bush.

If the measurements drift away slowly or adopt implausible values (under otherwise constant gas conditions), the reason is a poor level of air exchange. Remove any filters that may be present.

4 Operation

4.1 Startup

To start up the measurement system, switch on the auxiliary power. Please remember to control the overall facility so that the sensor reaches its operating temperature before coming into contact with the moist measurement gas.

Never allow the humidity sensor to come into contact with the measurement gas until the warm-up phase is over.

When you start up the equipment for the first time, do not install the humidity sensor at the point of measurement until the sensor is warm or make sure that no moist measurement gas comes into contact with the sensor until the warm-up phase is over.

Never touch the hot sensor with your bare hands!
Never bring the sensor into contact with inflammable or liquescent materials!
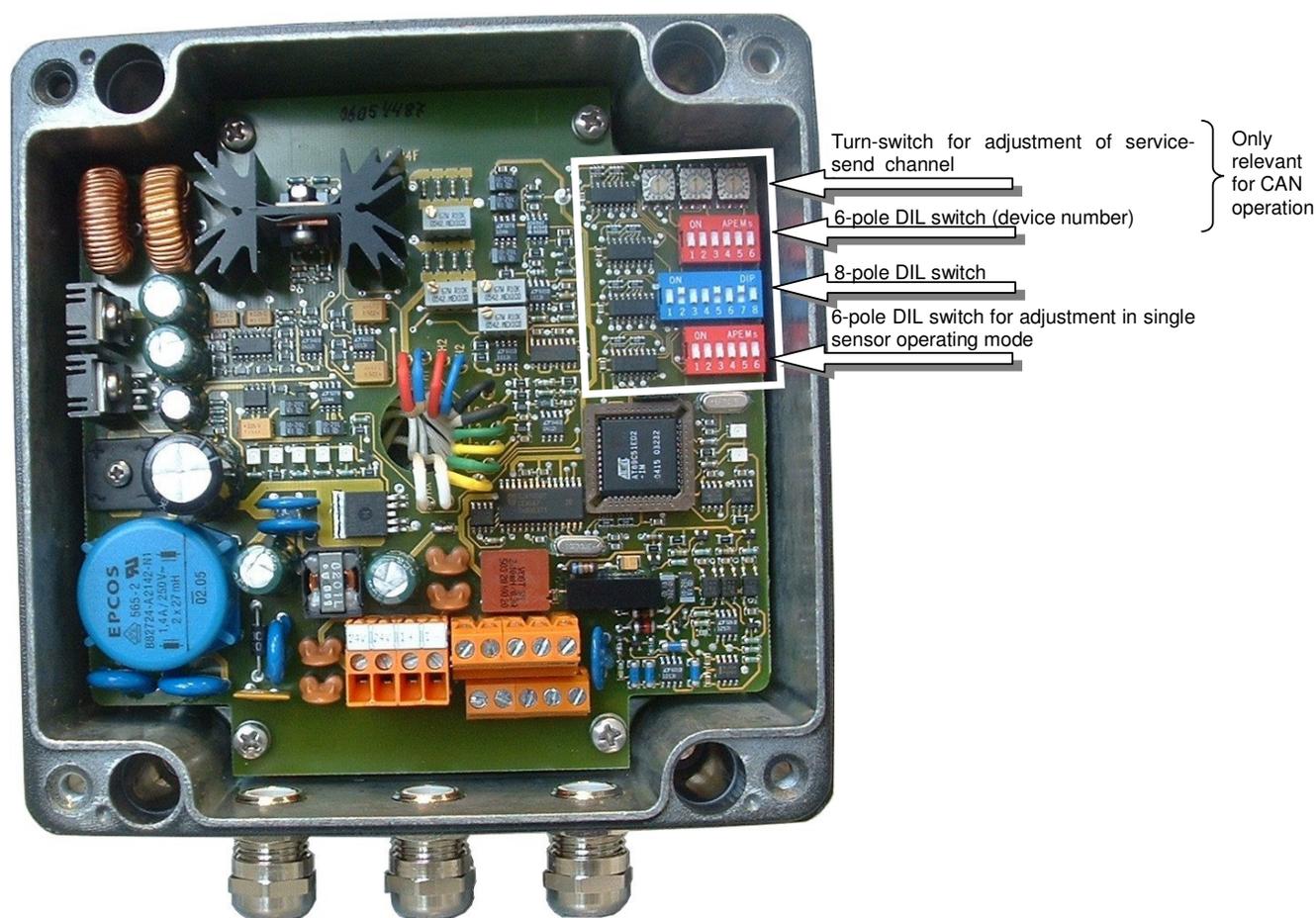
If there is a risk of condensed water forming when the facility is switched off, we recommend supplying the measurement system with auxiliary power and to keep it switched on all the time independently of the facility as a whole. Otherwise the sensor has to be dried before being put into operation again.

4.2 Programming

Where necessary, carry out the programming prior to starting up the system for the first time. The following settings are possible using DIL switches and turn switches:

• Select the measurement variable
• Fix the measurement range for the selected measurement variable
• Fix the error current level
• Fix the output current range
• Settings for CAN operating mode (see page 4-3).
• Settings for single sensor operating mode (see page 4-3).

1. Disconnect the equipment from the voltage source.
2. Undo the four screws in the case lid and take off the lid.
3. Using tweezers or small pliers, carefully place the switches in position to match the required programming (see page 4-3).

Turn-switch for adjustment of service-send channel

6-pole DIL switch (device number)

Only relevant for CAN operation

8-pole DIL switch

6-pole DIL switch for adjustment in single sensor operating mode

Switch numbers
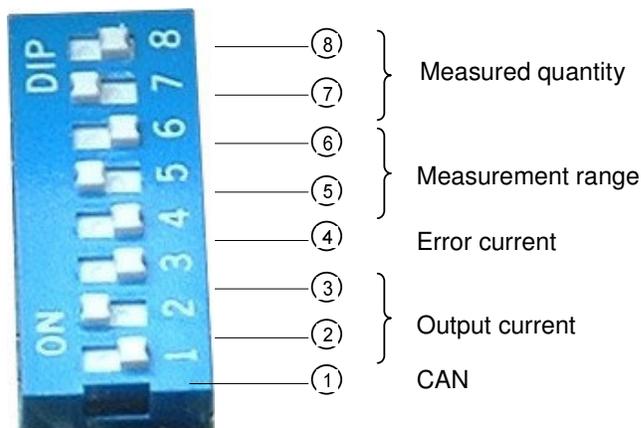
Use switches **7** and **8** to **select the measured quantity** presented at the analog output.

Selecting the measured quantity	
Measured quantity	**Switch no..**
Vol % O_2	⑧ = ON ⑦ = OFF
MH	⑦ = ON ⑧ = OFF
DT	⑦ and ⑧ = ON
Vol % H_2O	⑦ and ⑧ = OFF

The **measurement range** is fixed with switches **5** and **6** for the selected measured quantity.

Selecting the measurement range		
Measured quantity	**Measurement range**	**Switch no.**
H_2O	0...25%	⑥ = ON ⑤ = OFF
	0...50%	⑤ = ON ⑥ = OFF
	0...100%	⑤ = ON ⑥ = ON
MH	0...250 g/kg	⑥ = ON ⑤ = OFF
	0...500 g/kg	⑤ = ON ⑥ = OFF
	0...1000 g/kg	⑤ = ON ⑥ = ON
DT	0...100 °C	⑤ = ON ⑥ = ON
Vol % O_2	0...25%	⑥ = ON ⑤ = OFF

The current output level in the case of an error is fixed with switch **4** (the LED „ERROR" will be switched on at the same time)

Fixing the error curent level	
Output signal	**Switch no.**
0 mA	④ = OFF
21 mA	④ = ON

The **output signal** from the analog output is fixed with switches **2** and **3**.

Fixing the output signal from the analog output	
Output signal	**Switch no.**
0...20 mA	② = ON ③ = OFF
4...20 mA	③ = ON ② = OFF

If all switches are "OFF", the **default setting** is used.
This means 70...100 Vol % H_2O/ 0...20 mA output signal/ 0 mA error current!

✳   If there is present a **customer-specific programming** it will be used in-
stead of the default settings.

4.3   Status messages

Various system statuses are indicated by LEDs on the motherboard and on
the CPU board. The case lid has to be opened to check the LEDs. The
printed circuit-boards are to be found underneath the cover plate. The LED
"BUSY" and the LED "ERROR" are visible through a hole in the cover plate.
For checking the other LEDs you must remove the cover plate.

⚠ Never operate the equipment for lengthy periods without the cover plate.
The cover plate performs a cooling function. Components may be damaged
during operation without the cover plate.

Power Sensor (red)
24V (red)
+5V – Power CPU (red)
Heating-HW (red)
Heating-SW (red)

Error (red)

Busy (green)
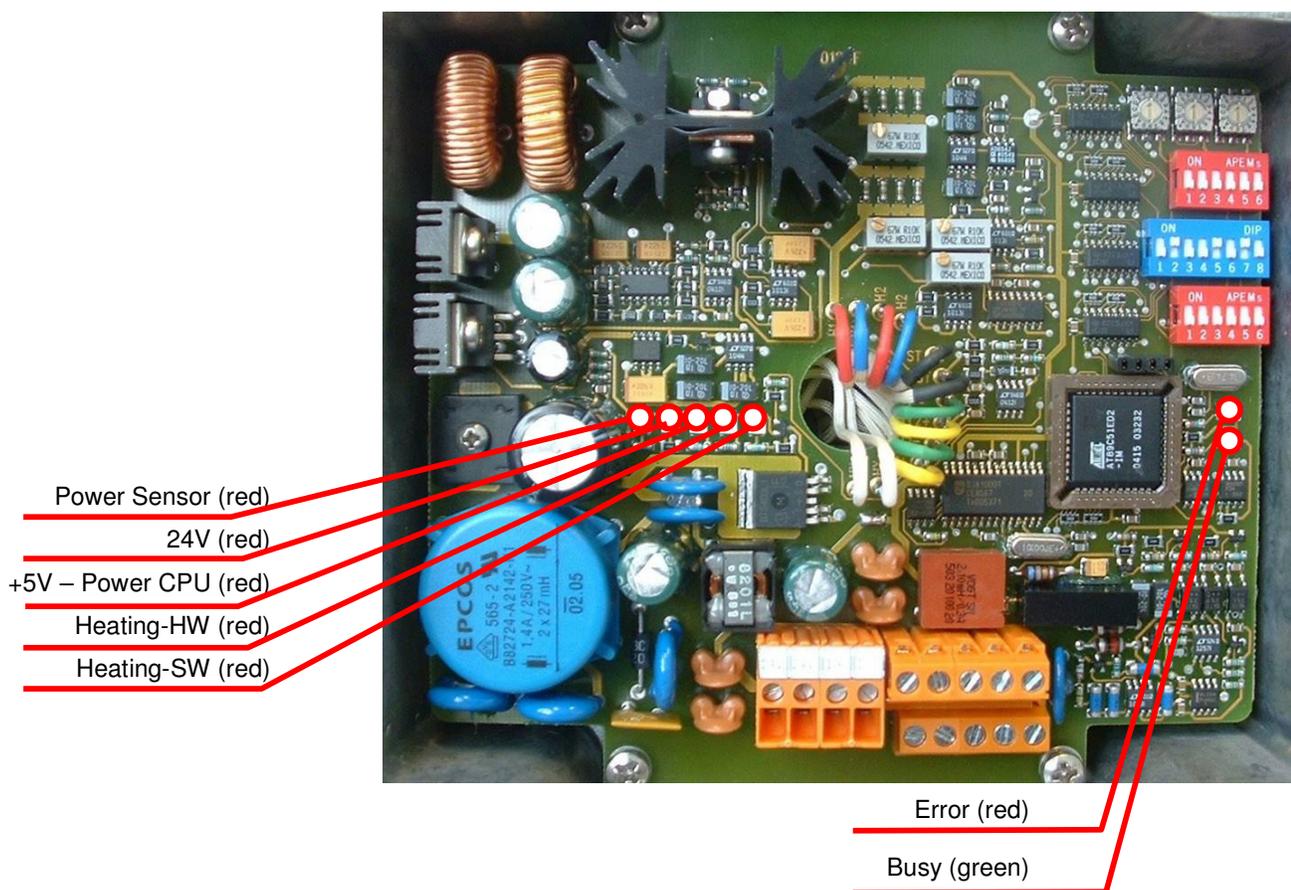
| LED Designation	Status	Meaning
24V (redt)	OFF	No supply voltage activated or the reversible fuse has blown
	ON	Supply voltage activated
POWER CPU (redt)	OFF	The 5V supply is faulty
	ON	The 5V supply is OK
POWER SENSOR (redt)	OFF	- During the "warm up" phase of the sensor (for approx. 10 min) - When there is a sensor fault (after expiry of the fault-tolerant period (approx. 10 min)
	Shines with increasing intensity	When warming up the sensor elements (for approx. 10 min)
	ON	When the warming up is over
HEATING HW HEATING SW (redt)	Flash together in rhythm with the regulator	Sensor heating OK, is being regulated to the right temperature
	Both OFF	Heating is not activated
	Both ON	Heating with full power
	SW ON HW OFF	Defect in the heating system, do not carry on using the sensor in moisture!
	SW OFF HW ON	Defect in the heating control system, risk of overheating. Switch off immediately!
ERROR/ (red)	OFF	No error, measuring mode
	ON	Error persists after the fault-tolerant period
	Flashes	Off or warm-up phase
BUSY (green)	OFF	- Fault-tolerant period (approx. 10 min) has expired - CPU does not start up
	Flashes	The program running as normal
	ON	CPU not running

4.4 Measuring operation via CAN bus

For this operating mode, put switch 1 at the the 8-pole DIL switch "ON" .
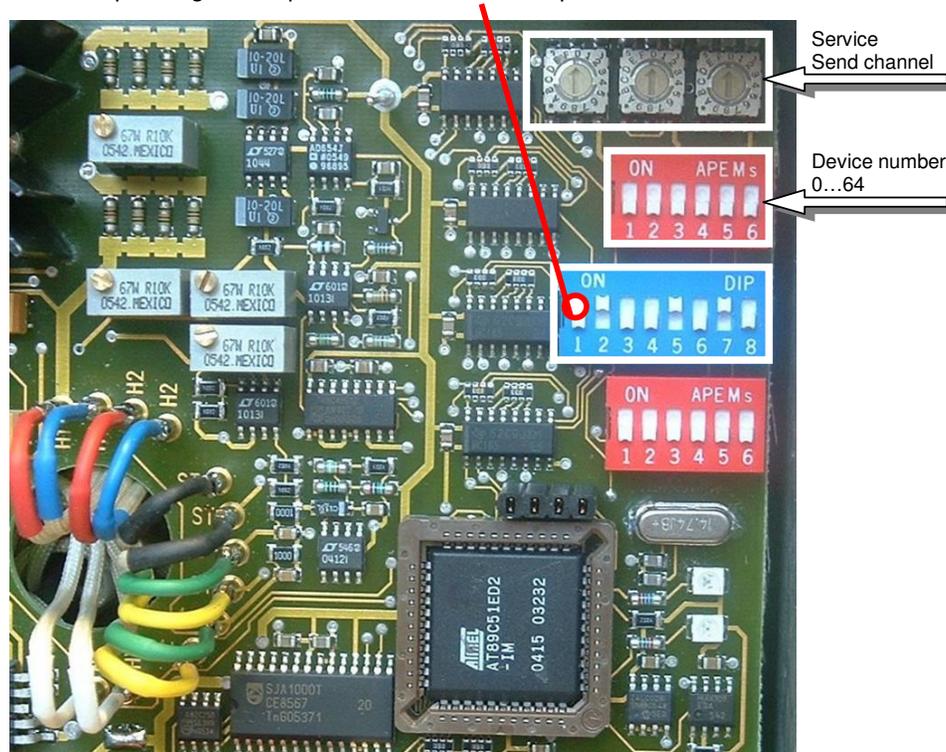

As several sensors 1701-41 can be operated at the CAN bus, each sensor will be called CAN station hereafter.

This measuring mode requires a CAN master (PC, SPS or the like) which parameterises and operates the measuring sensor in accordance with the following specification.

Specification and requirements of the participants on the CAN bus

Although a CAN-bus network is a multi-master system , there is a difference between a CAN master and a multitude of connected CAN stations. While the individual CAN stations show I/O functionality in the form of sensors and actors, the CAN master´s task is to transfer the individual data telegrams of all CAN stations participating in the network to a higher level. Likewise, nominal values can be transferred from the data server via the CAN master to the individual participants.
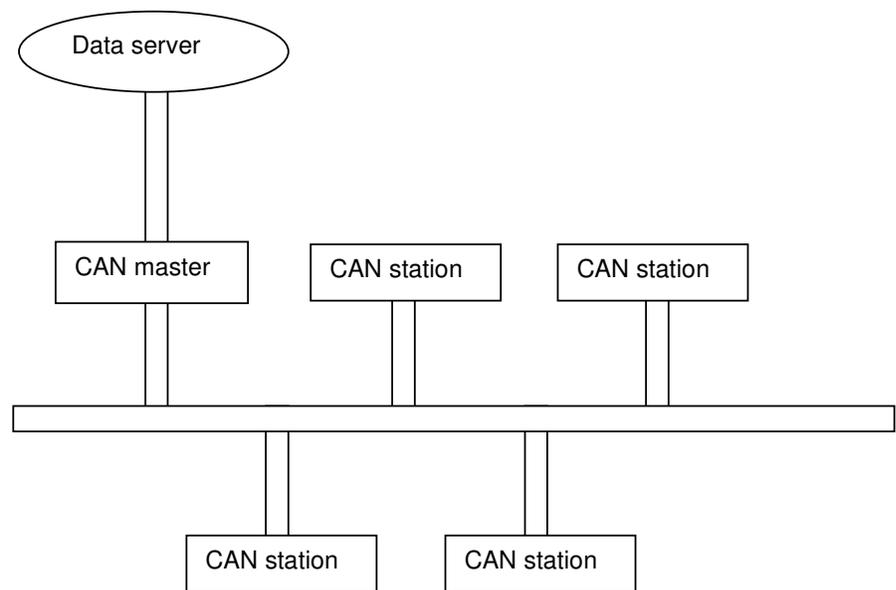
The individual participants on the CAN bus are subdivided in device classes. To distinguish them within the individual device classes, device numbers in the form of serial numbers are assigned.

Requirements to the individual CAN stations

- Adjustable baud rate (standard setting 250 kBit/s up to a bus length of 250 m).

- Adjustable 11-bit identifier for service-send channel of CAN station (higher priority than 29 bit identifier with the same ID) for parameterisation.

- The device class number is firmly assigned to the respective device (1 byte $\rightarrow$ 256 device classes are possible).

- Subordinate device number must be adjustable (1 byte $\rightarrow$ 256 devices are possible within a class).

- Data telegrams on the runtime (i.e. after parameterisation) use 29-bit identifiers.

Parameterisation of the CAN station by the CAN master

After the run-up phase of the CAN master, all participants connected to the bus have to be parameterised. The parameterisation consists of a standard parameterisation (mandatory) for all device classes, and an extended parameterisation (optional) which depends on the respective device class. This takes place via the so-called service channels. For parameterisation, each CAN station has a pair of service channels to the master consisting of a service send channel and a service receive channel.

Via the service send channel, the CAN station tries to log on until the CAN master answers to the request for parameterisation. By means of the request telegram received from the CAN station, the master can identify the participant and then parameterise it.

Service send channel (adjustable)

| CAN master | | CAN station_X |

Service receive channel **fixed: 100d and 64 h respectively**
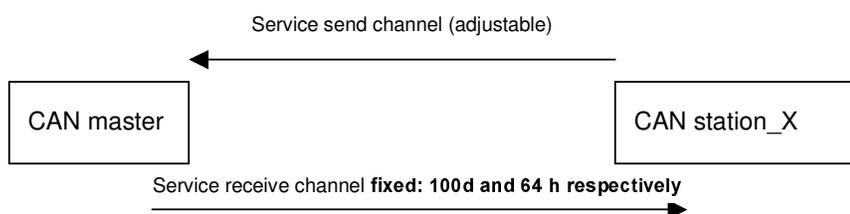
The service send channels of the CAN stations use adjustable uneven-numbered 11-bit identifiers. The service receive channel of all CAN stations belonging to the pair of service channels uses a **fixed** 11 bit identifier:

Service receive channel identifier at the CAN station:

100d / 64 hex respectively

Operational sequence of the standard parameterisaton via the service channels:

Step 1
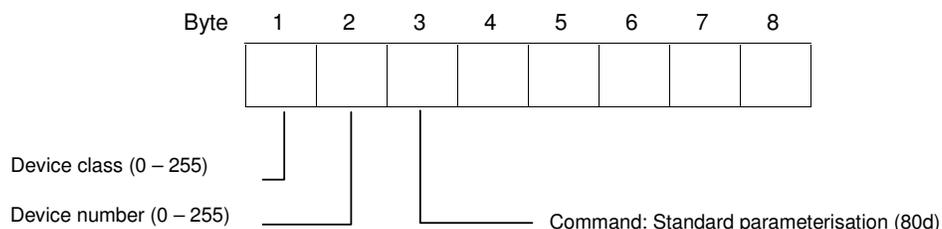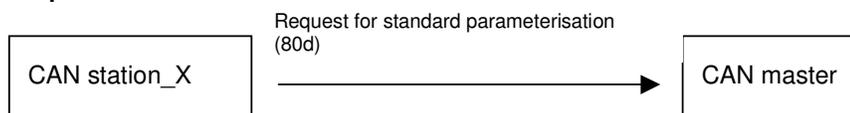
Request for standard parameterisation
(80d)

| CAN station_X | | CAN master |

Byte   1   2   3   4   5   6   7   8

Device class (0 – 255)

Device number (0 – 255)

Command: Standard parameterisation (80d)

Device class

Device class of CAN station_X (source)
Admissible values: 1 – 127

Device number

Device number of CAN station_X (source)
Admissible values: 1 – 127

The CAN-Station_X sends its requests for standard parameterisation via the service-send channel at a cycle time of 1 sec until it receives via the service-receive channel the first standard parameterisation telegram with telegram no. 0x00 (start code for standard parameterisation).

Step 2
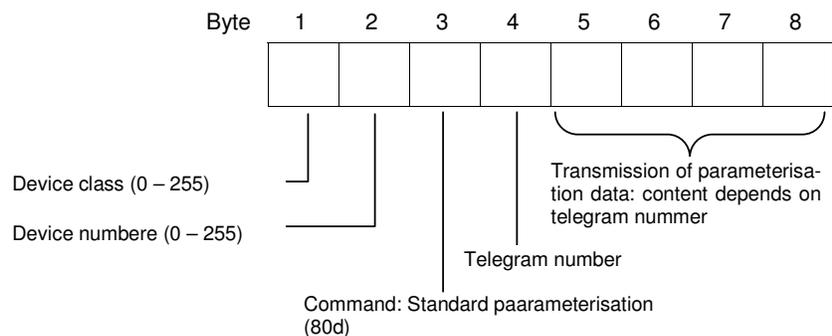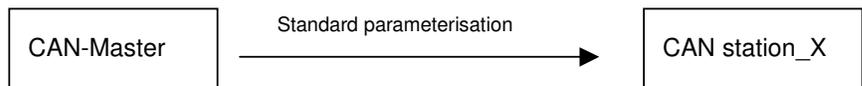
Device class

Device class of CAN Station_X (target)
Admissible values: 1 – 127: selection of device class
                       255: all device classes are addressed

Device number

Device number of CAN station_X (target)
Admissible values: 1 – 127: selection of CAN station with device number within device class
                       222: all devices within a device class are addressed

Telegram number

0x00:	start code for standard parameterisation
0x01-0xFE:	serial telegram number (see table)
0xFF:	end code for standard parameterisation

The standard parameterisation of each CAN station consists of maximally 7 successive parameterisation telegrams (1 start telegram, up to 5 parameterisation data, 1 end telegram) identified by the respective telegram number.

For the content of each telegram, see explanation in the table below

Telegram number	Parameterisation data (uint32)	Remarks
0	Without meaning	Start code for parameterisation
1	29-bit identifier nominal value specification channel	Receive channel at CAN station
2	29-bit identifier actual value request channel	Receive channel at CAN station
3	29-bit identifier actual value confirmation channel	Send channel at CAN station
4	29-bit-identifier state change channel	Send channel at CANstation
5	Baud rate	New adjustment or standard (250 kBit/s)
255	Without meaning	End code for parameterisation

The start of the standard parameterisation is characterised by the start code telegram, followed by maximally 5 parameterisation telegrams and finished by the end code telegram. After the end code telegram has been received, the standard parameterisation is considered as finished.

State diagram for standard parameterisation of a CAN station

```
                    ┌──────────────────────────────────────────┐
                    │  Send: request for standard parameterisation │◄──
                    │            Cycle time: 1 sec               │
                    └──────────────────────────────────────────┘
                                                        No response
                                                        from master

Standard parameterisation                    End code 0xFF of standard parame-
telegrams with telegram number!              terisation not received within timeout
= Start code 0x00

Reset command 0,52         Standard parametersiation
                           telegrams with telegram number for
                           start code 0x00

                    ┌──────────────────────────────────────────┐
                    │  Receipt of standard parameterisation data │
                    │            Timeout: 5 sec                  │
                    └──────────────────────────────────────────┘
                                                        Receipt of standard parameteri-
                                                        sation telegrams with telegram
                                                        number 0x01-0xFE

                    End code telegram 0xFF of
                    standard parameterisation

┌────────────────────────────────┐    ┌────────────────────────────────┐
│ Send: Request for extended     │    │ Exchange of user data via       │
│ parameterisation               │    │ process data channels           │
│ Cycle time: 1 sec              │    │                                 │
└────────────────────────────────┘    └────────────────────────────────┘

        After the extended parameterisation has been
        finished
```
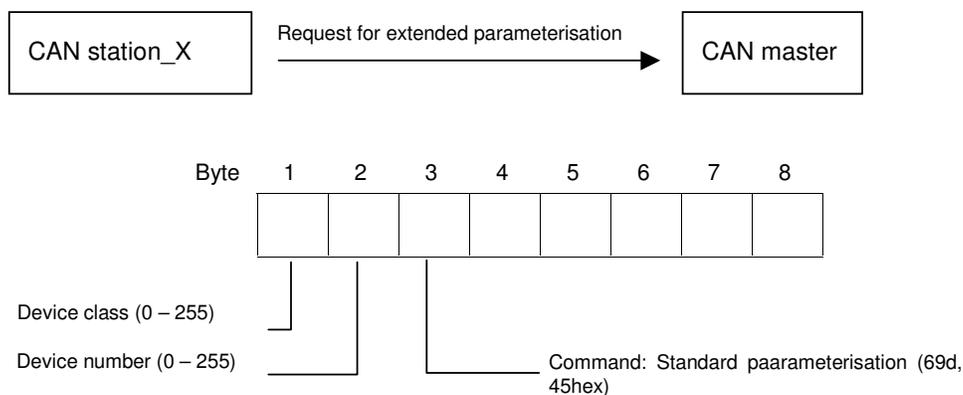
The reset command has the highest priority on the service channels, the CAN station leaves the current state and immediately returns to the original state *Request for standard parameterisation.* This also applies during the receipt of the individual parameterisation data telegrams.

The specified time monitoring with a timeout of 5 sec. begins with the receipt of the start code telegram 0x00 of the standard parameterisation. If after the expiry of the timeout period the end code telegram 0xFF is not received, the CAN station again returns to the original state *Request for standard parameterisation.*

Operational sequence of the extended parameterisation via the service channels

As mentioned above, certain device classes additionally require a class-specific extended parameterisation after the standard parameterisation. The extended parameterisation is mandatory for these devices. The operational sequence of the extended parameteristaion is divided in two steps:

Step 1

CAN station_X	Request for extended parameterisation →	CAN master

Byte	1	2	3	4	5	6	7	8

Device class (0 – 255)

Device number (0 – 255)

Command: Standard paarameterisation (69d, 45hex)
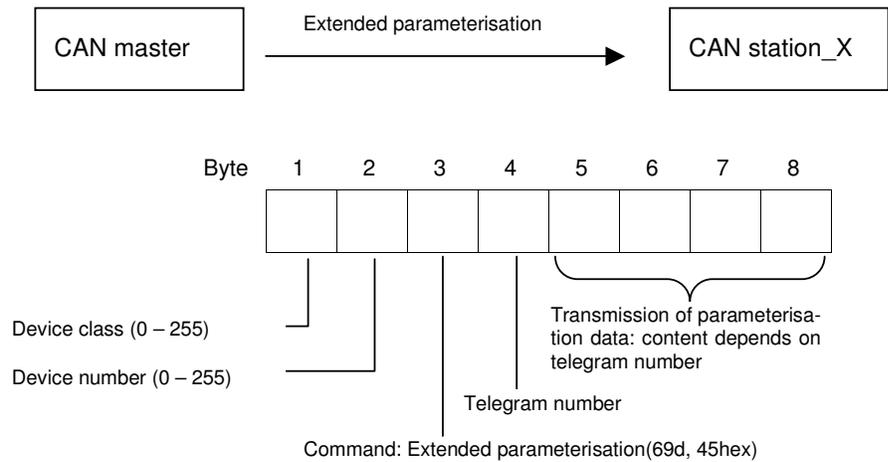
<u>Device class</u>

Device class of CAN station_X(source)
Admissible values: 1 – 127

<u>Device number</u>

Device number of CAN station_X(source)
Admissible values: 1 – 127

After the standard parameterisation has been finished, the CAN-Station_X sends its requests for extended parameterisation via the service send channel at a cycle time of 1 sec until it receives via the service receive channel the first extended parameterisation telegram with telegram no. 0x00 (start code for extended parameterisation).

Step 2

Device class

Device class of CAN station_X(target)
Admissible values: 1 – 127: selection of device class
                                    255: all device classes are addressed

Device number

Device number of CAN station_X(target)
Admissible values: 1 – 127: selection of CAN station with device number-
                                    within a device class
                                    255: all devices within a device class are
                                    adressed

Telegram number

0x00:   start code for extended parameterisation
0x01-0xFE: serial telegram number with class-specific
                  content in the parameterisation data field
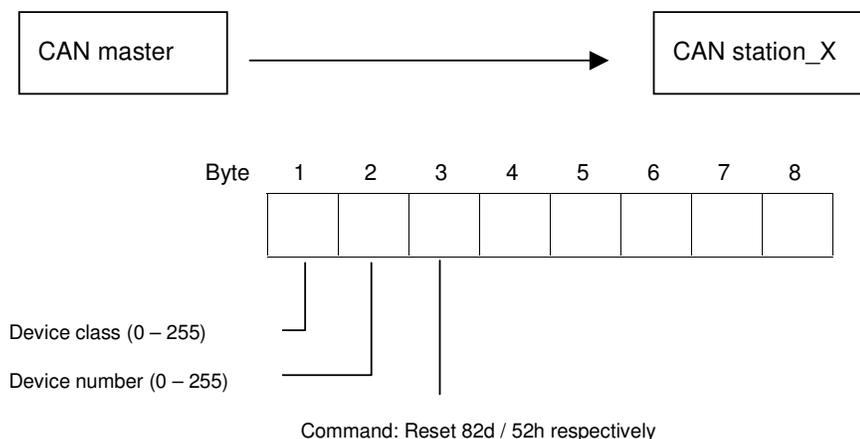0xFF: rnd code for extended parameterisation

Parameterisation data
Class-specific content, depending on telegram number

Further commands via service channels

For the transmission of telegrams on the service channels, the command is entered in the 3rd byte of the data field. Depending on the command code, the addressed CAN stations carry out the required functions. At present the following commands applying to all device classes are defined:

Reset the CAN station via the service channel

CAN master		CAN station_X

Byte   1   2   3   4   5   6   7   8

Device class (0 – 255)

Device number (0 – 255)

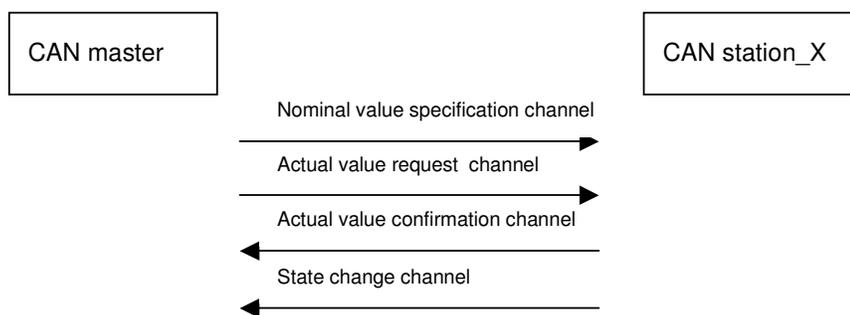Command: Reset 82d / 52h respectively

By means of a RESET telegram, the master can reset the CAN station into its original state. Consequently the RESET telegram has the highest priority of all command telegrams on the service channels and interrupts all other commands.

After receiving a RESET telegram, the CAN station switches to the state of the standard parameterisation request and waits for the standard parameterisation to be carried out by the CAN master.

The user data transmission channels (process data channels)

A maximum of four transmission channels can be used between a master and a station. If the two service channels are included, there are maximally six transmission channels per station.

CAN master		CAN station_X

Nominal value specification channel

Actual value request channel

Actual value confirmation channel

State change channel

Description of the user data channels

Nominal value specification channel

By means of this channel, the master can make certain nominal value specifications or configurations.

Actual value request channel

On request of the master via this channel, selected actual values can be requested.

Actual value confirmation channel

Via this channel, the CAN station makes available the required actual values.

State change channel

The CAN station automatically transmits each state change to the master.

Data format for user data transmission

Byte	1	2	3	4	5	6	7	8

Device class (0 – 255)

Device number (0 – 255)
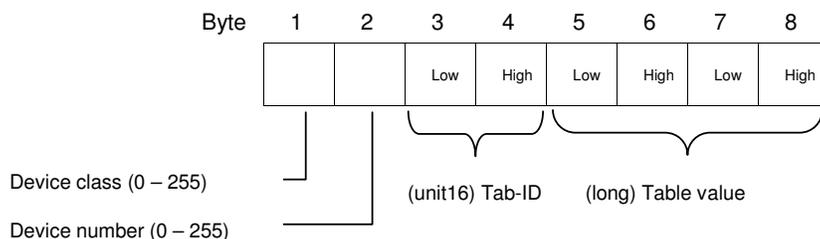
(unit16) Tab-ID
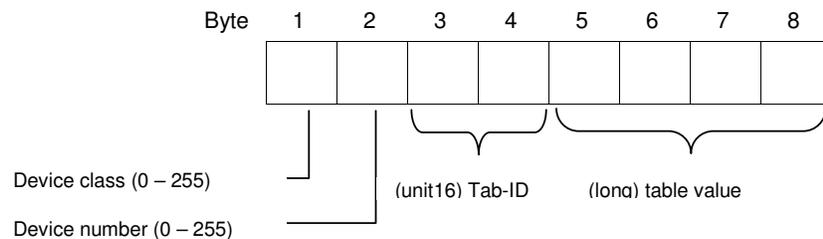
(long) table value

Tab-ID

The table ID makes possible an unequivocal assignment of the value to be transmitted.

Table value

Contains the current value of the required entry.

The respective table value is transmitted in the data type **long**. Consequently, floating values have to be multiplied by a factor to be transmitted in whole numbers**.**

Data transmission is carried out in accordance with the Intel convention and is explained in an example:

Byte	1	2	3	4	5	6	7	8
			Low	High	Low	High	Low	High

Device class (0 – 255)

Device number (0 – 255)

(unit16) Tab-ID   (long) Table value

This applies to the parameterisation on the service channels and to the data transmission on the user data channels.

Specification of zirconium sensor 1701

Decvice class:	20
Device number:	adjustable from 1 to 63
Parameterisation:	Standard parameterisation
Service send channel:	adjustable 11 bit standard identifier
Service receive channel:	100d
Baud rate:	Standard setting 250 kBit/s
Transmission channels:	All of the four user data transmission - channels are used
Support	Global and class telegrams with device class 255 and device number 255

Table ID	Factor	Description
1000	1000	Dewpoint DT in °C
1001	1000	H20 in VOL %
1002	1000	MH in g/kg
1003	1000	O2 in VOL %
2000	1	Sensor status: bit-coded (32 bit) in accordance with reference table BARTEC, see below
2001	1	Version
2002	1	Serial number
3000	1	Operating mode: 0 or 1 Operating mode: 0 → transmission of values to actual value confirmation channel after request of the master on the actual value request channel (standard) Operating mode: 1 → automatic transmission of values on the state change channel after each value change The operating mode can only be changed by the master via the nominal value specification channel. The currently applied operating mode can be requested via the actual value request channel.

A measurement value telegram of a 1701 sensor with table-ID 1000 and a measured value of 70000 would have the following meaning:

Dewpoint DT = 70.00 °C

Sensor state

State	Meaning	Bit code (32 Bit)
CAN (Bit 0 – 15)	WARNING-LEVEL BUS-OFF	0x00000001 0x00000002
Sensor (Bit 16 – 31)	Warm-up phase is over, normal operation, no errror	0x00000000
	Warm-up phase (LEDs "ERROR" and "BUSY" are flashing)	0x00010000
	Error after warm-up phase (LEDs "ERROR" and "BUSY" are lit permanently)	0x00020000
	Grave error, sensor is not able to measure (sensor is put out of operation, reset only via OFF/ON)	0x00040000

4.5 Single element operation

In the normal operating mode, the measuring sensor works with a dual element sensor. An operating mode with only one sensor element (O_2 sensor) may be reasonable for certain applications. The foreign share to be taken into consideration can then be adjusted in the range of 0.15 vol % via DIL switches. In this case, a recalibration on site is possible too.
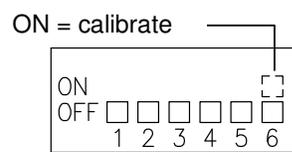

Switch for single element operation
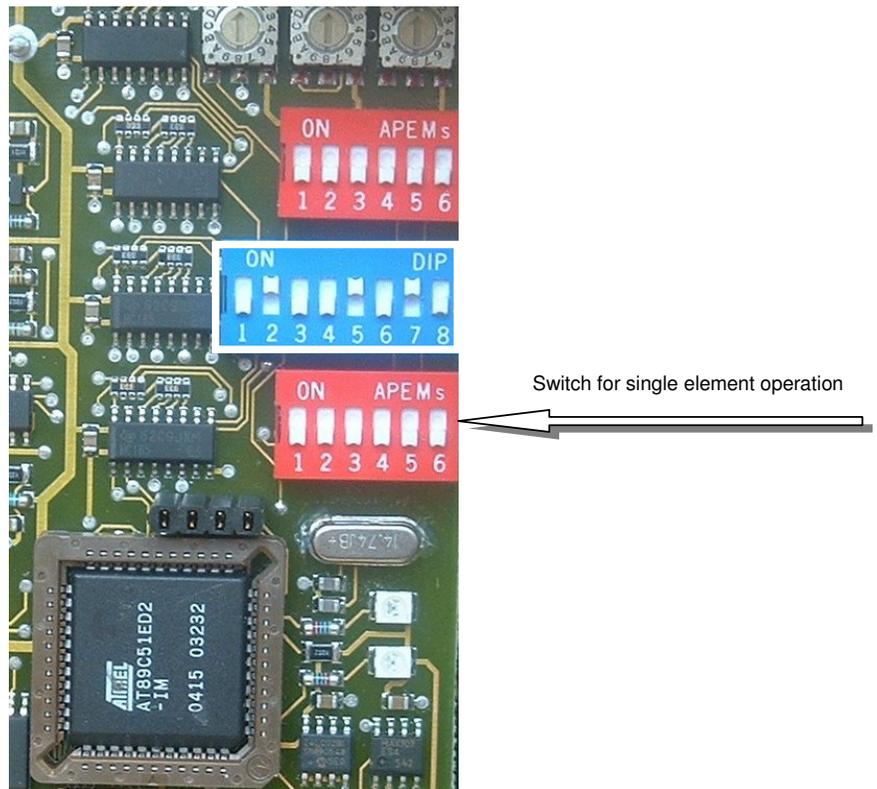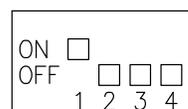
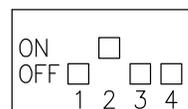H2O is identified by both sensors.

ON = calibrate

H2O is calculated from O2 and the preset foreign gas.

Fremdgas

Calibrate

The sensor can only be calibrated in normal room air and has to be demounted at the measurement site if required. For an exact calibration, the sensor should be turned on at least 1 hour before. Turn switches 5 and 6 "ON" for the calibration process.

The calibration process is as follows:

- Turn off sensor
- Turn switches 5 and 6 "ON"
- Preset foreign gas (for normal room air = 1)
- Turn on sensor and wait until warm-up phase is over
- Calibration is finished if only the green LED "BUSY" is flashing. The new calibration values have been stored.

0 Vol %

1 Vol %

15 Vol %

212860.dwg

Note:

After the calibration process, switch 6 **must** be turned **"OFF"** again!

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