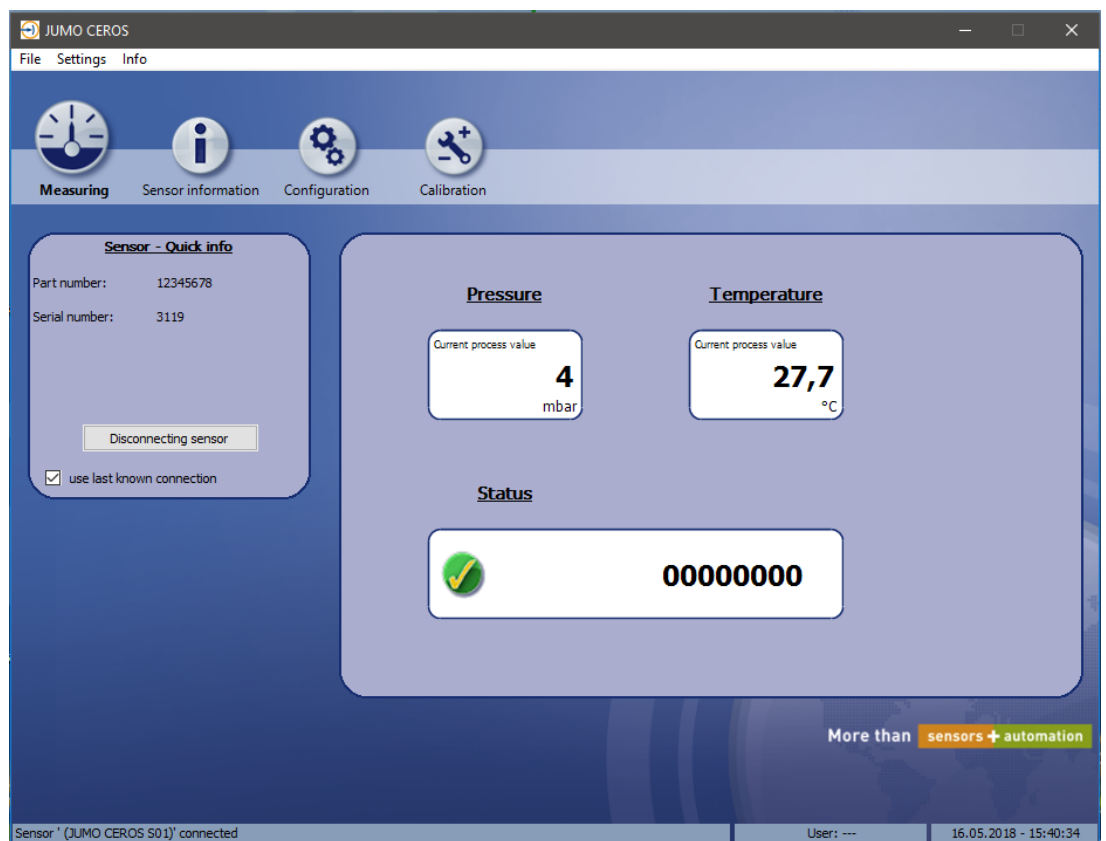


JUMO CEROS S01 M

Digital pressure measuring cell



Interface Description



40510109T92Z001K000

V4.00/EN/00687084/2020-06-30

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1 General information and notes for the reader

1.1 General

This manual contains important information regarding the safe and proper use of this product.

Before starting any form of work using this product, this manual must be read and understood.

Only by observing all of the safety information and all safety/warning symbols in this manual can optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device, be ensured.

In the interest of clarity, this manual does not contain all the detailed information about all product versions and cannot take into consideration every conceivable case involving the installation, operation, or maintenance.

If you would like further information, or if problems occur that are not covered by this manual, the required information can be obtained from the manufacturer.

The contents of this manual are not part of and do not constitute a change to a previous or existing agreement, assurance or legal relationship.

This manual is an integral component of the product and must be stored so that it is accessible to personnel at all times.

It is essential to observe any notes and symbols that are directly on the product. They may not be removed and must be fully legible at all times.

1.2 Trademark information

- Microsoft® is a registered trademark of Microsoft Corp., Redmond, VA 98052-6399, US.
- Windows® is a registered trademark of Microsoft Corp., Redmond, VA 98052-6399, US.

1 General information and notes for the reader

1.3 Symbols and signal words

1.3.1 Warning symbols



DANGER!

The signal word "**DANGER**" indicates an immediate danger.

Non-observance will lead to death or serious injury.

- ▶ The instructions in the warning notice must be observed and followed!
-



WARNING!

The signal word "**WARNING**" indicates an imminent danger.

Non-observance can lead to death or serious injury.

- ▶ The instructions in the warning notice must be observed and followed!
-



CAUTION!

The signal word "**CAUTION**" indicates an imminent danger.

Non-observance can lead to minor or moderate injury.

- ▶ The instructions in the warning notice must be observed and followed!
-

NOTICE!

The signal word "**CAUTION**" indicates possible damage to property.

Non-observance can lead to damage to devices, systems or the environment.

- ▶ Observe the instructions in the note for avoiding damage!
-

1.3.2 Note symbols



NOTE!

This symbol refers to **important information** about the product, its handling, or additional benefits.



FURTHER INFORMATION!

This symbol is used in tables and indicates that **further information** is provided after the table.



REFERENCE!

This symbol refers to **additional information** in other sections, chapters, or other manuals.



DISPOSAL!

At the end of its service life, the device and any batteries present do not belong in the trash! Please ensure that they are **disposed of** properly and in an **environmentally friendly** manner.

2.1 General

The digital pressure measuring cell is equipped with a digital I²C interface and optionally an analog output.

The communication via the I²C interface is described in the following chapters. This includes the correct electrical connection, the entire design as an I²C-bus with master, slave and pull-up resistors. Additionally, the digital communication is described to read out the pressure value, as well as other device information. Finally the correct interpretation and conversion of the digital value into a decimal pressure- or temperature value is depicted. Furthermore configuration possibilities of the digital pressure measuring cell are described by using the corresponding software ⇒ see chapter 4 "PC software", Page 19.



NOTE!

Additional information can be found in the data sheet 40510100T10Z001K000 and in the I²C-bus specification and user manual UM10204 on www.nxp.com.

2.2 Interface connection

2.2.1 Pin assignment

| Electrical connection | 05 Pins | 24 Braids | 39 JST-plug (Type BM05B-SRSS-TB) |
|-----------------------|---------|-----------|----------------------------------|
| | | | |
| A _{out} | 2 | YE | 5 |
| GND | 3 | BK | 4 |
| U _B | 4 | RD | 3 |
| SCL | 6 | WH | 2 |
| SDA | 7 | BU | 1 |

2.2.2 Cabling



NOTE!

Be careful with cabling over more than a few centimetres.

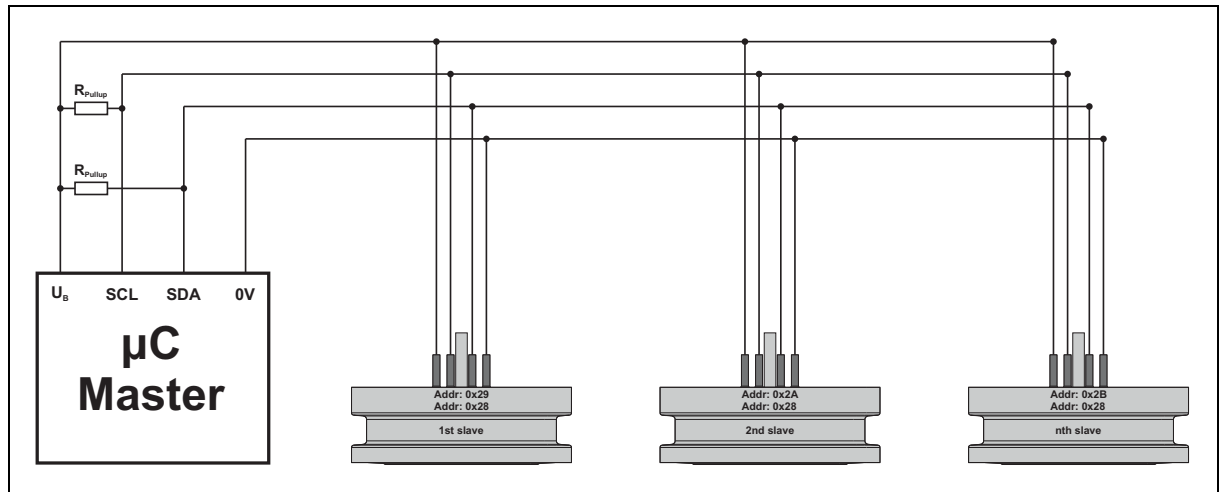
The I²C-bus is not a field-bus and only EMC safe if the interconnections are short or screened by the surrounding housing of the whole application or a suitable cable.

2 I²C - communication

2.2.3 Entire design of the I²C-bus

The following figure shows a entire design by way of example, including a master, three digital pressure measuring cells as slaves and pull-up resistors. The signal wires SDA and SCL are connected by pull-up resistors to U_B . A pull-up resistor in the range of 1 to 10 k Ω is recommended. In order to optimize the data rate or low power consumption, other resistance values are possible.

Scheme of a I²C-bus structure:



I²C is designed as a Master-Slave-bus. A data transfer is initiated by a master and the slave, which is addressed, reacts on it. Every slave in a bus structure needs a different address to avoid collisions. The address is stored in the memory of the device. For the communication between master and slave the bus needs two signal wires: SCL as a clock wire and SDA as a data wire.

Every device connected to SCL and SDA has an open-collector-output. Combined with the pull-up resistors it results in a wired-and circuit. Additional series resistors can be placed directly at the devices to get more security.

The I²C-bus has a positive logic, what means that a high level at SDA corresponds to a logical '1' and a low level corresponds to a logical '0'.

The transmission protocol of I²C starts with a start-bit, the address and a R/W- bit (Read/Write) sent by the master. This will be confirmed by the addressed slave with an ACK-bit. Dependent on the R/W-bit data is written (data to slave) or read (data to master). The confirmation with the ACK-bit is sent by the slave when writing and by the master when reading. The last byte of a reading access is confirmed with a NACK-bit by the master, to show the end of a transmission. The transmission is finished with a stop-bit.

The bit rate of the data transfer is set by the master.

The maximum bit rate, supported by the digital pressure measuring cell, is shown in the following chapter.

2.2.4 Connection to the computer



NOTE!

The digital pressure measuring cell can be connected with a PC/Notebook via PC-Interface with Converter USB/I²C TO39.

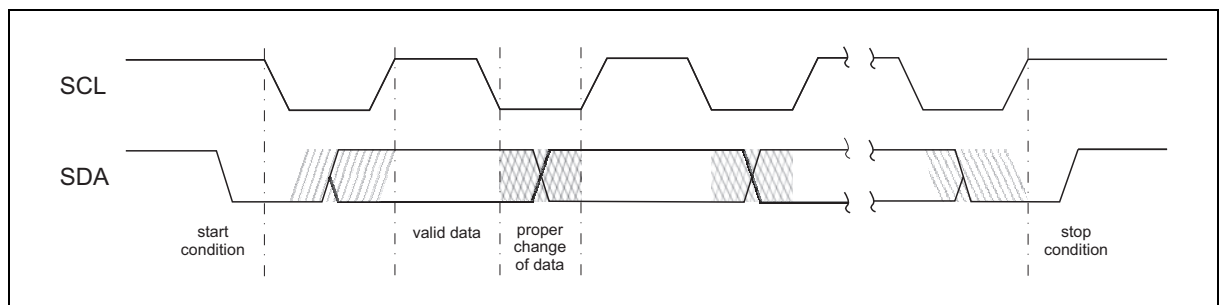
⇒ see chapter 4.3 "Connection to the computer", Page 19

2.3 Bit rate

The digital pressure measuring cell works over two sets of bitrates (transfer speed). The maximum clock frequency is 400 kbit/s. Furthermore the maximum bit rate depends on the cable length and the pull-up resistors. So it is recommended to start with lower bit rates and test the maximum possible bit rate by increasing it.

| Mode | Max. bit rate | Direction |
|--------------------|---------------|---------------|
| Standard mode (Sm) | 100 kbit/s | bidirectional |
| Fast mode (Fm) | 400 kbit/s | bidirectional |

2.4 Data structure



- **Idle period**

During inactivity of the bus, SDA and SCL are pulled-up to the supply voltage VDDA.

- **Start condition**

Every data frame starts with a start condition. A high-to-low transition on SDA while SCL is at the high level indicates a start condition. Every command must be initiated by a start condition sent by a master.

2 I²C - communication

- **Valid data**

Data is transmitted in bytes (8 bits) starting with the most significant bit (MSB). Each byte transmitted is followed by an acknowledge bit. Transmitted bits are valid if, after a start condition, SDA remains at a constant level during the high period of SCL. The SDA level may change only when the clock signal at SCL is low.

- **Acknowledge**

An acknowledge after a transmitted byte is obligatory. The master must generate an acknowledge-related clock pulse. The receiver (slave or master) pulls down the SDA line during the acknowledge clock pulse. If no acknowledge is generated by the receiver, a transmitting slave will become inactive. A transmitting master can abort the transmission by generating a stop condition and can repeat the command. A receiving master may signal the end of the transfer to the transmitting slave by not generating an acknowledge-related clock pulse at SCL. The digital pressure measuring cell changes to inactive interface mode when processing internal command routines started by a previously sent command.

After every transferred byte (in both directions) the receiver of the byte gives feedback with the acknowledge bit. The slave should always confirm the bytes by an ACK. If the slave does not respond with a LOW level after the 8th bit, the master detects an exception (for example caused by requesting to the wrong slave address). A NACK from the master's side is not always an exception. It is also needed to terminate a read data frame.

- **Stop condition**

Every data frame ends with a stop condition. A low-to-high transition on SDA while SCL is at the high level indicates a stop condition. A command must be closed by a stop condition to start processing the command routine in the digital pressure measuring cell.

2.5 Addressing

The first byte of every data frame contains the slave address and a R/W bit (Write = 0/Read = 1).

The default slave address (standard address) of the digital pressure measuring cell transmitters is: 0x28, another address can be set by using the software (⇒ see chapter 4.7.2 "Communication", Page 28). The 7 bit address of a I²C-device allows 112 bus addresses in general, because 16 of the 128 possible addresses are reserved for special purposes.

The digital pressure measuring cell has a fixed 5 bit-address, with a 2 bit-subaddress, which is configurable, but the device always answers to 0x28. So it is possible to use three digital pressure measuring cells on one bus without getting collisions at the maximum. Possible addresses for the slaves in a bus structure with one slave are 0x28, 0x29, 0x2A, 0x2B, in a bus structure with more than one slave 0x29, 0x2A, 0x2B. Other devices with other addresses (e.g. temperature sensors) can be added to the bus too, as long as the maximum number of 112 devices is not exceeded.

Examples:

ADDR is 0x28 - data transfer from the master to the slave (write)

| | | | | | | | |
|-------------------|---|---|---|---|---|---|--------------|
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0x28 (address) | | | | | | | 0x00 (write) |
| 0x50 (first byte) | | | | | | | |

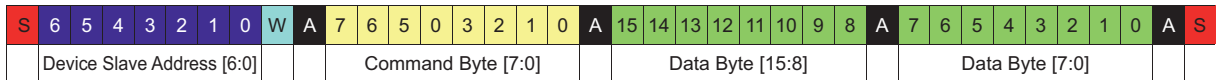
ADDR is 0x2B - data transfer from the slave to the master (read)

| | | | | | | | |
|-------------------|---|---|---|---|---|---|-------------|
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0x2B (address) | | | | | | | 0x01 (read) |
| 0x57 (first byte) | | | | | | | |

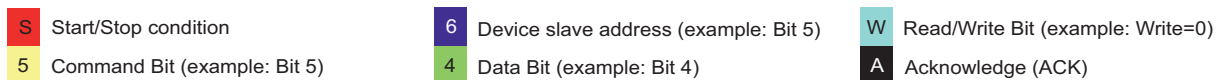
2.6 WRITE Operation

An I²C WRITE operation is initiated by the master sending the slave an address byte including a data direction bit set to '0' (WRITE). The address byte is followed by a command byte, and for applicable commands two additional data bytes (optional). The digital pressure measuring cell's internal micro-controller evaluates the received command and processes the related routine. In the following a WRITE command with two data bytes and another WRITE command without data bytes is illustrated.

WRITE Command Byte and 2 Data Bytes



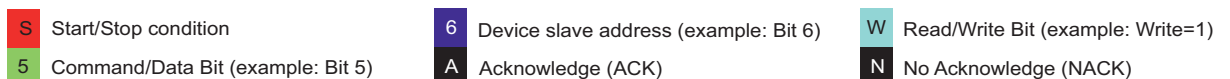
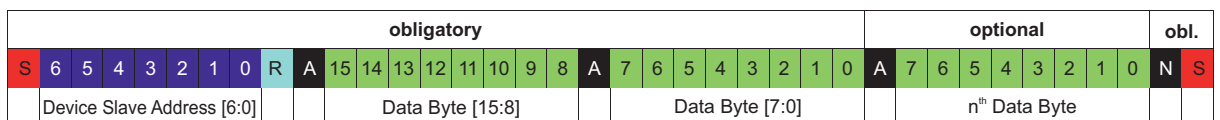
WRITE Command Byte and no Data Bytes



2.7 READ Operation

A data request from a master to a slave is initiated by sending an address byte including a data direction bit set to '1' (READ). The slave answers by sending data from the interface output registers. The master must generate the transmission clock for the following: SCL, acknowledges after each data byte (except after the last one), and the stop condition at the end. A data request is handled by the digital pressure measuring cell's interface module and consequently does not interrupt the current process of the internal micro-controller.

Read 2 (+n) Data Bytes



2.8 Data bytes

The data registers of the digital pressure measuring cell consists always of 2 bytes. The device always returns a status byte before sending the data bytes. The status byte can be for example the reading command. So the slave returns 3 bytes when reading one register.

2 I²C - communication

3.1 Receive sensor data

The chart states the combination of address and function in the default settings.

| | |
|--|------|
| ADDR default | 0x28 |
| W (Write): 0 ⇒ ADDR W default | 0x50 |
| R (Read): 1 ⇒ ADDR R default | 0x51 |

3.1.1 Pressure

1. Requesting pressure value (4 bytes from master)

| Bits | S | ADDR W | A | 0x2E | A | 0x21 | A | 0x00 | A | S |
|---------|--------|-------------------|-------|---------|-------|--------|-------|--------|-------|--------|
| sent by | master | master | slave | master | slave | master | slave | master | slave | master |
| type | Start | address + r/w bit | ACK | command | ACK | data | ACK | data | ACK | Stop |

2. Reading pressure value (1 byte from master, 3 bytes from slave)

| Bits | S | ADDR R | A | 0x2E | A | Byte 2 | A | Byte 3 | N | S |
|---------|--------|-------------------|-------|---------|--------|-------------|--------|------------|--------|--------|
| sent by | master | master | slave | slave | master | slave | master | slave | master | master |
| type | Start | address + r/w bit | ACK | command | ACK | data [15:8] | ACK | data [7:0] | NACK | Stop |



NOTE!

The first byte returns the command 0x2E (read RAM), Byte 2 and 3 make the 15 bit digital count of the actual pressure value in common: $P[u15] = \text{data [Byte 2; Byte 3]}$.

3.1.2 Temperature

1. Requesting temperature value (4 bytes from master)

| Bits | S | ADDR W | A | 0x2E | A | 0x1D | A | 0x00 | A | S |
|---------|--------|-------------------|-------|---------|-------|--------|-------|--------|-------|--------|
| sent by | master | master | slave | master | slave | master | slave | master | slave | master |
| type | Start | address + r/w bit | ACK | command | ACK | data | ACK | data | ACK | Stop |

2. Reading temperature value (1 byte from master, 3 bytes from slave)

| Bits | S | ADDR R | A | 0x2E | A | Byte 2 | A | Byte 3 | N | S |
|---------|--------|-------------------|-------|---------|--------|-------------|--------|------------|--------|--------|
| sent by | master | master | slave | slave | master | slave | master | slave | master | master |
| type | Start | address + r/w bit | ACK | command | ACK | data [15:8] | ACK | data [7:0] | NACK | Stop |



NOTE!

The first byte returns the command 0x2E (read RAM), Byte 2 and 3 make the 15 bit digital count of the actual pressure value in common: $T[u15] = \text{data [Byte 2; Byte 3]}$.

3 Sensor data

3.1.3 Read NVM (Non-Volatile Memory)



NOTE!

The NVM can only be read out in Command Mode. A measured value can only be read out in Normal Mode. Changes of NVM registers have influence on the checksum and the function of the cell and are therefore not allowed!

1. Command Mode (4 bytes from master)

| Bits | S | ADDR W | A | 0x72 | A | 0xF5 | A | 0xA2 | A | S |
|---------|--------|-------------------|-------|---------|-------|--------|-------|--------|-------|--------|
| sent by | master | master | slave | master | slave | master | slave | master | slave | master |
| type | Start | address + r/w bit | ACK | command | ACK | data | ACK | data | ACK | Stop |

2. Request NVM Word (4 bytes from master)

| Bits | S | ADDR W | A | 0x24 | A | 0x00 | A | 0xFF ^a | A | S |
|---------|--------|-------------------|-------|---------|-------|--------|-------|-------------------|-------|--------|
| sent by | master | master | slave | master | slave | master | slave | master | slave | master |
| type | Start | address + r/w bit | ACK | command | ACK | data | ACK | data | ACK | Stop |

^a registry addresses ⇒ see table "Registry addresses ", Page 15

3. Read NVM Word (1 bytes from Master, 3 bytes from Slave)

| Bits | S | ADDR R | A | 0x24 | A | Byte 2 | A | Byte 3 | N | S |
|---------|--------|-------------------|-------|---------|--------|-------------|--------|------------|--------|--------|
| sent by | master | master | slave | slave | master | slave | master | slave | master | master |
| type | Start | address + r/w bit | ACK | command | ACK | data [15:8] | ACK | data [7:0] | NACK | Stop |

4. Normal Mode (4 bytes from Master)

| Bits | S | ADDR W | A | 0x01 | A | 0xF5 | A | 0xA2 | A | S |
|---------|--------|-------------------|-------|---------|-------|--------|-------|--------|-------|--------|
| sent by | master | master | slave | master | slave | master | slave | master | slave | master |
| type | Start | address + r/w bit | ACK | command | ACK | data | ACK | data | ACK | Stop |

Registry addresses

Sensor specification

| Registry | Description |
|----------|---|
| 0x49 | Measuring range start [15] - Unit: 1 = bar, 0 = mbar [14] - Prefix sign: 1 = negative, 0 = positive [13:0] - Value: 0 to 16383 |
| 0x4A | Measuring range end [15] - Unit: 1 = bar, 0 = mbar [14] - Prefix sign: 1 = negative, 0 = positive [13:0] - Value: 0 to 16383 |
| 0x4B | Sensor type [15:1] - free [0] - Type: 1 = absolute pressure, 0 = relative pressure |

Manufacturing data

| Registry | Description |
|----------|---|
| 0x3E | Part number highword [31:16] |
| 0x3F | Part number lowword [15:0] |
| 0x40 | FA number (production order number) highword [31:16] |
| 0x41 | FA number (production order number) lowword [15:0] |
| 0x42 | Production location – 010 (dec) for JUMO Fulda |
| 0x43 | Production date – year [15:8] / calendar week [7:0] |
| 0x44 | Counter number (serial number) 000 to 999 |
| 0x45 | T_{offset} (value range floating point value from 0 to -1024) Value 0 = 0 Value 65535 = -1024 $\text{Offset} = \frac{-T_{\text{offset}} * 1024}{65535}$ |
| 0x45 | T_{slope} (value range floating point value from 0 to 0.05) Value 0 = 0 Value 65535 = 0.05 $\text{Slope} = \frac{T_{\text{slope}} * 0.05}{65535}$ |

3 Sensor data

3.2 Interpretation of the sensor data

3.2.1 Pressure

The conversion of the digital values to decimal pressure values is realized by a linear function defined by two points (P_{min} and P_{max}).

| P[u15] | P[bar] | P[bar] example |
|-------------------------------------|-----------|----------------|
| $P_{10\%}$: 3277 (10 % of 15 bit) | P_{min} | -1 |
| $P_{90\%}$: 29491 (90 % of 15 bit) | P_{max} | +15 |

The minimum and maximum pressure values are stated in the order confirmation. Additionally, the pressure range of the digital pressure measuring cell is stored in its memory and can be read by the software (⇒see chapter 4.6.1 "Sensor details", Page 22).

The output range is 10 % to 90 % of the 15 bit data. This way concurrently over- and underpressure is measurable and the resulting 26214 full scale guarantee a very high resolution.

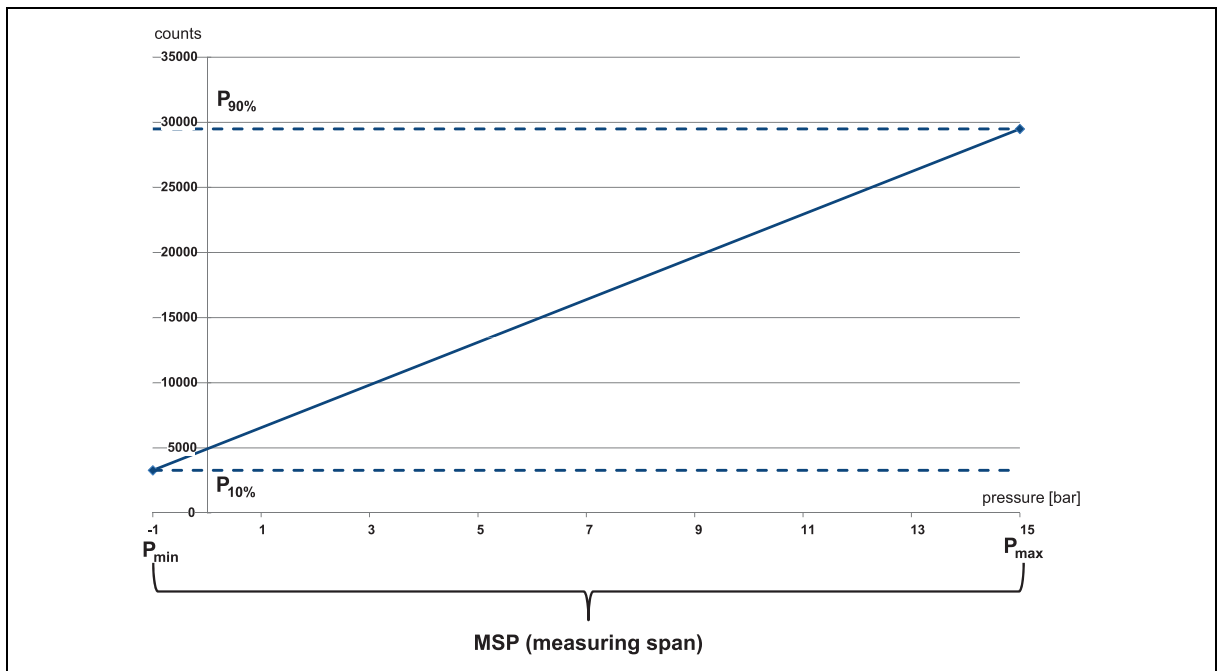
Calculating pressure value

In standard configuration the actual pressure can be calculated with the following formula:

$$P[\text{bar}] = \left(\frac{P[\text{u15}] - 3277}{26214} * \text{MSP} \right) + P_{min}$$

$\text{MSP (measuring span)} = P_{min} \text{ (measuring range start)} - P_{max} \text{ (measuring range end)}$

Example:



Calculation

pressure range: -1 to +15 bar ⇒ span: 16 bar

$$P[\text{bar}] = \left(\frac{P[\text{u15}] - 3277}{26214} * 16 \right) - 1 \text{ bar}$$

3.2.2 Temperature

The interpretation of the digital temperature values follows a linear function. To interpret the digital values of the temperature it is necessary to read the parameters T_{slope} and T_{offset} once from NVM (0x45 and 0x46), by using the commands (\Rightarrow see chapter 3.1.3 "Read NVM (Non-Volatile Memory)", Page 14) or using the software, or manually by reading the protocol. Every digital pressure measuring cell has its individual parameters T_{slope} and T_{offset} .

Calculate temperature value

In standard configuration the actual temperature can be calculated with the following formula:

$$T[^\circ\text{C}] = (T_{\text{slope}} * T[\text{u15}]) + T_{\text{offset}}$$

3 Sensor data

4.1 Brief description

The PC software was developed for communication between PC and digital pressure measuring cell. Using the PC software, the user can adjust the digital pressure measuring cell (offset) and set various parameters within the device.

Communication between PC and digital pressure measuring cell is via PC-Interface with Converter USB/I²C TO39, which also provides the operating voltage for the connected pressure cell.

The PC software is designed for online operation. The data to be set are read out from the connected digital pressure measuring cell, displayed, modified by the user and written back into the device.

It is not necessary to save data in a file on the PC, and a printout is also not required.

4.2 Installation

4.2.1 Hardware and software requirements

For operation and the installation of the PC software the following hardware and software requirements have to be met:

- Notebook or Desktop-PC
- Microsoft Windows 7 or newer
- USB interface
- PC-Interface with Converter USB/I²C TO39 (Part no. 00695325)

4.2.2 Starting installation via download file



NOTE!

The PC software was developed for communication between PC and digital pressure measuring cell and is available as a free download at www.jumo.net.

1. Start the installation file after the download via Windows Explorer.
2. Follow the installation instructions.

4.3 Connection to the computer

To use the PC software, the digital pressure measuring cell must be connected to the PC/Notebook via PC-Interface with Converter USB/I²C TO39.



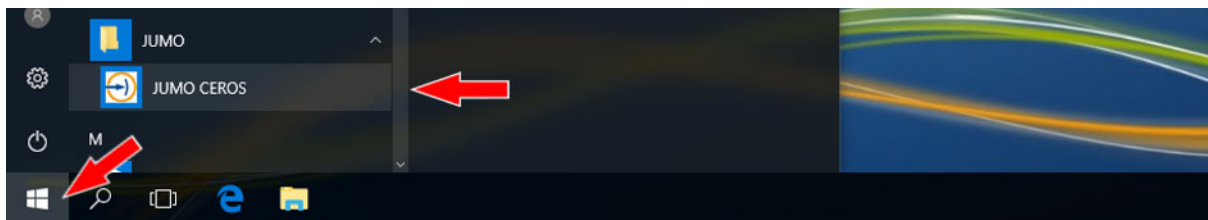
- (1) PC/Notebook – setup software installed
- (2) PC-Interface with Converter USB/I²C TO39 (Part no. 00695325)
- (3) Digital pressure measuring cell

4 PC software

4.4 Program start

Windows Start Menu

1. Make sure the digital pressure cell is connected to the PC/notebook.
⇒ see chapter 4.3 "Connection to the computer", Page 19
2. Start the PC software via the **Windows Start Menu**.



The start screen of the PC software appears.

Start screen



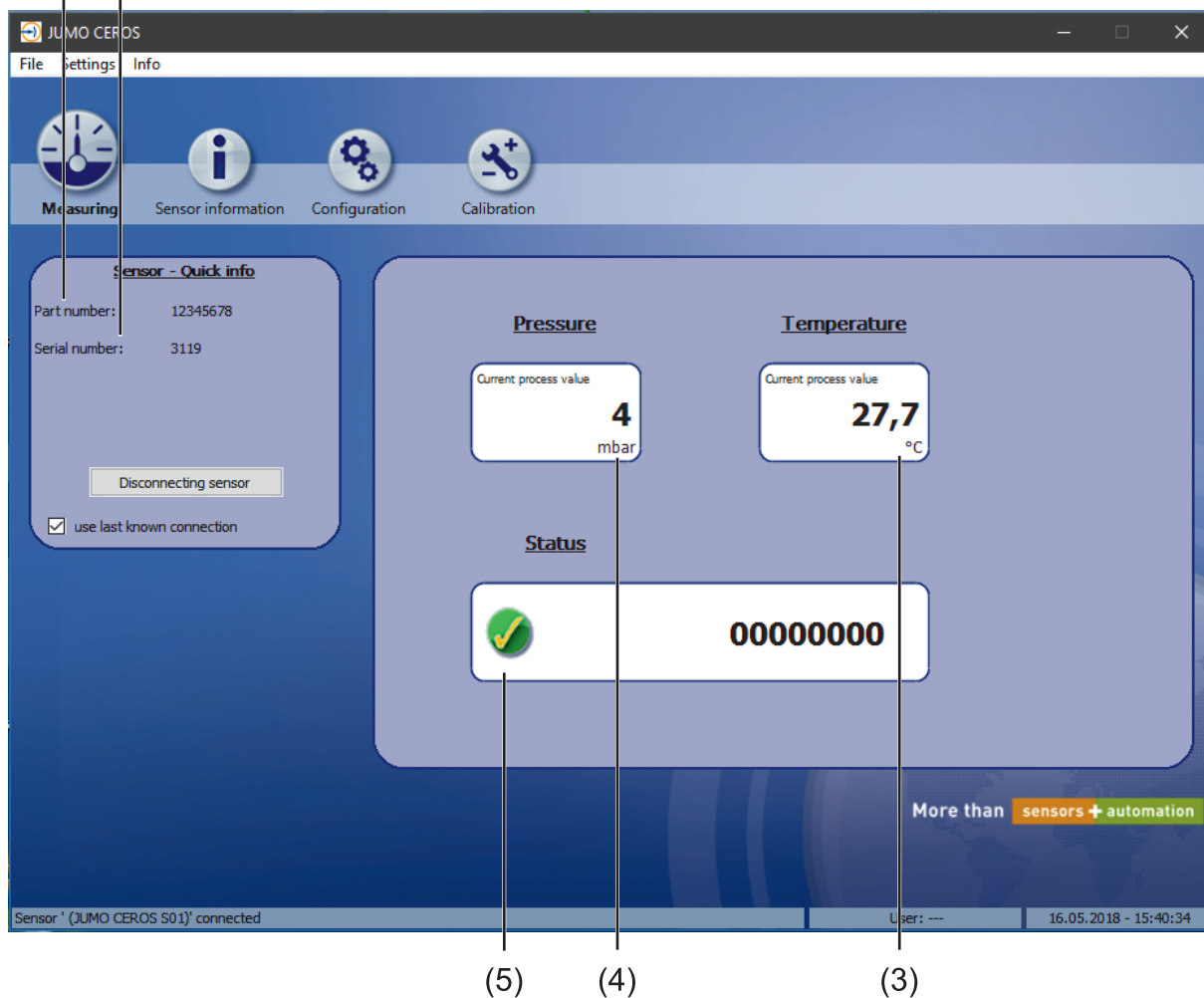
- (1) Menu bar
- (2) Toolbar
- (3) Sensor - Quick info
- (4) Dialogue box
- (5) Status bar

4.5 Measuring

4.5.1 Connecting with sensor

1. Connect the digital pressure measuring cell to the PC software via the connecting with sensor button in the **Sensor - Quick info** window.

(1) (2)



After successfully connecting the digital pressure measuring cell and PC software, **Part number** (1) and **Serial number** (2) of the sensor are displayed in the **Sensor - Quick info** window.

The **Measuring** dialogue box displays the current process values **Temperature** (3) and **Pressure** (4) and in addition, the **Status** (5) indicates the functionality of the digital pressure measuring cell.



NOTE!

If the **Status** shows an error: ⇒ chapter 4.11 "Error messages", Page 32

4 PC software

4.6 Sensor information

The **Sensor information** dialogue box displays non-editable information about the digital pressure measuring cell. The information is used to uniquely identify the digital pressure measuring cell.

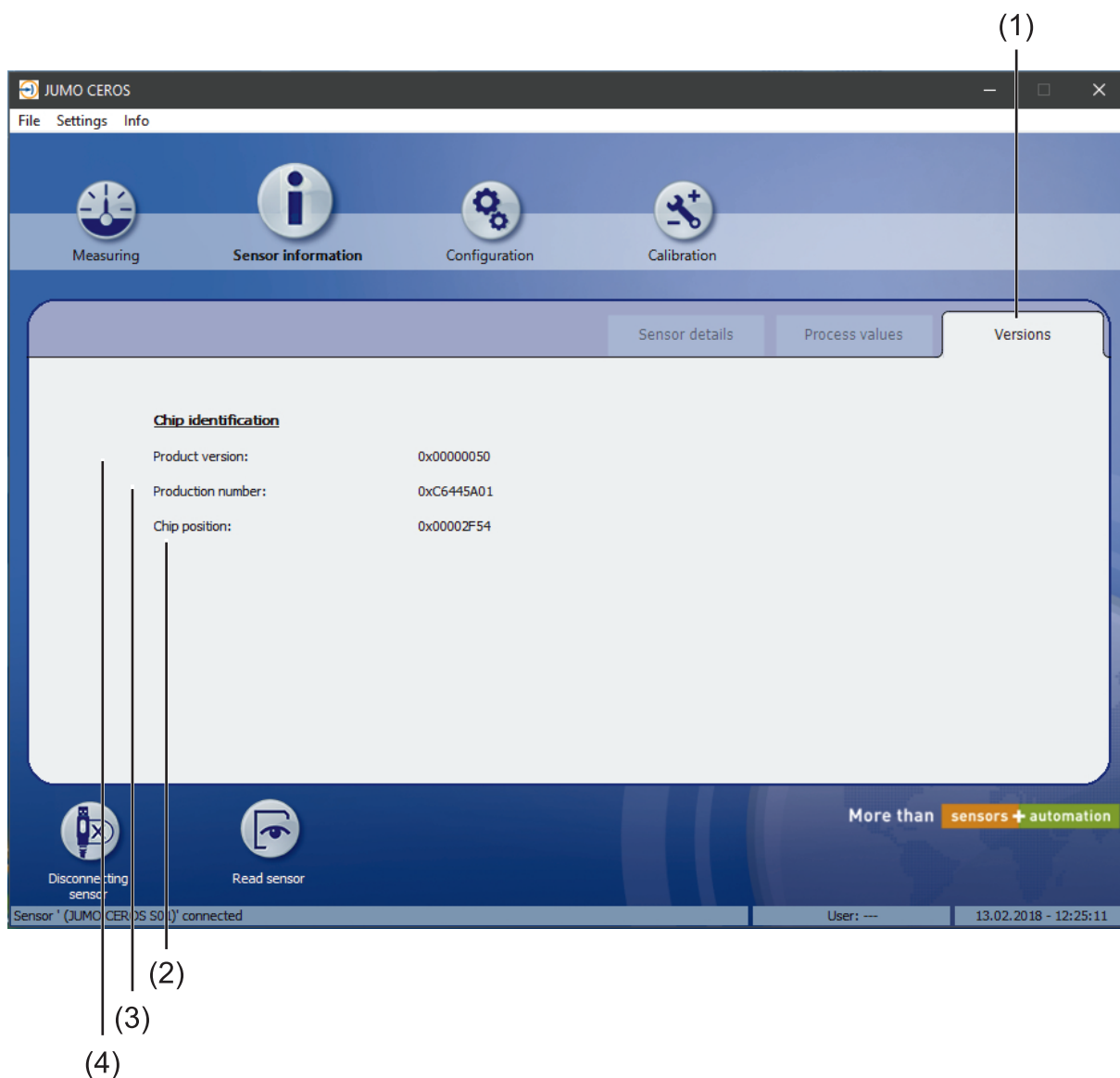
4.6.1 Sensor details



The individual parameters **Temperature slope** (4) and **Temperature offset** (5) are displayed in the **Sensor details** tab (1). Based on these values, the digital temperature value can be interpreted and converted to °C ⇒ see chapter 3.2.2 "Temperature", Page 17

The **Read sensor** button (2) allows to read the sensor's configuration, and the **Disconnecting sensor** button (3) removes the connection between digital pressure measuring cell and PC software.

4.6.2 Versions



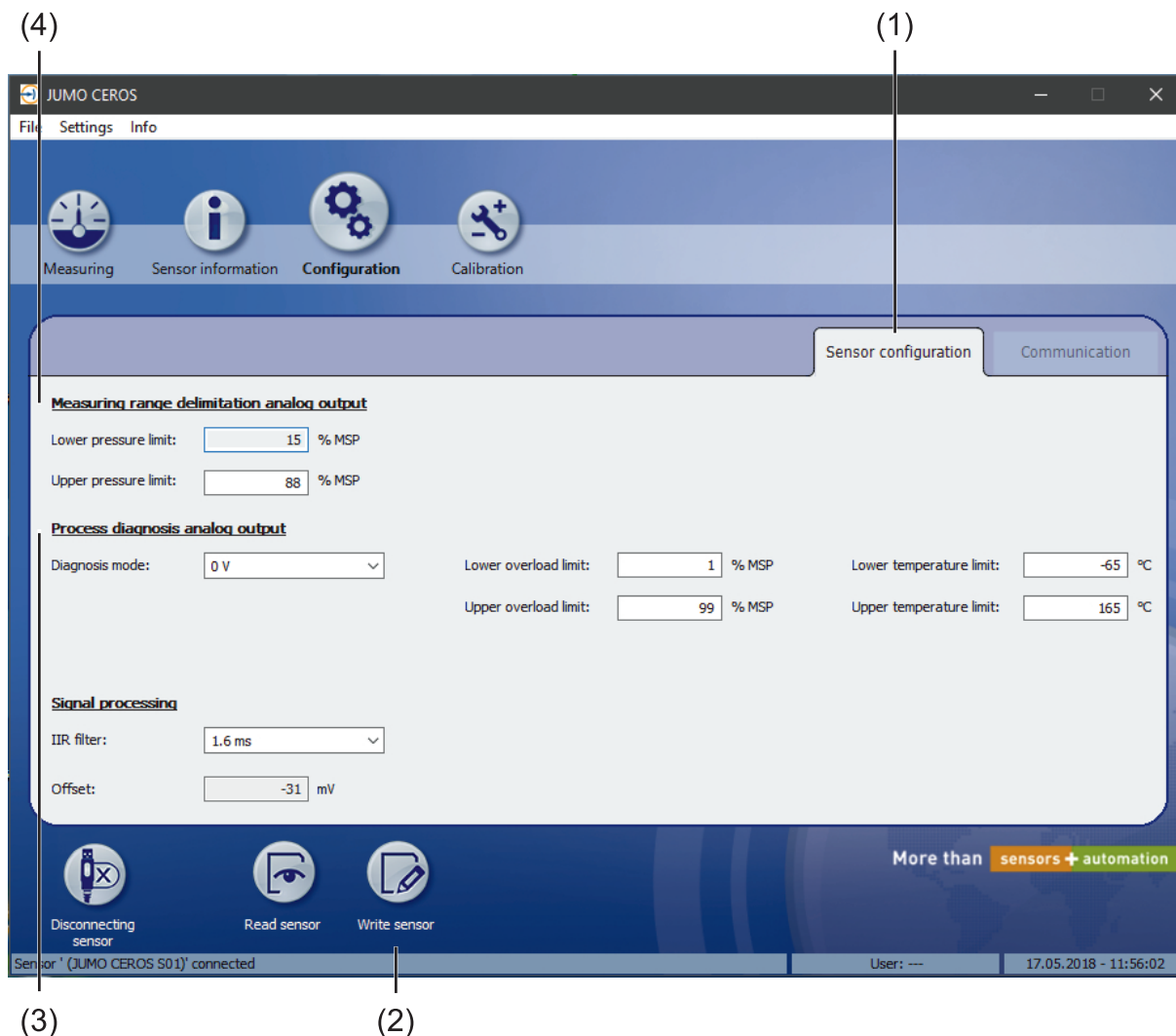
The individual product details **Product Version** (4), **Production number** (3) and **Chip position** (2) are displayed in the **Versions** tab (1) which is used for traceability of the digital pressure measuring cell.

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4.7 Configuration

The **Configuration** dialogue box displays editable information and sensor data about the digital pressure measuring cell.

4.7.1 Sensor configuration



The **Sensor configuration** tab (1) displays editable functions of the analog output of the digital pressure measuring cell ⇒ see "Measuring range delimitation analog output", Page 25 (3) and "Process diagnosis analog output", Page 26 (4).



NOTE!

If changes have been made, the data must be transferred to the sensor via the **Write sensor** button (2).

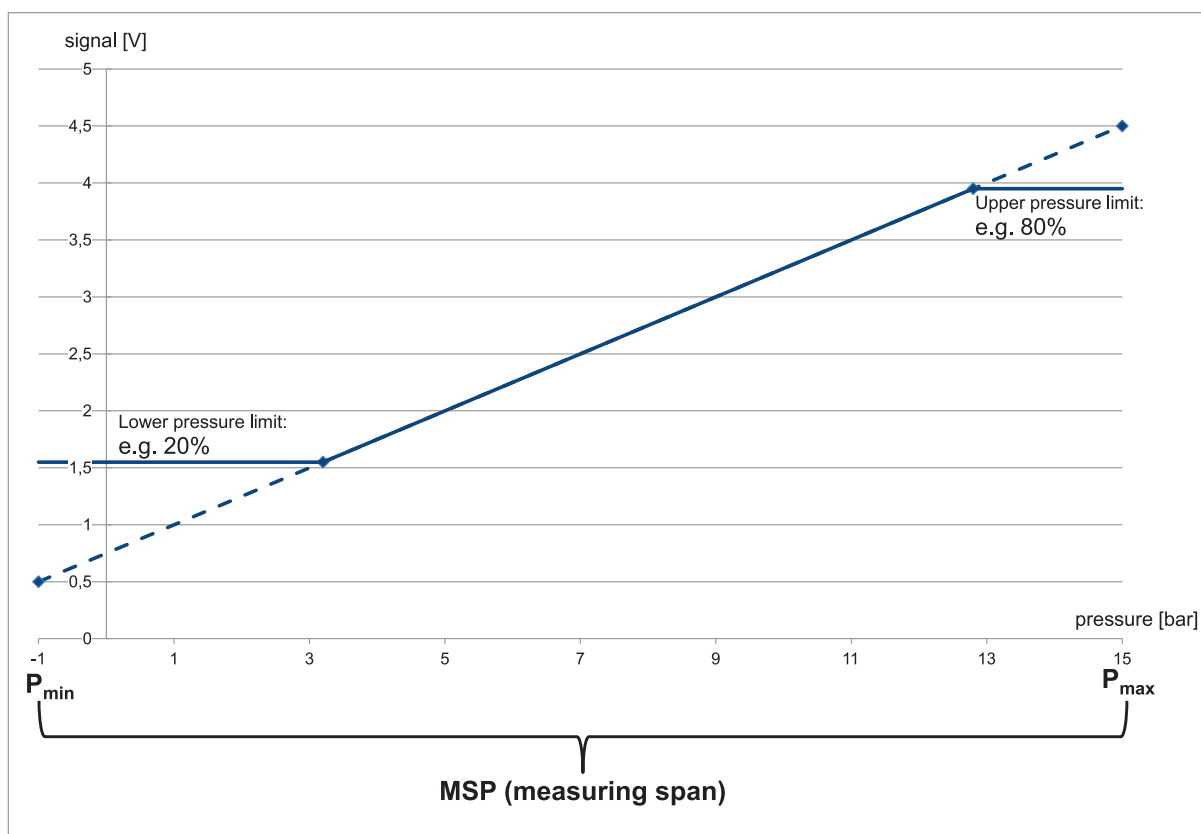
Measuring range delimitation analog output

The **Lower pressure limit** (1) and **Upper pressure limit** (2) text fields allow to set the Measuring range delimitation of the analog output.

The screenshot shows the 'Sensor configuration' tab with the following settings:

- Measuring range delimitation analog output:**
 - Lower pressure limit: % MSP (labeled (1))
 - Upper pressure limit: % MSP (labeled (2))
- Process diagnosis analog output:**
 - Diagnosis mode:
 - Lower overload limit: % MSP
 - Upper overload limit: % MSP
 - Lower temperature limit: °C
 - Upper temperature limit: °C
- Signal processing:**
 - IIR filter:
 - Offset: mV

Example:



NOTE!

If changes have been made, the data must be transferred to the sensor via the **Write sensor** button.

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Process diagnosis analog output

To use the **Diagnosis mode** (1), you can choose either a 0 V or 5 V output signal of the analog output.

Overload limits

If the Diagnosis mode is not deactivated, analog output enters the chosen diagnosis mode by exceed the overload limits. Use the text fields **Lower overload limit** (2) and **Upper overload limit** (3) to enter the switching threshold values.

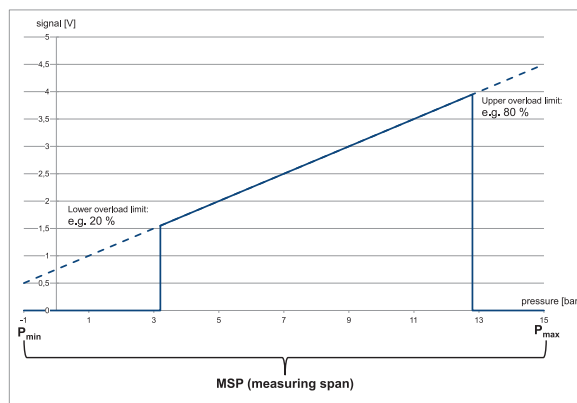
The screenshot shows the 'Sensor configuration' window with the following settings:

- Measuring range delimitation analog output:**
 - Lower pressure limit: 20 % MSP
 - Upper pressure limit: 80 % MSP
- Process diagnosis analog output:**
 - Diagnosis mode: 0 V (selected from a dropdown menu)
 - Lower overload limit: 20 % MSP
 - Upper overload limit: 80 % MSP
- Signal processing:**
 - IIR filter: 1.6 ms
 - Offset: 3 mV
- Temperature limits:**
 - Lower temperature limit: 32 °C
 - Upper temperature limit: 128 °C

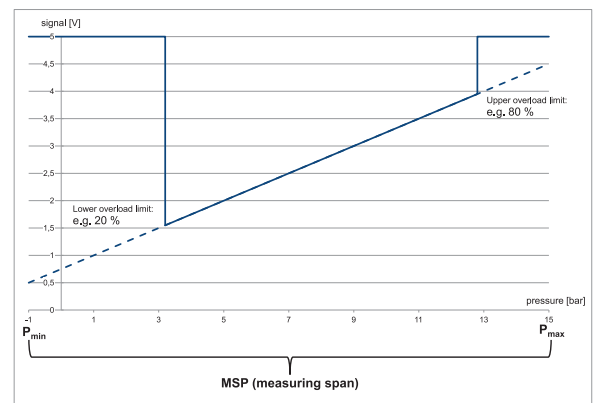
Annotations (1), (2), and (3) point to the 'Diagnosis mode' dropdown, the 'Lower overload limit' field, and the 'Upper overload limit' field respectively.

Example:

Diagnosis mode: 0 V



Diagnosis mode: 5 V



NOTE!

If changes have been made, the data must be transferred to the sensor via the **Write sensor** button.

To use the **Diagnosis mode** (1), you can choose either a 0 V or 5 V output signal of the analog output.

Temperature limits

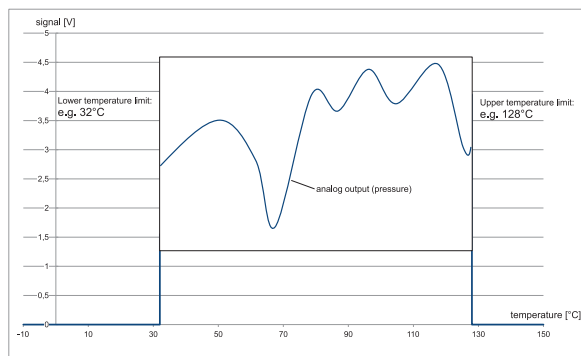
If the Diagnosis mode is not deactivated, analog output enters the chosen diagnosis mode by exceed the temperature limits. Use the text fields **Lower temperature limit** (2) and **Upper temperature limit** (3) to enter the switching threshold values.

The screenshot shows the 'Sensor configuration' tab in the software. It is divided into three main sections:

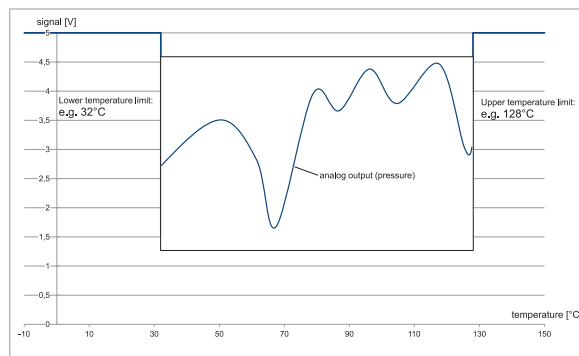
- Measuring range delimitation analog output:** Contains two input fields for 'Lower pressure limit' (set to 20 % MSP) and 'Upper pressure limit' (set to 80 % MSP).
- Process diagnosis analog output:** Features a dropdown menu for 'Diagnosis mode' with options '0 V', 'deactivated', '0 V', and '5 V'. To its right are 'Lower overload limit' (20 % MSP) and 'Upper overload limit' (80 % MSP) fields.
- Temperature limits:** On the right side, there are two text input fields: 'Lower temperature limit' (set to 32 °C) and 'Upper temperature limit' (set to 128 °C). Arrows labeled (2) and (3) point to these fields.
- Signal processing:** At the bottom, it includes an 'IIR filter' dropdown (set to 1.6 ms) and an 'Offset' field (set to 3 mV).

Example:

Diagnosis mode: 0 V



Diagnosis mode: 5 V

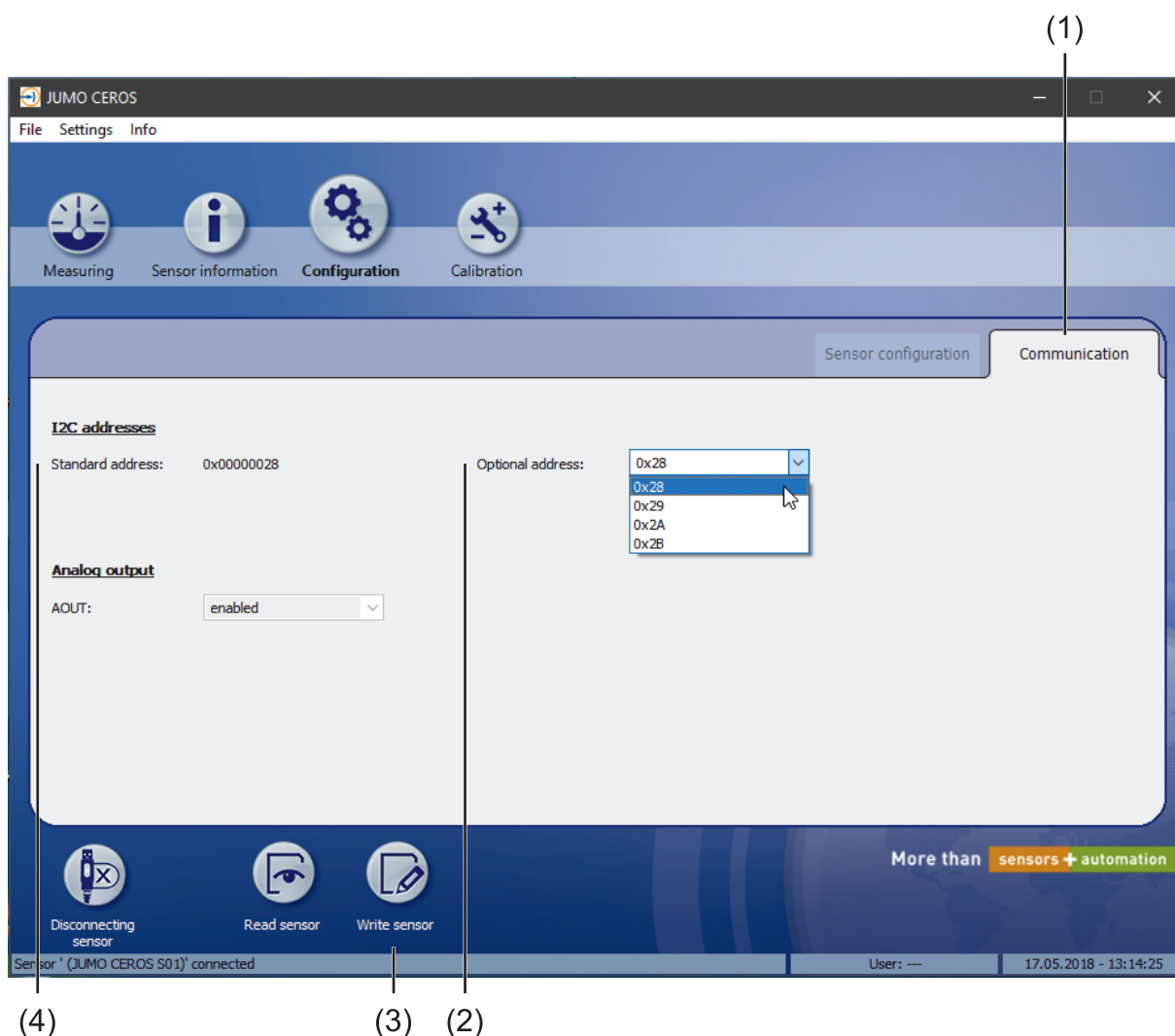


NOTE!

If changes have been made, the data must be transferred to the sensor via the **Write sensor** button.

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4.7.2 Communication



The **Communication** tab (1) displays the I²C **Standard address** (4). The sensor always responds to the standard address.

The drop-down menu **Optional Address** (2) allows the selection of further addresses and transferring them to the digital pressure measuring cell via the **Write sensor button** (3). To the optional addresses the digital pressure measuring cell responds as a slave.



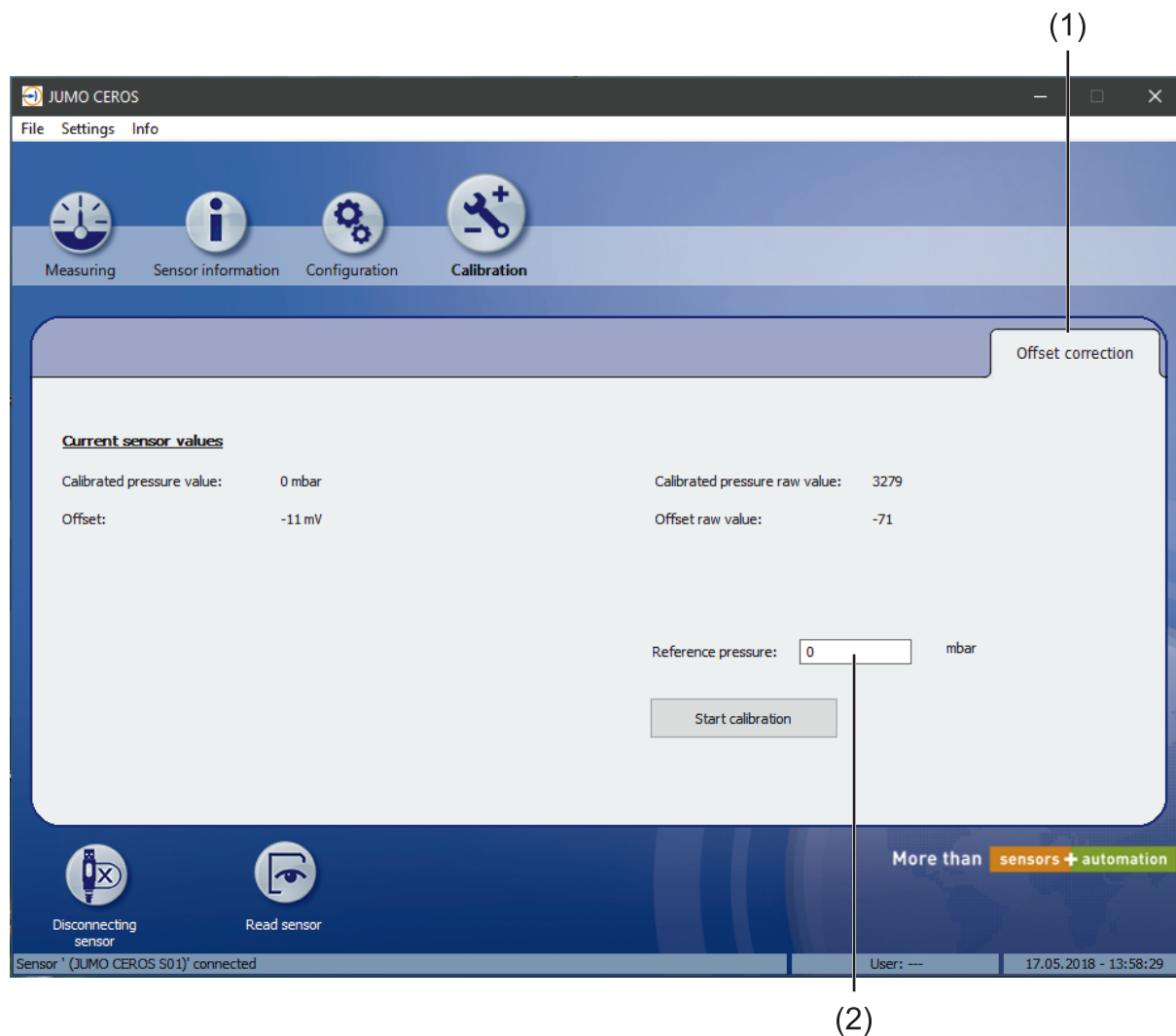
NOTE!

If changes have been made, the data must be transferred to the digital pressure measuring cell via the **Write sensor** button (3).

4.8 Calibration

The **Calibration** dialogue box displays **current sensor values** and offers performing an offset correction.

4.8.1 Offset correction



In order to increase the accuracy in the operating point, the **Offset correction** tab (1) offers performing offset correction at any operating point by specifying a reference pressure (2) and pushing the **Start calibration** button.



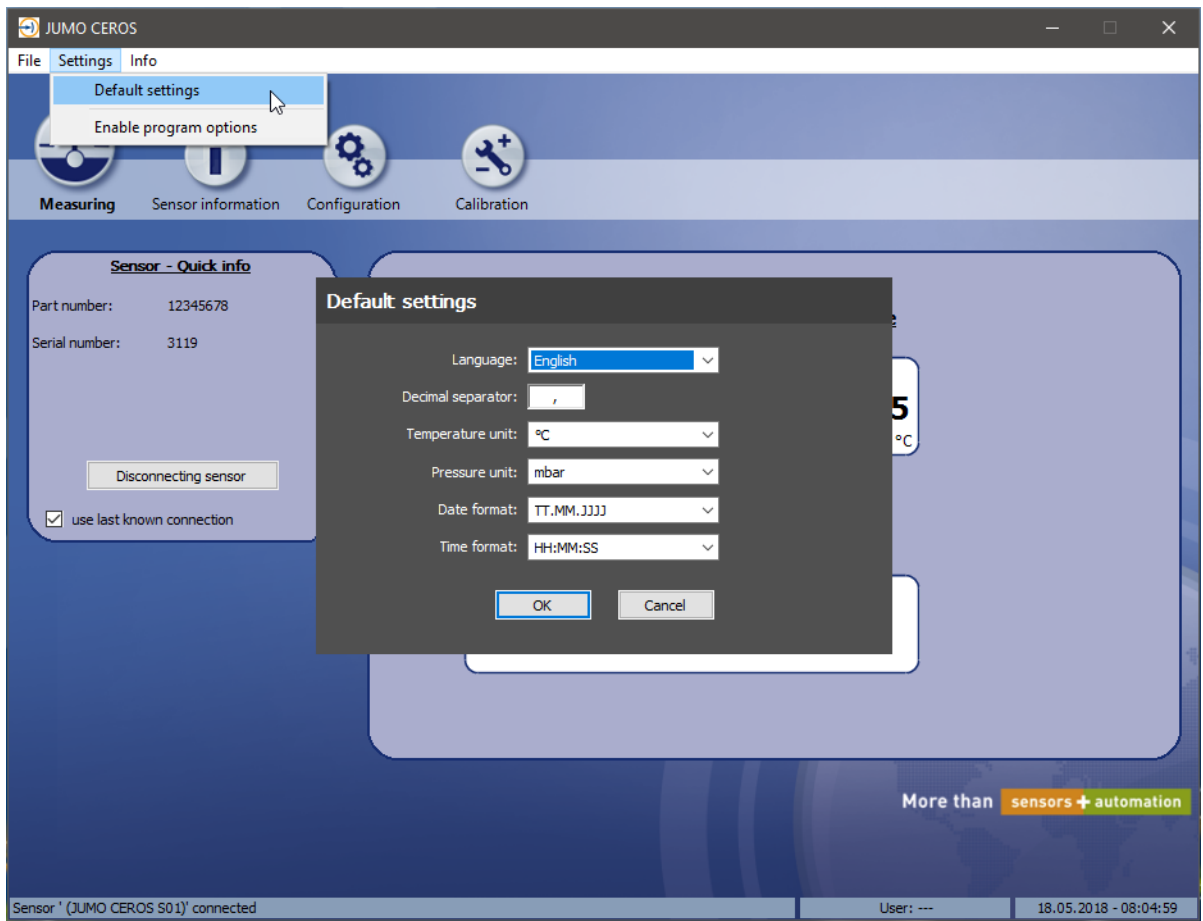
NOTE!

In the simplest case, the offset correction of a relative digital pressure measuring cell is carried out at zero without a calibrator.

4 PC software

4.9 Settings

Via the **Settings** menu the **Default settings** dialogue box can be edited.

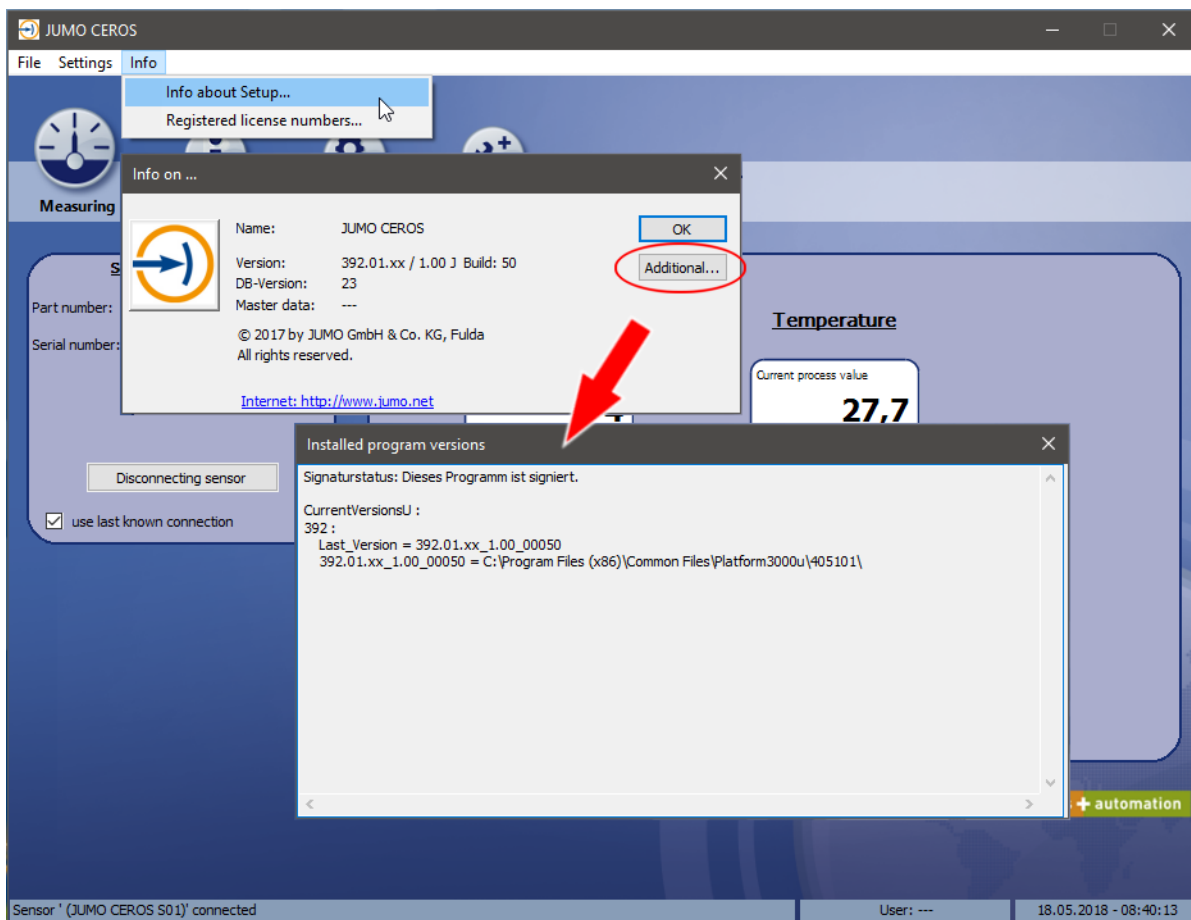


NOTE!

Changing the language will only be effective after a fresh program start!

4.10 Info

Via the **Info** menu, information about the setup software can be called up.

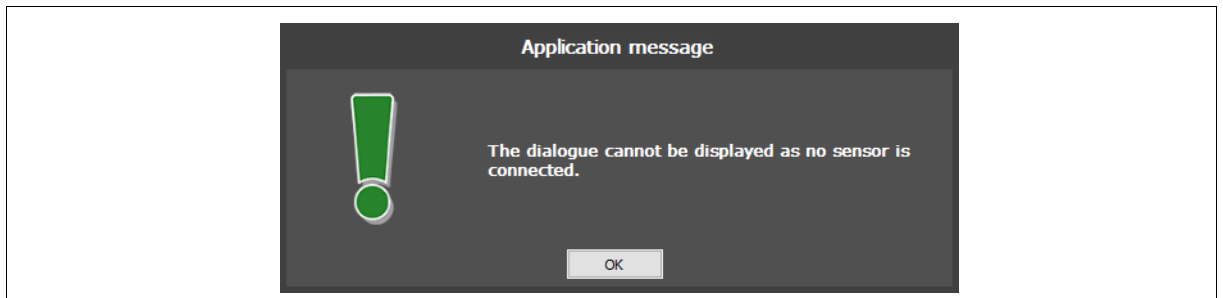


NOTE!

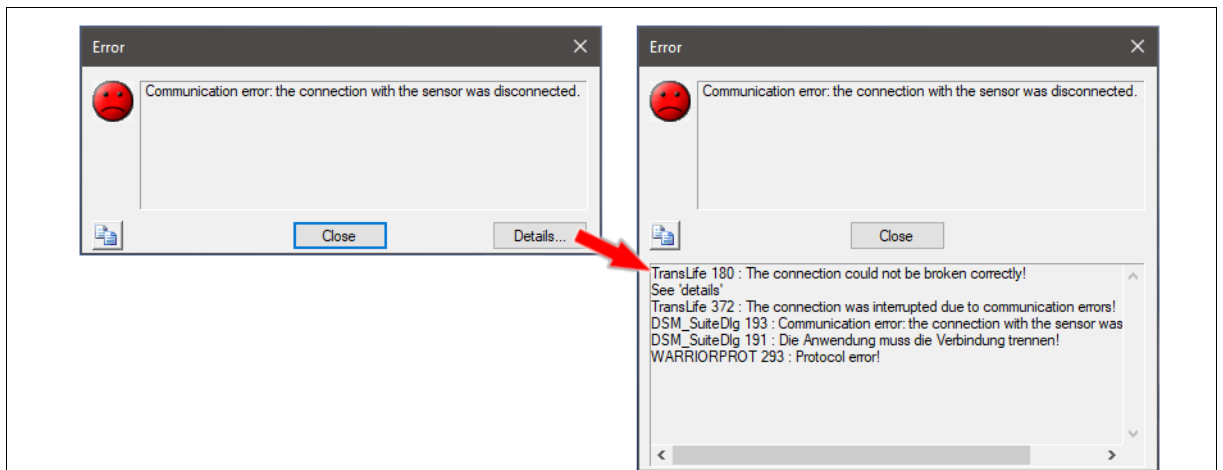
In case of service or maintenance, please have this information ready.

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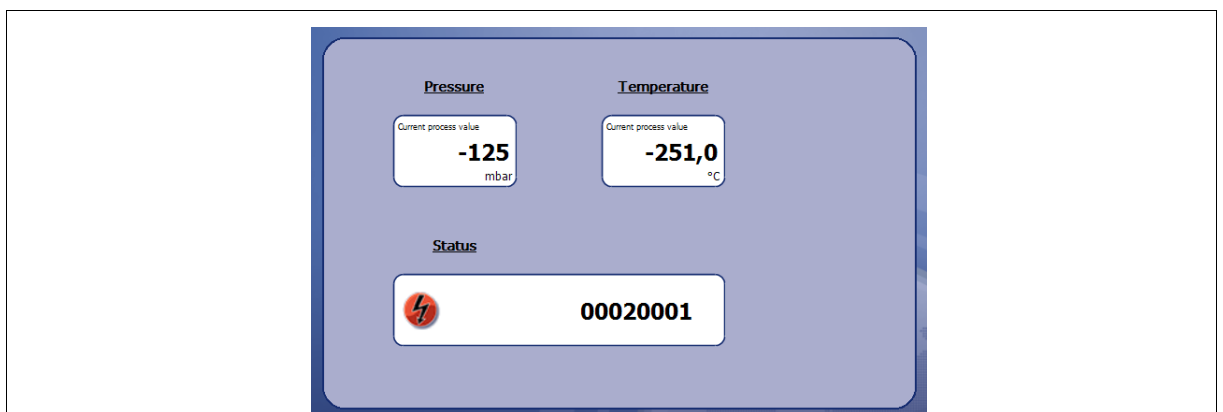
4.11 Error messages



| | |
|--------------------------|--|
| Error cause: | Digital pressure measuring cell is not connected to the computer |
| Troubleshooting: | Connect the digital pressure measuring cell with the USB port of your PC/Notebook by using PC-Interface with Converter USB/I ² C TO39 (Part no. 00695325) |
| More information: | ⇒ see chapter 4.3 "Connection to the computer", Page 19 |



| | |
|--------------------------|--|
| Error cause: | Connection between digital pressure measuring cell to the computer is broken |
| Troubleshooting: | Check the correct connection |
| More information: | Contact manufacturer |



| | |
|-------------------------|---|
| Error cause: | Sensor error |
| Troubleshooting: | Contact manufacturer and tell status code |



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