



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Technical Information

# Smartec S CLD132

Measuring system with inductive sensor for conductivity and concentration measurement in the food industry



### Application

- Product monitoring in breweries, dairies and the beverage industry
- CIP system control
- Phase separation of product/water and product/product mixtures in pipe systems
- Alkali and acid concentration control in remaking
- Monitoring and control of bottle cleaning systems

### Your benefits

- Transmitter housing made of stainless steel
- Sensor made of highly resistant plastic (PEEK)
- Sterilisable sensor
- High measuring reliability due to extensive self-monitoring functions
- Insensitive to polarisation and soiling
- Versions with ultrafast temperature response ( $t_{90} < 5$  s) available
- Sensor versions for all process connections used in hygienic applications
- Various operating possibilities:
  - Keys
  - HART® hand-held terminal
  - PROFIBUS PA/DP
  - PC with Commuwin II software
- Large two-line display allows simultaneous display of measured value and temperature
- Standard version extendable by function extension with remote parameter set switching (measuring range switching)

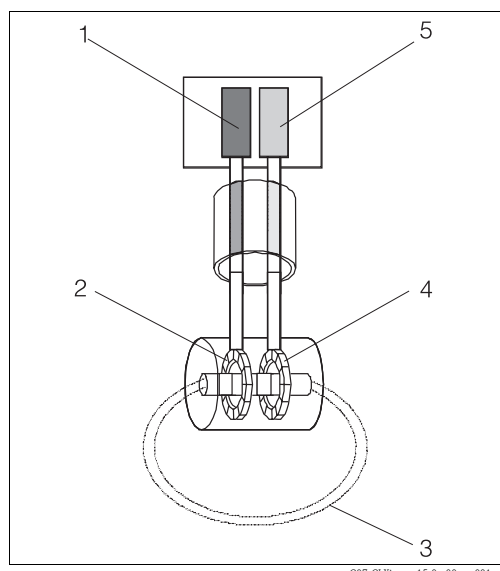
With  
quality certificate

## Function and system design

### Measuring principle

#### Inductive conductivity measurement

A generator (1) generates an alternating magnetic field in the primary coil (2) which induces a current in the medium (3). The strength of the induced current depends on the conductivity and thus the ion concentration of the medium. The current flow in the medium generates another magnetic field in the secondary coil (4). The resulting current induced in the coil is measured by the receiver (5) and processed to determine the conductivity.



#### Inductive conductivity measurement

- 1 Generator
- 2 Primary coil
- 3 Current flow in the medium
- 4 Secondary coil
- 5 Receiver

#### Benefits of inductive conductivity measurement

- No electrodes, therefore no polarisation
- Accurate measurement in media or solutions with a high soiling degree and a tendency to deposition
- Complete galvanic separation of measurement and medium

### Important properties of Smartec S CLD132

#### ■ Hygiene

The sensor, injection-moulded from highly chemically, mechanically and thermally resistant PEEK (polyether ether keton), does not have joints or crevices and is therefore hygienically safe.

#### ■ Temperature measurement

- For applications requiring quick temperature measurement (e.g. CIP return, phase separation at various temperatures), the Pt 100 temperature sensor is installed in a stainless-steel thermal conductivity socket that is sealed by a Chemraz O-ring. This ensures extremely fast temperature response times ( $t_{90} < 5$  s).
  - For high-load applications, particularly for alternating thermal load due to very frequent sterilisation cycles or temperature shocks, the Pt 100 temperature sensor is embedded in the PEEK sensor body thus eliminating the need for a seal. This ensures a long service life.
- This sensor version can also be applied at underpressure.

#### ■ Temperature compensation

Smartec S CLD132 offers the following types of temperature compensation:

- Linear compensation with freely selectable temperature coefficient  $\alpha$
- Compensation according to IEC 746-3 for NaCl
- Compensation with freely programmable coefficient table with 10 elements maximum

#### ■ Process temperature

The use of special components and materials makes the sensor suitable for continuous exposure to temperatures of +125 °C. Short-time (max. 30 min.), it will work at +140 °C for sterilisation.

#### ■ Concentration measurement

The transmitter can be switched from conductivity operating mode to concentration operating mode. The concentration operating mode provides one freely programmable as well as various predefined concentration curves, especially for common CIP solutions. This enables a direct display of the concentration in %.

#### ■ Remote parameter set switching

Smartec S CLD132 can be ordered with remote parameter set switching (measuring range switching, MRS) enabling you

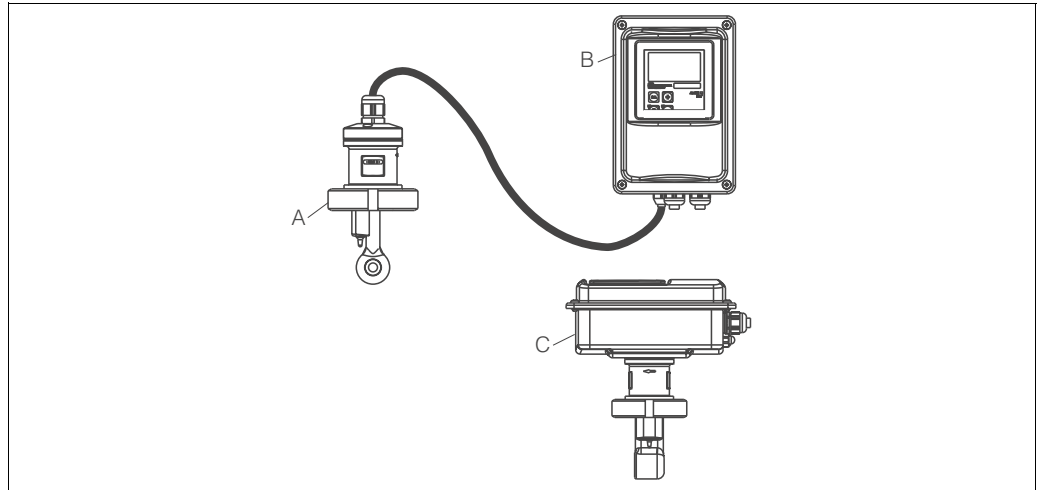
- to cover a wide measuring range
- to adjust temperature compensation when changing the product
- to switch between concentration curves.

**Measuring system**

A complete measuring system comprises:

- the Smartec S CLD132 transmitter
- the CLS52 conductivity sensor with integrated temperature sensor and fixed cable  
or
- the CLD132 compact version with integrated CLS52 conductivity sensor

Optional for the separate version: CLK5 extension cable, VBM junction box, mounting kit for pipe mounting



Complete measuring systems Smartec S CLD132 as separate transmitter and compact version

- A CLS52 conductivity sensor
- B Smartec S CLD132 transmitter
- C Smartec S CLD132 compact version with integrated CLS52

**Input**

**Measured variables**

Conductivity  
Concentration  
Temperature

**Measuring range**

Conductivity: recommended range: 100 µS/cm ... 2000 mS/cm (uncompensated)  
 Concentration:  
   NaOH: 0 ... 15 %  
   HNO<sub>3</sub>: 0 ... 25 %  
   H<sub>2</sub>SO<sub>4</sub>: 0 ... 30 %  
   H<sub>3</sub>PO<sub>4</sub>: 0 ... 15 %  
   User 1 (... 4): (4 tables available in versions with remote parameter set switching)  
 Temperature: -35 ... +250 °C / -31 ... +482 °F

**Sensor cable**

max. cable length 55 m / 180.46 ft with CLK5 cable (separate version)

**Binary inputs 1 and 2**

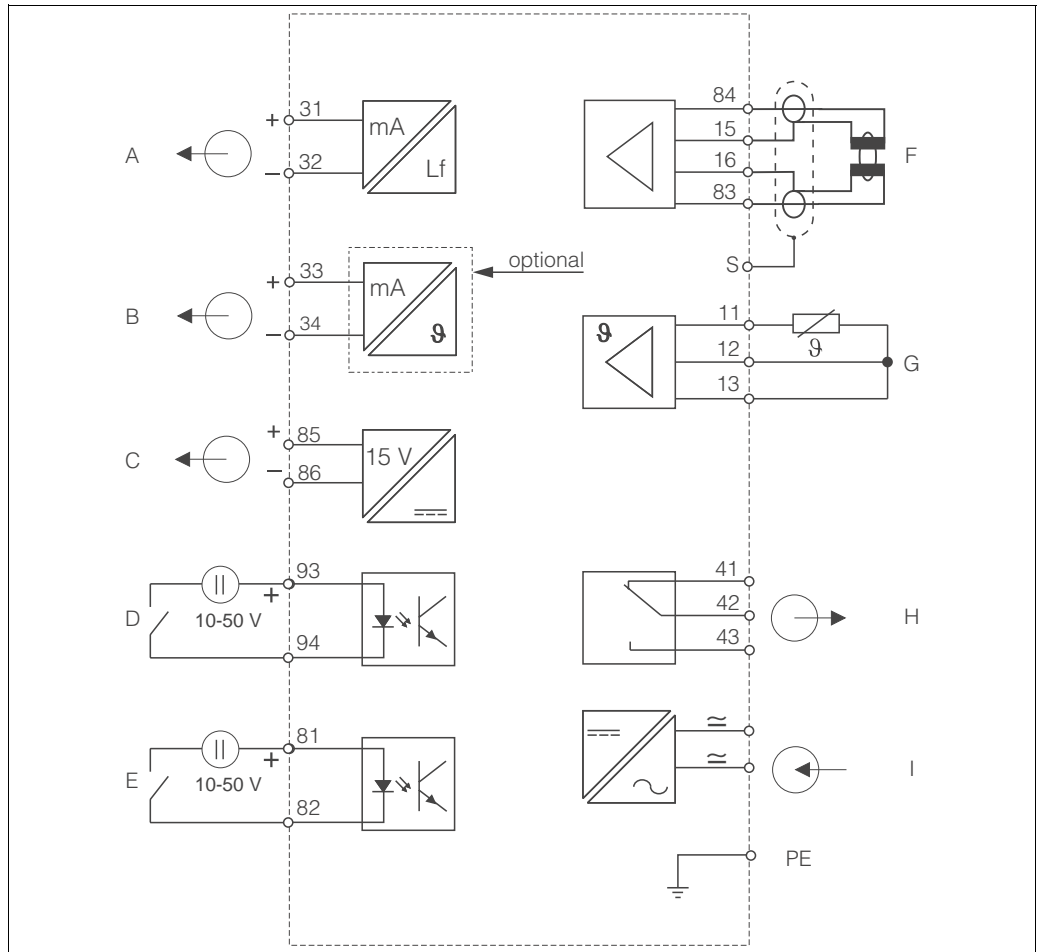
Voltage: 10 ... 50 V DC  
 Current consumption: max. 10 mA at 50 V

## Output

<b>Output signal</b>	Conductivity: 0 / 4 ... 20 mA, galvanically isolated Temperature (optional second current output)
<b>Signal on alarm</b>	2.4 mA or 22 mA error current
<b>Load</b>	max. 500 $\Omega$
<b>Output range</b>	Conductivity: adjustable Temperature: adjustable
<b>Signal resolution</b>	max. 700 digits/mA
<b>Separation voltage</b>	max. 350 V <sub>RMS</sub> / 500 V DC
<b>Minimum distance of output signal</b>	Conductivity: Measured value 0 ... 19.99 $\mu\text{S/cm}$ : 2 $\mu\text{S/cm}$ Measured value 20 ... 199.9 $\mu\text{S/cm}$ : 20 $\mu\text{S/cm}$ Measured value 200 ... 1999 $\mu\text{S/cm}$ : 200 $\mu\text{S/cm}$ Measured value 0 ... 19.99 mS/cm: 2 mS/cm Measured value 20 ... 200 mS/cm: 20 mS/cm Measured value 200 ... 2000 mS/cm: 200 mS/cm Concentration: no minimum distance Temperature: 15 °C / 59 °F
<b>Overvoltage protection</b>	acc. to EN 61000-4-5:1995
<b>Auxiliary voltage output</b>	Output voltage: 15 V $\pm$ 0.6 V Output current: max. 10 mA
<b>Contact outputs</b>	Switching current with ohmic load ( $\cos \varphi = 1$ ): max. 2 A Switching current with inductive load ( $\cos \varphi = 0.4$ ): max. 2 A Switching voltage: max. 250 V AC, 30 V DC Switching power with ohmic load ( $\cos \varphi = 1$ ): max. 500 VA AC, 60 W DC Switching power with inductive load ( $\cos \varphi = 0.4$ ): max. 500 VA AC
<b>Limit contactor</b>	Pickup / dropout delay: 0 ... 2000 s (versions with remote parameter set switching only)
<b>Alarm</b>	Function (switchable): steady / fleeting contact Alarm delay: 0 ... 2000 s (min)

## Power supply

### Electrical connection



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Electrical connection of CLD132

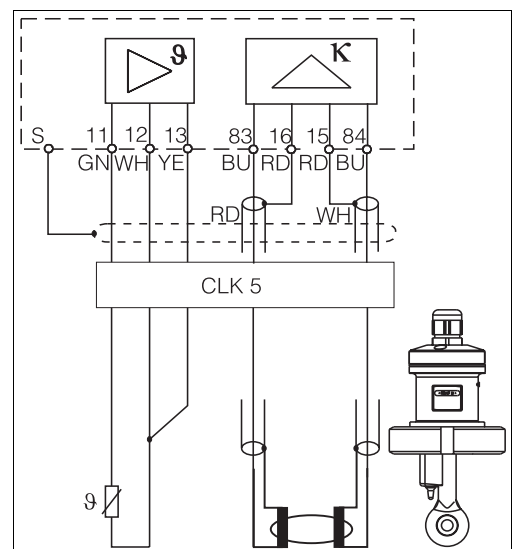
- A Signal output 1 conductivity
- B Signal output 2 temperature
- C Auxiliary power output
- D Binary input 2 (MRS 1+2)
- E Binary input 1 (hold / MRS 3+4)

- F Conductivity sensor
- G Temperature sensor
- H Alarm (contact position: no current)
- I Power supply

MRS: Remote parameter set switching (measuring range switching)

### Sensor connection

The conductivity sensor of the separate version is connected using the shielded multi-core fixed cable. Use the junction box VBM and the CLK5 extension cable (see Accessories) to extend the cable length.

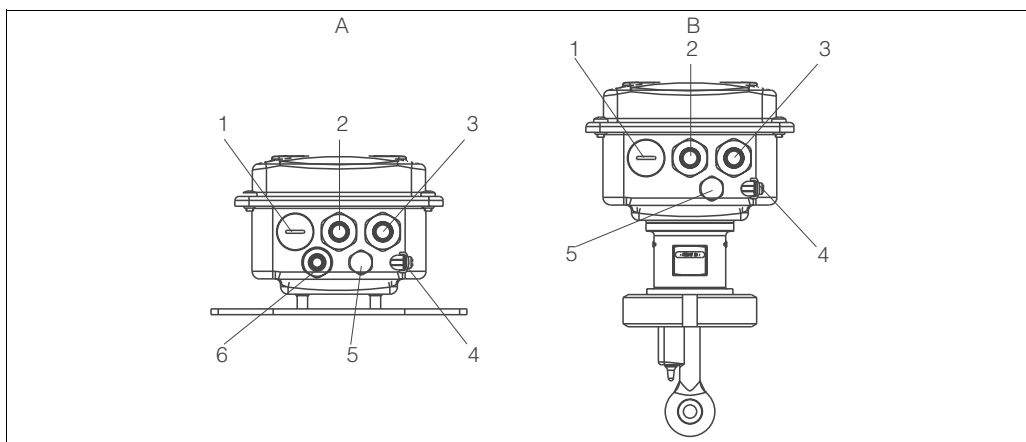


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Electrical connection of CLS52

**Supply voltage** Depending on ordered version:  
 100 / 115 / 230 V AC +10 / -15 %, 48 ... 62 Hz  
 24 V AC/DC +20 / -15 %

**Cable entries**



Terminal assignments of cable glands on Smartec S CLD132

- |  |  |
|--|--|
| <b>A</b> Separate version                      | <b>B</b> Compact version                       |
| 1 Plug, analog output, binary input            | 1 Plug, analog output, binary input            |
| 2 Cable gland for alarm contact                | 2 Cable gland for alarm contact                |
| 3 Cable gland for power supply                 | 3 Cable gland for power supply                 |
| 4 Housing ground                               | 4 Housing ground                               |
| 5 Pressure comp. element PCE (Goretex® filter) | 5 Pressure comp. element PCE (Goretex® filter) |
| 6 Cable gland for sensor connection, Pg 9      |  |

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**Power consumption** max. 7.5 VA

**Mains fuse** Fine-wire fuse, medium time lag, 250 V / 3.15 A

**Performance characteristics**

**Measured value resolution** Temperature: 0.1 °C / 0.18 °F

**Temperature response time**  $t_{90} < 5$  s versions with stainless steel socket (CLD132-\*\*\*\*\*1/2)  
 $t_{90} < 3.5$  min versions with encapsulated Pt 100 (CLD132-\*\*\*\*\*6/7)

**Measured error of the sensor<sup>a</sup>** Conductivity:  
 - -5 ... +100 °C / 23 ... 212 °F ± (10 µS/cm + 0.5 % of measured value)  
 - > 100 °C / > 212 °F ± (30 µS/cm + 0.5 % of measured value)  
 Temperature: Pt 100 class A acc. to IEC 751

**Measured error of the transmitter<sup>a</sup>** Conductivity:  
 - Display: max. 0.5 % of measured value ± 4 digits  
 - Conductivity signal output: max. 0.75 % of current output range  
 Temperature  
 - Display: max. 0.6 % of measuring range  
 - Temperature signal output: max. 0.75 % of current output range

**Repeatability<sup>a</sup>** Conductivity: max. 0.2% of measured value ± 2 digits

a) acc. to IEC 60746 part 1, at nominal operating conditions

<b>Cell constant</b>	5.9 cm <sup>-1</sup>	
<b>Measuring frequency (oscillator)</b>	2 kHz	
<b>Temperature compensation</b>	Range:	-10 ... +150 °C / 14 ... 302 °F
	Compensation types:	<ul style="list-style-type: none"> <li>- none</li> <li>- linear with freely selectable temperature coefficient <math>\alpha</math></li> <li>- one freely programmable coefficient table (four tables available in versions with remote parameter set switching)</li> <li>- NaCl acc. to IEC 746-3</li> </ul>
	Minimum distance for table:	1 K
<b>Reference temperature</b>	25 °C / 77 °F	
<b>Temperature offset</b>	adjustable, $\pm 5$ °C / 9 °F, for temperature display adjustment	

## Installation

### Installation instructions

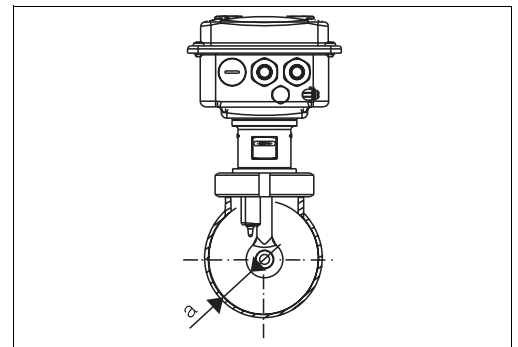
In narrow installation conditions, the ion flow in the medium is affected by the pipe walls. This effect is compensated by the so-called installation factor. The installation factor can be entered in the transmitter or the cell constant can be corrected by multiplication with the installation factor to ensure correct measurement.

The value of the installation factor depends on the diameter and the conductivity of the pipe as well as the sensor's distance from the wall.

If the distance from the wall is sufficient ( $a > 15$  mm, from DN 65), it is not necessary to consider the installation factor ( $f = 1.00$ ).

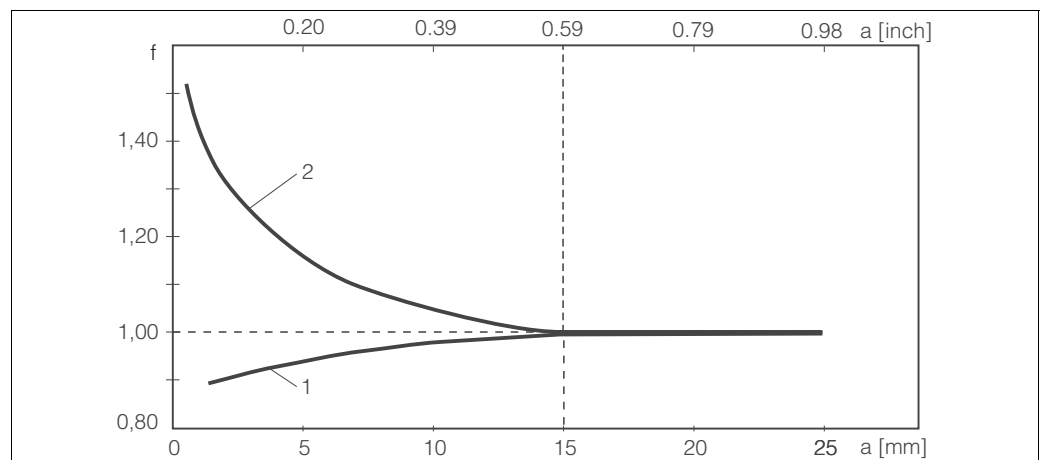
If the distance from the wall is smaller, the installation factor increases in case of electrically insulating pipes ( $f > 1$ ) and decreases in case of electrically conductive pipes ( $f < 1$ ).

The installation factor can be measured using calibration solutions or it can be approximately determined from the diagram below.



CLD132 installation

a Wall distance



Relationship between installation factor  $f$  and distance from wall  $a$

- 1 Electrically conductive pipe wall
- 2 Insulating pipe wall

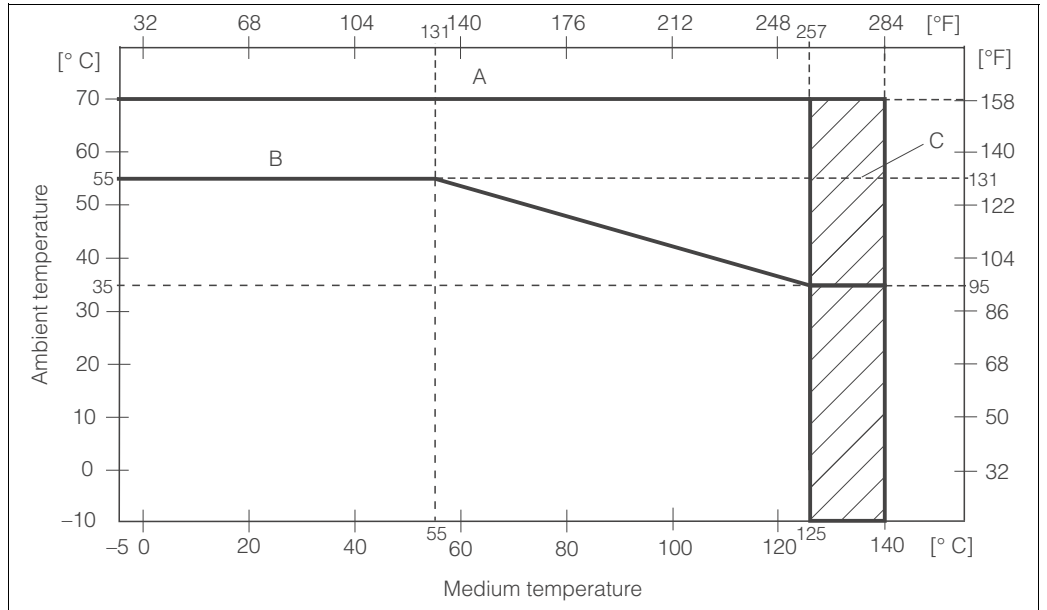
## Environment

<b>Ambient temperature</b>	0 ... +55 °C / 32 ... 131 °F	
<b>Ambient temperature limits</b>	-10 ... +70 °C / 14 ... 158 °F (separate version) -10 ... +55 °C / 14 ... 131 °F (compact version) See figure "Permissible temperature ranges of Smartec S CLD132" on page 11.	
<b>Storage temperature</b>	-25 ... +70 °C / -13 ... 158 °F	
<b>Electromagnetic compatibility</b>	Interference emission and interference resistance acc. to EN 61326: 1997 / A1: 1998	
<b>Ingress protection</b>	IP 67	
<b>Relative humidity</b>	10 ... 95%, non-condensing	
<b>Vibration resistance acc. to IEC 60770-1 and IEC 61298-3</b>	Oscillation frequency:	10 ... 500 Hz
	Deflection (peak value):	0.15 mm / 0.01"
	Acceleration (peak value):	19.6 m/s <sup>2</sup>
<b>Impact resistance</b>	Display window:	9 J

## Process

<b>Process temperature</b>	CLS52 sensor with separate version:	max. 125 °C / 257 °F at 70 °C / 158 °F ambient temperature
	Compact version:	max. 125 °C / 257 °F at 35 °C / 95 °F ambient temperature max. 55 °C / 131 °F at 55 °C / 131 °F ambient temperature
<b>Sterilisation</b>	CLS52 sensor with separate version:	140 °C / 284 °F at 70 °C / 158 °F ambient temperature, 4 bar / 58 psi, max. 30 min
	Compact version:	140 °C / 284 °F at 35 °C / 95 °F ambient temperature, 4 bar / 58 psi, max. 30 min
<b>Process pressure</b>	max. 16 bar (90 °C) / 232 psi (194 °F) no underpressure allowed with versions with stainless steel socket (CLD132*****1, CLD132*****2)	

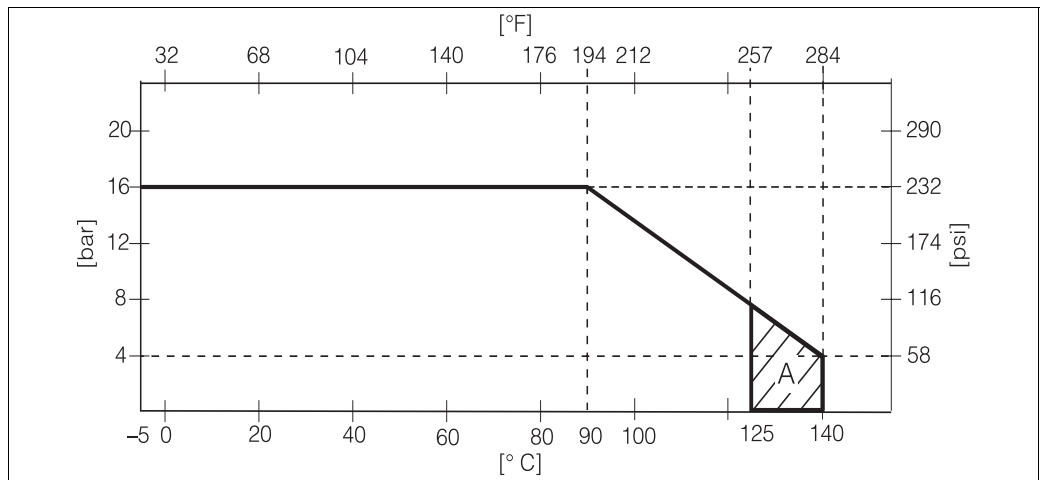
**Permissible temperature ranges of Smartec S CLD132**



Permissible temperature ranges of Smartec S CLD132

- A CLS52 sensor with separate version
- B Compact version
- C Short-term for sterilisation (< 30 min)

**Pressure-temperature load curve of CLS52 sensor**



Permissible pressure and temperature ranges of CLS52 sensor

- A short-term for sterilisation (< 30 min)

## Mechanical construction

<b>Dimensions</b>	Separate transmitter with mounting plate:	L x W x D: 225 x 142 x 109 mm / 8.86 x 5.59 x 4.29"
	Compact transmitter	
	MV1, CS1, GE1, SMS versions:	L x W x D: 225 x 142 x 242 mm / 8.86 x 5.59 x 9.53"
	VA1, AP1 versions:	L x W x D: 225 x 142 x 180 mm / 8.86 x 5.59 x 7.09"

<b>Weight</b>	Separate version:	
	Transmitter:	approx. 2.5 kg / 5.5 lb.
	CLS52 sensor	depending on version , approx. 400 ... 800 g / 0.9 ... 1.8 lb.
	Compact version with CLS52 sensor:	approx. 3 kg / 6.6 lb.

<b>Materials of the sensor (in contact with medium)</b>	Sensor	PEEK-GF20
	Varivent flange, APF flange:	
	Flange:	stainless steel 1.4435 (AISI 316L)
	Seal:	EPDM
	Metall temperature sensor socket:	
	Socket:	stainless steel 1.4435 (AISI 316L)
	Seal:	Chemraz®

<b>Materials of the transmitter</b>	Housing:	stainless steel 1.4301
	Front window:	polycarbonate

### Chemical durability of the sensor

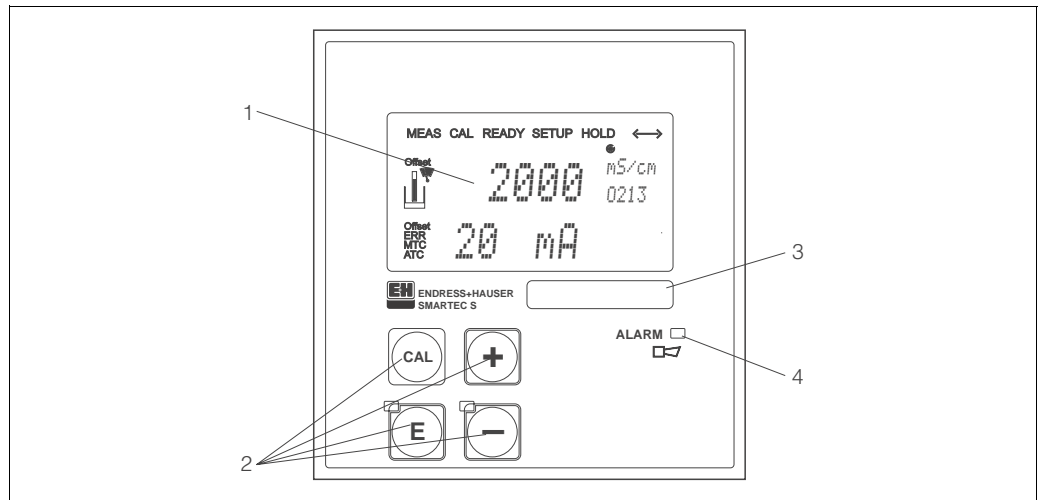
Medium	Concentration	PEEK	1.4435 (AISI 316L)	Chemraz	EPDM
Caustic soda NaOH	0 ... 10 %	20 ... 100 °C / 68 ... 212 °F	20 ... 90 °C / 68 ... 194 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F
	0 ... 50 %	20 ... 100 °C / 68 ... 212 °F	20 ... 90 °C / 68 ... 194 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 60 °C / 68 ... 140 °F
Nitric acid HNO <sub>3</sub>	0 ... 10 %	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	20 °C / 68 °F
	0 ... 25 %	20 ... 40 °C / 68 ... 104 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	not suitable
Phosphoric acid H <sub>3</sub> PO <sub>4</sub>	0 ... 10 %	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 80 °C / 68 ... 176 °F
	0 ... 30 %	20 ... 100 °C / 68 ... 212 °F	20 ... 85 °C / 68 ... 185 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 80 °C / 68 ... 176 °F
Sulphuric acid H <sub>2</sub> SO <sub>4</sub>	0 ... 2.5 %	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	20 ... 70 °C / 68 ... 158 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 30 °C / 68 ... 86 °F
	0 ... 30 %	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	not suitable	20 ... 100 °C / 68 ... 212 °F	20 ... 30 °C / 68 ... 86 °F

1) slight affect possible

No responsibility is taken for the correctness of this information.

## Human interface

### Display and operating elements



Display and keys of CLD132

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- 1 LC display showing measured values and configuration data
- 2 Four operating keys for calibration and instrument configuration
- 3 Field for user labeling
- 4 LED indicator for alarm function

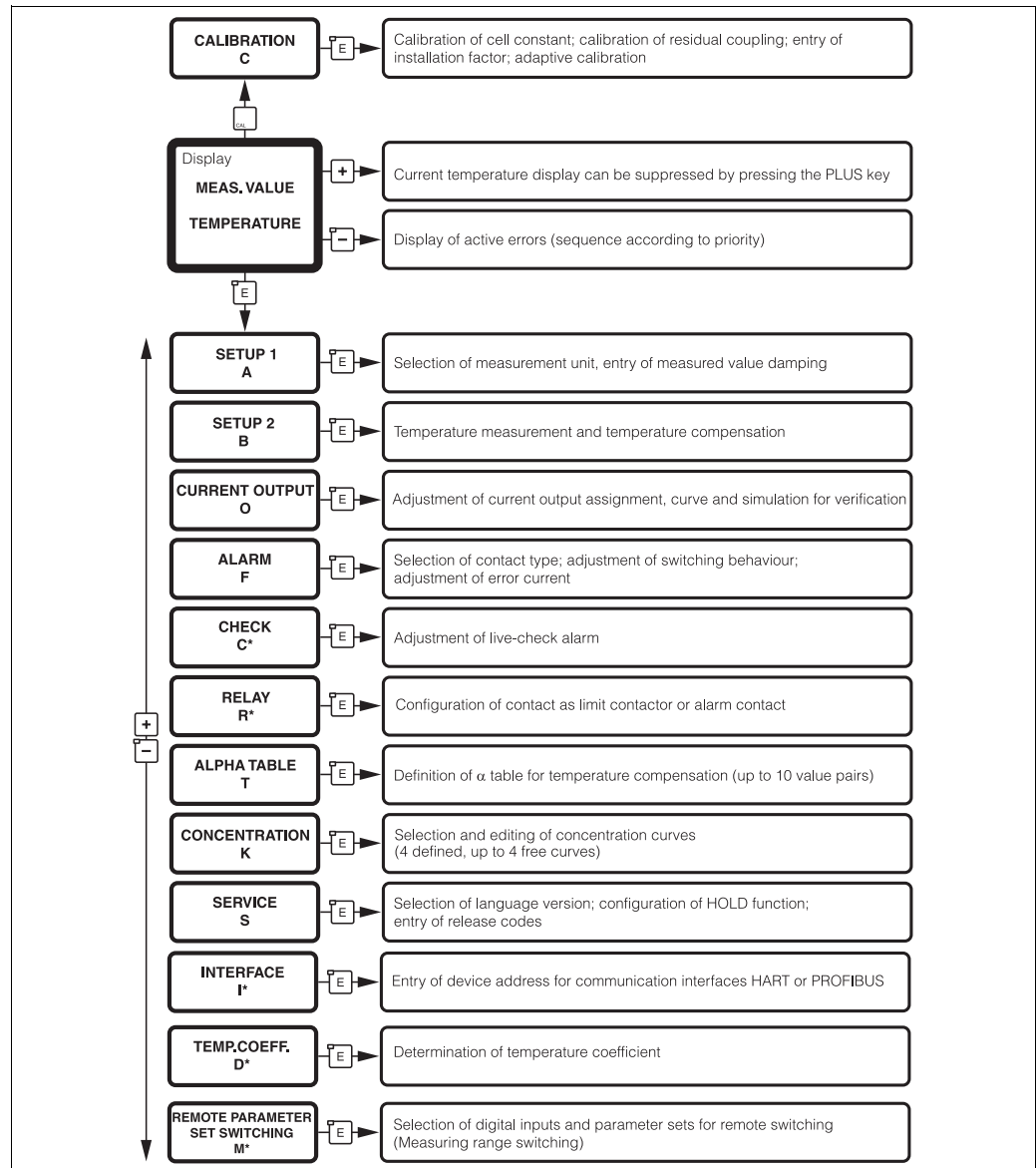
### Operation

You have the following options of operating Smartec S CLD132:

- Local operation via operating keys
  - The four keys are located underneath the housing cover. For operation, open the housing cover by removing the four screws.
- Via HART® interface
  - HART hand-held terminal
  - PC with HART modem and the Communwin II software
- Via PROFIBUS PA/DP using a PC with a corresponding interface and the Communwin II software or via programmable logical controller (PLC)

**Calibration and configuration functions**

All calibration and configuration functions are arranged in a logical menu structure. The individual parameters can only be modified after entering the access code. The current position within the menu structure is displayed.



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Overview of the Smartec S CLD132 menu, showing all options that can be installed

\* Menus not available in standard version

## Ordering information

### Product structure

Version	
P	Compact version
S	Separate transmitter, cable length 20 m / 65.62 ft
W	Separate transmitter, cable length 5 m / 16.41 ft
X	Separate transmitter, cable length 10 m / 32.81 ft
Process connection	
MV1	Dairy fitting DN 50 (acc. to DIN 11851)
CS1	Clamp connection 2" (acc. to ISO 2852)
GE1	Internal thread G 1 1/2
VA1	Varivent connection DN 40 ... 125
AP1	APV connection DN 40 ... 100
SMS	SMS connection 2"
Cable entry	
1	Cable gland Pg 13.5
3	Cable gland M 20 x 1.5
5	Conduit adapter NPT 1/2 "
Power supply	
0	230 V AC
1	115 V AC
5	100 V AC
8	24 V AC / DC
Current output / communication	
AA	Current output conductivity, without communication
AB	Current output conductivity and temperature, without communication
HA	HART, current output conductivity
HB	HART, current output conductivity and temperature
PE	PROFIBUS-PA, no current output
PF	PROFIBUS-PA, M 12 connector, no current output
PP	PROFIBUS-DP, no current output
Additional features	
1	Basic version with fast temperature measurement
2	Remote parameter set switching with fast temperature measurement
6	Basic version with encapsulated Pt 100 for high loads
7	Remote parameter set switching with encapsulated Pt 100 for high loads
<b>CLD132-</b>	complete order code

### Scope of delivery

The scope of delivery of the compact version includes:

- Smartec S CLD132 compact measuring system with integrated sensor
- Terminal strip set
- Expansion bellows (-\*GE1\*\*\*\*\* versions only)
- Operating Instructions BA 207C/07/en
- Versions with HART communication only:  
Operating Instructions Field communication with HART, BA 212C/07/en
- Versions with PROFIBUS interface only:  
– Operating Instructions Field communication with PROFIBUS, BA 213C/07/en  
– M12 connector (-\*\*\*\*\*PF\* versions only)

The scope of delivery of the separate version includes:

- Smartec S CLD132 transmitter
- CLS52 inductive sensor with fixed cable
- Terminal strip set
- Expansion bellows (-\*GE1\*\*\*\*\* versions only)
- Operating Instructions BA 207C/07/en
- Versions with HART communication only:  
Operating Instructions Field communication with HART, BA 212C/07/en
- Versions with PROFIBUS interface only:  
– Operating Instructions Field communication with PROFIBUS, BA 213C/07/en  
– M12 connector (-\*\*\*\*\*PF\* versions only)

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