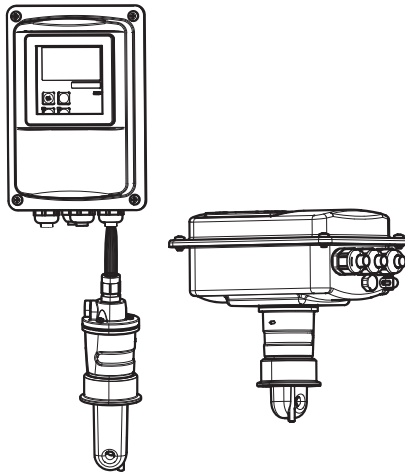Brief Operating Instructions

Smartec S CLD134

Conductivity Measuring System

These instructions are Brief Operating Instructions.
For detailed information, please read the Operating Instructions.

The complete device documentation comprises:
- these Brief Operating Instructions
- the Operating Instructions

Endress+Hauser

People for Process Automation

Table of contents

1   Safety instructions

⚠ Warning!
Electric shocks can cause death or severe injury.
Proceed with extreme care when touching cables and terminals. If the device/measuring system is installed in a high-voltage environment and malfunctions or installation errors occur, the terminals or the device/measuring system themselves might be high-voltage energized.

1.1   Designated use

Smartec S CLD134 is a field-tested and reliable transmitter used to determine the conductivity of liquid media.
It is particularly suitable for use in the foodstuffs industry.

Any other use than the one described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.
The manufacturer is not liable for damage caused by improper or non-designated use.

1.2   Installation, commissioning and operation

- The device/measuring system may only be installed, connected, operated and maintained by trained technical personnel (e.g. certified electrician). The technical personnel must strictly adhere to the Operating Instructions, prevailing standards, legal regulations and certificates (depending on application).
- If the Brief Operating Instructions do not provide sufficient information, you must read the Operating Instructions. There, you can find detailed information on the device.
- The operator may only perform modifications and repairs of the device/measuring system that are explicitly permitted in the Operating Instructions.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
- If faults can not be rectified, the products must be taken out of service and secured against unintentional commissioning.

1.3 Operational safety

The transmitter has been designed and tested according to the state of the art and left the factory in perfect functioning order.
Relevant regulations and European standards have been met.

As the user, you are responsible for complying with the following safety conditions:
- Guidelines for explosion protection
- Installation instructions
- Local prevailing standards and regulations.

Caution!
Pay attention to the technical data on the nameplate!

2 Installation

2.1 Installation of the separate version

Wall mounting
For wall mounting, attach the mounting plate to the wall by drilling holes as required. Anchors and screws are to be provided by the operator.

Note!
Wall mounting is not recommended for hygienically sensitive areas.

Post mounting
A mounting kit for installing the housing on horizontal or vertical posts or pipes
(max. Ø 60 mm / Ø 2.36") is available as an accessory.

Note!
For use in hygienically sensitive areas, shorten the threads as much as possible.

1. Remove the mounting plate.

2. Insert the holding bars through the pre-drilled holes of the mounting plate and screw the mounting plate onto the transmitter.

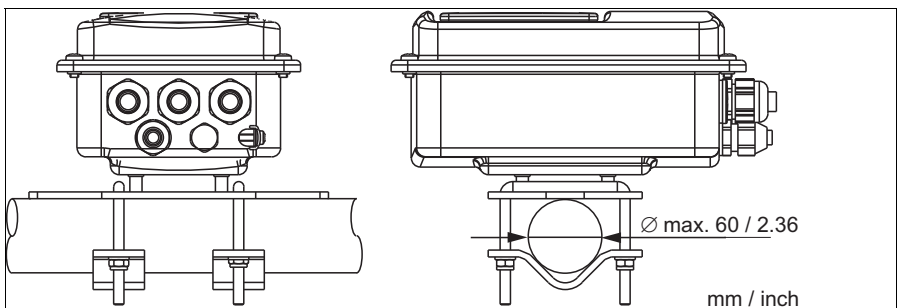3. Use the brackets to install the Smartec S on the post or pipe.

Fig. 1: Post mounting of separate version

2.2   Installation of the compact version or CLS54 sensor for separate version

✎ Note!
Perform an air set and calibrate the sensor before installing the compact version or the sensor.

Install the compact version or the CLS54 sensor directly on the pipe or vessel socket via the process connection (depending on ordered version).

1.   When installing the Smartec S CLD134 or the sensor, make sure that the flow opening of the sensor is oriented in the flow direction of the medium. An orientation arrow on the sensor facilitates orientation.

2.   Tighten the flange.

3   Wiring

⚠ Warning!
- The electrical connection must only be carried out by a certified electrician.
- Technical personnel must have read and understood the instructions in this manual and must adhere to them.
- Ensure that there is no voltage at the power cable before beginning the connection work.

3.1   Cable glands
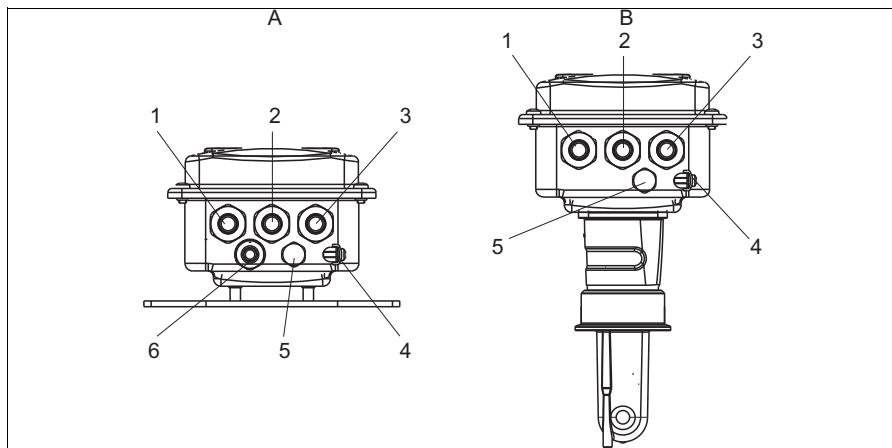
a0005439

Fig. 2:   Terminal assignment of cable glands

A	Separate version	B	Compact version
1	Cable gland for analog output, binary input	1	Cable gland for 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, M 16x1.5		

3.2 Connection diagram
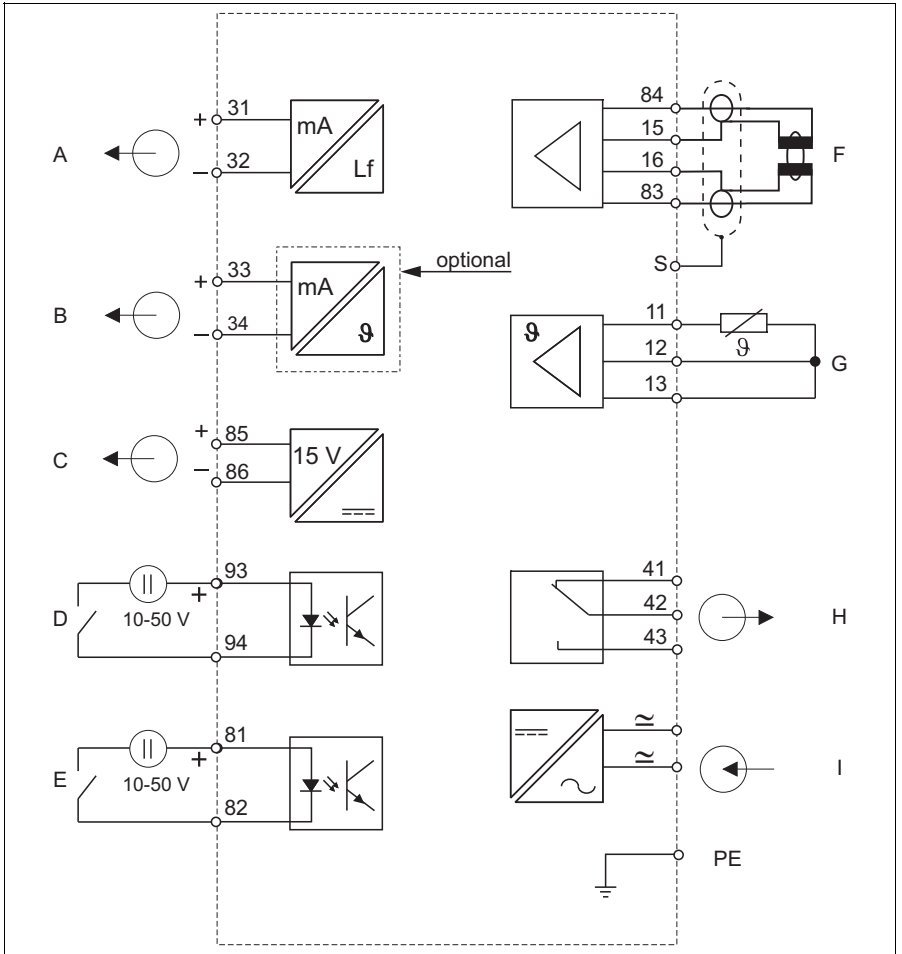
Fig. 3: Electrical connection of Smartec S CLD134

A	Signal output 1 conductivity	F	Conductivity sensor
B	Signal output 2 temperature	G	Temperature sensor
C	Auxiliary power output	H	Alarm (contact position: no current)
D	Binary input 2 (MRS 1+2)	I	Power supply
E	Binary input 1 (hold / MRS 3+4)	MRS	Remote parameter set switching (measuring range switching)

Connection of binary inputs
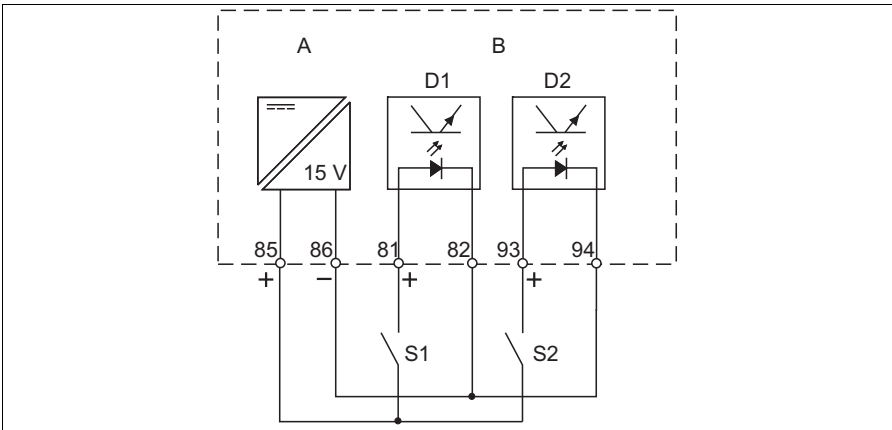
Fig. 4:   Connection of binary inputs when using external contacts

A   *Auxiliary power output*
B   *Contact inputs D1 and D2*
S1   *External contacts, not energized*
S2   *External contacts, not energized*

3.3   Structure and termination of measuring cable

Fig. 5:   Structure of the measuting cable

Fig. 6:   Electrical connection of the CLS54 sensor for the separate version

4   Commissioning

4.1   Function check

⚠ Warning!
- Check all connections for correctness.
- Make sure that the supply voltage is identical to the voltage indicated on the nameplate!

4.2   Key assignment

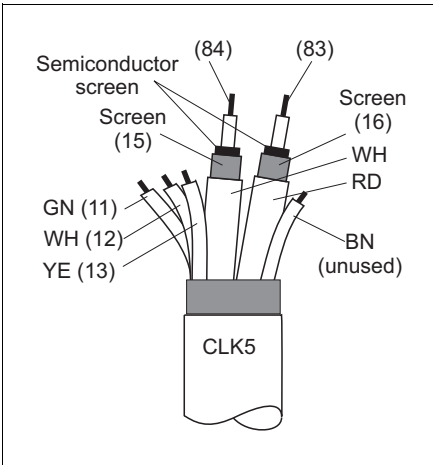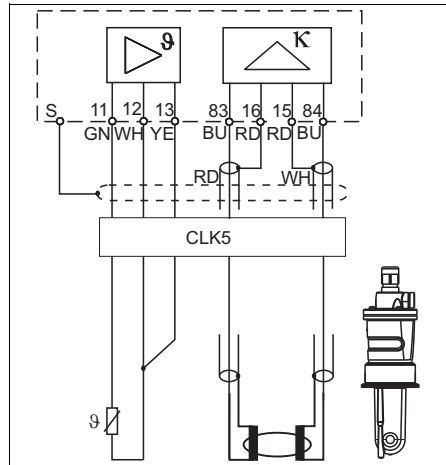| Key	Assignment
CAL	Use the CAL key to acknowledge calibration data and to continue through the calibration process.
E	The ENTER key has several functions: ■ It calls up the setup menus from the measuring mode. ■ It is used to store (acknowledge) data entered in setup mode. ■ It is used to move on within function groups.
+ and –	In setup mode, the PLUS and MINUS keys have the following functions: ■ Selection of function groups. ■ Setting of parameters and numeric values. In measuring mode, **repeatedly pressing the PLUS key** displays the following settings in sequence: 1. Temperature display in °F. 2. Hide temperature display. 3. Display of uncompensated conductivity value. 4. Back to basic setting. In measuring mode, **repeatedly pressing the MINUS key** displays the following settings in sequence: 1. Display of current measuring range. 2. Display of current errors in sequence (max. 10). 3. After all errors are displayed, the standard display is shown again. Press the PLUS and the MINUS key simultaneously to perform the escape function.

4.3   Quick setup

After switching the transmitter on, configure the major functions required for accurate measurement. The following section gives you an example for a basic configuration.

Input	Selection or range (factory setting bold)	Display
1. Press the ENTER key. 2. Enter the code 22 to be able to edit the setup. Press the ENTER key.		
3. Press the MINUS key several times until the "Service" function group is displayed. 4. Press the ENTER key to edit this function group.		SERVICE
5. Select your language, e.g. "ENG" for English. Confirm your entry by pressing the ENTER key.	**ENG = English** GER = German FRA = French ITA = Italian NEL = Dutch ESP = Spanish	ENG Language
6. Press the PLUS and MINUS keys simultaneously to quit the "Service" function group.		
7. Press the MINUS key several times until the "Setup 1" function group is displayed. 8. Press the ENTER key to edit "Setup 1".		SETUP 1
9. In A1, select the operating mode, e.g. "cond" = conductivity. Confirm your selection by pressing the ENTER key.	**cond = conductivity** conc = concentration	cond Oper.Mode
10. In A2, press the ENTER key to confirm the factory setting.	% **ppm** mg/l TDS = Total Dissolved Solids none	ppm Conc.Unit
11. In A3, press the ENTER key to confirm the factory setting.	**XX.xx** X.xxx XXX.x XXXX	XX.xx Format
12. In A4, press the ENTER key to confirm the factory settting.	**auto**, µS/cm, mS/cm, S/cm, µS/m, mS/m, S/m	auto Unit
13. In A5, enter the cell constant for the connected sensor. Refer to the sensor's or the compact version's quality certificate for the exact value.	0.10 ... **6.3** ... 9.99	6.300 l/cm Cellconst
14. In A6, press the ENTER key to confirm the factory setting.	0.10 ... **1** ... 5.00	1.000 InstFac

Input	Selection or range (factory setting bold)	Display
15. If you are working in applications that fluctuate a great deal and you need to stabilize the display, enter the required damping factor in A7. Confirm your entry by pressing ENTER. The display returns to the inital display of "Setup 1".	**1** 1 ... 60	1 Damping
16. Press the MINUS key to go to the "Setup 2" function group. 17. Press the ENTER key to edit "Setup 2".		SETUP 2
18. In B1, select the temperature sensor of your conductivity sensor. By default, your measuring system is supplied with the CLS54 sensor with Pt 1000 temperature sensor. Confirm your entry by pressing ENTER.	Pt100 **Pt1k = Pt 1000** NTC30 fixed	Pt1k ProcTemp.
19. In B2, select the appropriate temperature compensation for your process, e.g. "lin" = linear. Confirm your selection by pressing ENTER.	none **lin = linear** NaCl = common salt (IEC 60746) Tab 1 ... 4	lin TempComp.
20. In B3, enter the temperature coefficient α. Confirm your entry by pressing ENTER.	**2.1 %/K** 0.0 ... 20.0 %/K	2.10 %/K Alpha val
21. The real temperature is displayed in B5. If necessary, calibrate the temperature sensor to an external measurement. Confirm your entry by pressing ENTER.	Display and entry of real temperature –35.0 ... 250.0 °C	0.0 °C RealTemp.
22. The difference between the measured and the entered temperatures is displayed. Press the ENTER key. The display returns to the initial display of the "Setup 2" function group.	**0.0 °C** –5.0 ... 5.0 °C	0.0 °C TempOffs.
23. Press the MINUS key to go to the "Output" function group. 24. Press the ENTER key to edit the output settings.		OUTPUT
25. In O1, select your output, e.g. "out1" = output 1. Confirm your selection by pressing ENTER.	**out 1** out 2	out1 Sel. Out
26. In O2, select the linear characteristic. Confirm your selection by pressing ENTER.	**lin = linear (1)** sim = simulation (2)	lin Sel. Type
27. In O211, select the current range for your output, e.g. 4 ... 20 mA. Confirm your selection by pressing ENTER.	**4 ... 20 mA** 0 ... 20 mA	4-20 Sel.Range
28. In O212, enter the conductivity corresponding to the minium current value at the transmitter output, e.g. 0 µS/cm. Confirm your entry by pressing ENTER.	**0.00 µS/cm** 0.00 µS/cm ... 2000 mS/cm	0 µS/cm 0/4 mA
29. In O213, enter the conductivity corresponding to the maximum current value at the transmitter output, e.g. 930 mS/cm. Confirm your entry by pressing ENTER. The display returns to the initial display of the "Output" function group.	**2000 mS/cm** 0.0 µS/cm ... 2000 mS/cm	930 mS/cm 20 mA
30. Press the PLUS and MINUS keys simultaneously to return to measuring mode.		

✎ Note!
You must perform an air set before installing the sensor. To do so, refer to the chapter
"Calibration".

4.4   Calibration

To access the "Calibration" function group, press the CAL key (code = 22).

Code	Field	Selection or range	Display	Info
C	**Function group CALIBRATION**		CALIBRAT	Calibration settings
C1(1)	Compensation of residual coupling	**Airs=Airset (1)** Cellc=cell constant (2) InstF=Installation factor(3)	AirS Calibrat	When commissioning inductive sensors, an airset is mandatory. The calibration of the sensor is to be performed in air. The sensor must be dry.
Remove sensor from the medium and dry **completely**.				
C111	Residual coupling start calibration (airset)	**current measured value**	0.0 µS/cm AirSet	Start calibration with CAL.
C112	Residual coupling is displayed	–80.0 ... 80.0 µS/cm	5.3 µS/cm AirSetVal	Residual coupling of measuring system (sensor and transmitter).
C113	Calibration status is displayed	o.k. E xxx	o.k. Status	If the calibration status is not o.k., the second display line shows an explanation of the error.
C114	Store calibration results	**yes** no new	yes Store	If C113 = E xxx, then only no or **new**. If new, return to C. If yes/no, return to "Measurement".
C1(2)	Calibration of cell constant	Airs=Airset (1) **Cellc=cell constant (2)** InstF=installation factor(3)	Cellc Calibrat	
Immerse sensor in calibration solution. ✎ Note! This section decribes the calibration for temperature compensated conductivity. For calibration with uncompensated conductivity, set the temperature coefficient α to 0.				The sensor should be immersed at a sufficient distance from the vessel wall (installation factor has no influence if a > 15 mm / 0.59").
C121	Enter process temperature (MTC)	**25 °C** –35.0 ... 250.0 °C	25.0 °C ProcTemp.	Only exists if B1 = fixed
C122	Enter α value of calibration solution	**2.10 %K** 0.00 ... 20.00 %K	2.10 %K alpha val	This value is specified in the Technical Information of all E+H calibration solutions. You can also use the printed–on table to calculate the value. Set α to 0 for calibration with uncompensated values.
C123	Enter correct conductivity value of calibration solution	**current measured value** 0.0 ... 9999 mS/cm	10.30 mS/cm Real. val	The display is always in mS/cm.

Code	Field	Selection or range	Display	Info
C124	Calculated cell constant is displayed	0.1 ... **6.3** ... 9.99 cm^{-1}	6.300 1/cm Cellconst	The calculated cell constant is displayed and entered in A5.
C125	Calibration status is displayed	o.k. E xxx	o.k. Status	If the calibration status is not o.k., the second display line shows an explanation of the error.
C126	Store calibration results	**yes** no new	yes Store	If C125 = E xxx, then only no or **new**. If new, return to C. If yes/no, return to "Measurement".
C1(3)	Calibration with sensor adaptation for inductive sensors	Airs=airset (1) Cellc= cell constant (2) **InstF=installation factor(3)**	InstF Calibrat	Sensor calibration with compensation of wall influence. The distance from the sensor to the pipe wall and the pipe material (conductive or nonconductive) influence the measured value. The installation factor compensates this influence.
	The sensor is installed in the process.			
C131	Enter process temperature	**25 °C** –35.0 ... 250.0 °C	25.0 °C MTC temp.	Only exists if B1 = fixed.
C132	Enter α value of calibration solution	**2.10 %K** 0.00 ... 20.00 %K	2.10 %K alpha value	This value is specified in the Technical Information of all E+H calibration solutions. You can also use the printed-on table to calculate the value. Set α to 0 for calibration with uncompensated values.
C133	Enter correct conductivity value of calibration solution	**current measured value** 0.0 ... 9999 mS/cm	10.30 mS/cm Real val.	Determine the correct conductivity value by a reference measurement.
C134	Calculated installation factor is displayed	**1** 0.10 ... 5.00	1 InstFact	The distance of the sensor to the pipe wall and the pipe material (conductive or nonconductive) influence the measured value. The installation factor compensates this influence.
C135	Calibration status is displayed	o.k. E xxx	o.k. Status	If the calibration status is not o.k., the second display line shows an explanation of the error.
C136	Store calibration results?	**yes** no new	yes Store	If C135 = E xxx, then only no or **new**. If new, return to C. If yes/no, return to "Measurement".

www.endress.com/worldwide

Endress+Hauser

People for Process Automation

71059831