

Instruction Manual

Stratos PROFIBUS 2221 X Cond

Knick >

Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).

Accessories: 1 year

Software release: 2.x
Date of issue: 20070810



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English

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1 Information on this instruction manual

1.1 Markings



The warning symbol means that the instructions given must always be followed for your own safety. Failure to follow these instructions may result in injuries



Notes provide important information that should be strictly followed when using the device.



When a key is shown, its function is explained.



When a display is shown, the corresponding information or operating instructions are provided.

Operating instructions

- Each operating instruction is preceded by a dot.

Enumerations

- Each enumeration is preceded by a dash.

Model designation

For practical purposes, the Stratos PROFIBUS 2221 X Cond is simply referred to as Stratos in this instruction manual.

Trademarks

The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.

- Registered trademarks
 - Sensocheck®
 - Sensoface®
 - GainCheck®

2 Safety information

2.1 Be sure to read and observe the following instructions!

The device has been designed in accordance with the state of the art and complying with the applicable safety regulations.

When operating the device, certain conditions may nevertheless be dangerous for the operator or cause damage to the device.



Whenever it is likely that protection has been impaired, the device shall be made inoperative and secured against unintended operation.

The protection is likely to be impaired if, for example:

- the device shows visible damage
- the device fails to perform the intended measurements
- after prolonged storage at temperatures above 70 °C
- after severe transport stress

Before recommissioning the device, a professional routine test in accordance with EN 61010-1 must be performed. This test should be carried out by the manufacturer.



Stratos PROFIBUS 2221 X Cond is approved for installation in ATEX, FM Zone 1 with measurement in Zone 0, and FM Class I Div 1.



Before commissioning it must be proved that the intrinsic safety is maintained when connecting the device to other equipment, such as segment coupler and cable.



For hazardous-area applications, the Stratos PROFIBUS 2221 X Cond may only be connected to explosion-proof segment couplers, power supplies

The Stratos PROFIBUS 2221 X Cond may be operated in accordance with the FISCO model.



The stipulations of EN 60079-10: 1996 and the following must be observed for the installation.



To protect against electrostatic discharge, the Stratos may only be cleaned with a damp cloth in hazardous locations.

3 PROFIBUS technology

3.1 General

PROFIBUS is a digital communication system that connects different field devices over a common cable and integrates them into a control system. In the long term, PROFIBUS will replace the 4-20 mA technology, which only supplies pure measured values.

Advantages of the PROFIBUS technology are:

- easy and cost-saving cabling
- convenient operation over a central control station
- transmission, evaluation and control of high amounts of data from field device to control station.

- devices installed in hazardous locations are configured and maintained from the control station

PROFIBUS is the leading open fieldbus system in Europe. Its application range covers manufacturing, process and building automation. As open fieldbus standard to EN 50170, PROFIBUS ensures communication of different devices over one bus.

PROFIBUS User Organizations provide for further development and maintenance of the PROFIBUS technology. They combine the interests of users and manufacturers.

English

3.2 Variations and basic characteristics

PROFIBUS determines the technical and functional characteristics of a serial bus system.

There are three PROFIBUS variations:

- PROFIBUS-FMS (FMS protocol)
 - is particularly suited for exchanging large amounts of data between control devices. It operates according to the RS 485 standard with transmission rates up to 12 Mbits/sec.
- PROFIBUS-DP (decentralized peripherals)
 - is tailored for communication of automation systems and distributed peripherals. It operates according to the RS 485 standard with transmission rates up to 12 Mbits/sec.
- PROFIBUS-PA (process automation)
 - is dedicated to the process industry. It permits connection of sensors and actuators to a common bus even in hazardous locations. PROFIBUS-PA has a transmission rate of 31.25 kbits/sec.

PROFIBUS distinguishes between two types of devices:

- Masters
 - control the data traffic on the bus. They send messages without external request.
- Slaves
 - are peripheral devices such as valves, drives, transmitters and analyzers. They can react acyclically to servicing, configuration and diagnostic tasks of the master. The central controller cyclically reads the measurement data with status.

3.3 Definitions for PROFIBUS-PA

The bus protocol defines type and speed of the data exchange between master and slave devices and determines the transmission protocol of the respective PROFIBUS system.

PROFIBUS-PA permits cyclic and acyclic services.

- Cyclic services are used for transmission of measurement data and actuating commands with status information.

- Acyclic services are used for device configuration, maintenance and diagnostics during operation.

The device profile defines the device class and typical functionalities with parameters, ranges and limit values.

The FISCO model developed by the German PTB for hazardous locations permits connection of several devices to one common bus and defines permissible limits for device and cable parameters.

3.4 PROFIBUS-PA with Stratos

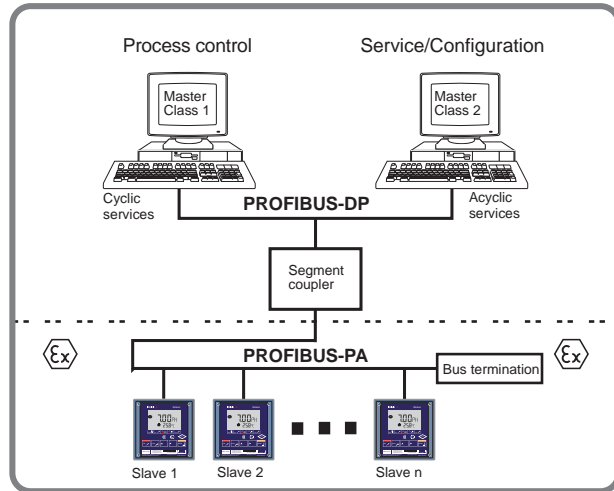


Fig. 3.1 Typical configuration of a PROFIBUS system with Stratos

4 Description

4.1 Proper use

Stratos is a PROFIBUS-PA analyzer. The Stratos is used for conductivity measurement in biotechnology, food processing, pharmaceutical and chemical industry, water/wastewater treatment, as well as for monitoring ultrapure water. The rugged molded enclosure can be wall mounted or fixed into a control panel. It can also be mounted at a post or

pipe.

The protective hood provides additional protection against direct weather exposure and mechanical damage.

The device can be easily replaced since the terminals are of a plug-in design.

English

4.2 Technical features

Communication between measuring point and control room is via PROFIBUS-PA. The data exchange (cyclic and

acyclic) is performed in accordance with the PROFIBUS-DP/V1 protocol.

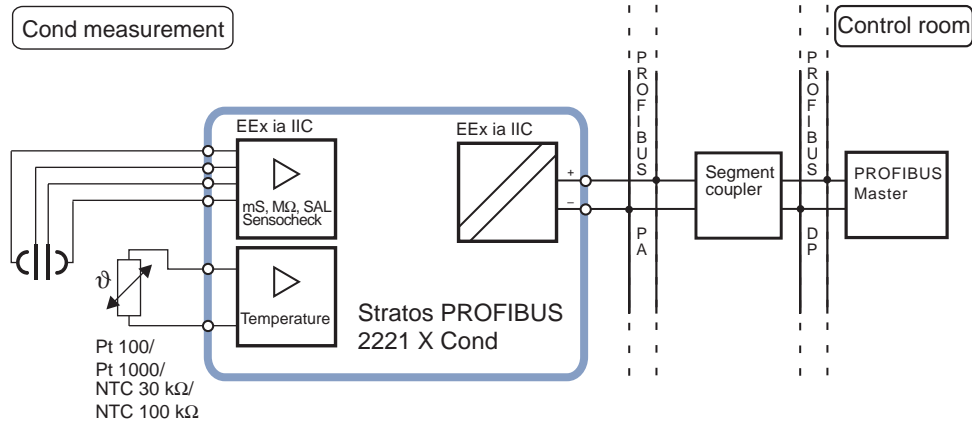


Fig. 4.1 System functions (hardware)

4.3 Communication model

The device performance is described by function blocks according to the PNO profile for Process Control Devices.

The respective blocks contain different parameters and functions.

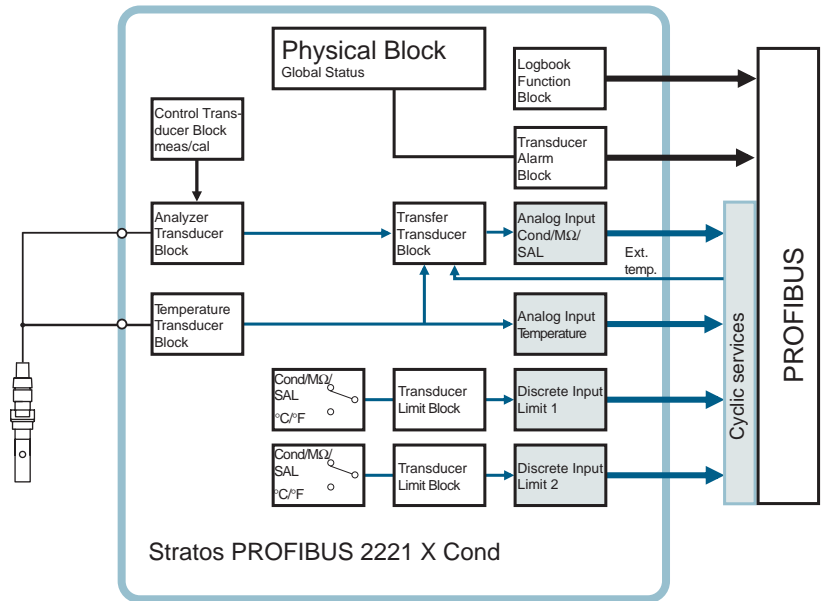


Fig. 4.2 Communication model Stratos PROFIBUS 2221 X Cond according to the PNO Profile

4.4 Device profile for Process Control Devices (extract)

Type of block	Block contents (general)	Block contents (detailed)
Physical Block (PB)	Description of device	Measurement procedure, device configuration Serial number, manufacturer name Operating state (run, maintenance, ...) Global status, diagnostics information
Transducer Block (TB)	Measurement procedure with interpretation	Process variable (plain text and unit) Number of measurement ranges (MR), start and end value of MR, active MR Autorange function On/Off Sampling rate of measured values Uncorrected measured value with status
Control Transducer Block	Control of device functions	Status of function execution of respective Transducer Blocks Slope of sensor characteristic (cell constant)
Transfer Transducer Block	Pre-processing of a measured value	Measured value pre-processing Temperature compensation Selection of pre-processing function
Transducer Limit Block	Limit monitoring	Block (TB) for limit setting Threshold, effective direction, hysteresis On-delay, off-delay Reset behavior, reset confirmation Limit status (active, not active)

English

Type of block	Block contents (general)	Block contents (detailed)
Analog Input (AI) Function Block	Measured value	Currently measured value with status and scale Rise time, hysteresis of AI limits Upper/lower alarm limit Upper/lower warning limit Switchover manual/automatic operation, measured value simulation Fail-safe behavior
Discrete Input (DI) Function Block	Digital input	Switchover manual/automatic operation Signal inversion Fail-safe behavior Limit value message/status
Transducer Alarm Block	Signaling of states and events	Required maintenance, function check, errors, limit values incl. summing Binary messages (error messages)
Logbook Function Block	Registration of states and events	Power on, power off, reset State of execution (Logbook status) Number of entries Navigation through entries

Tab. 4.1: Device profile for Process Control Devices (function contents)

5 Assembly

5.1 Package contents and unpacking

Unpack the device carefully. Check the shipment for transport damage and completeness.

The package should contain:

- Front unit of Stratos
- Lower case
- This instruction manual
- Short instruction sheet
- Floppy disk with GSD file KNIC7533.GSD
- Bag containing small parts:

English

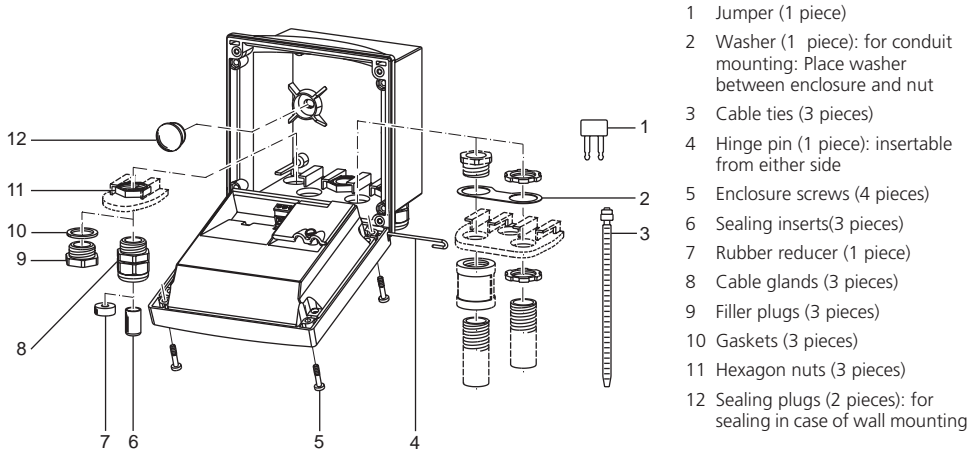


Fig. 5.1 Assembling the enclosure

5.2 Mounting plan

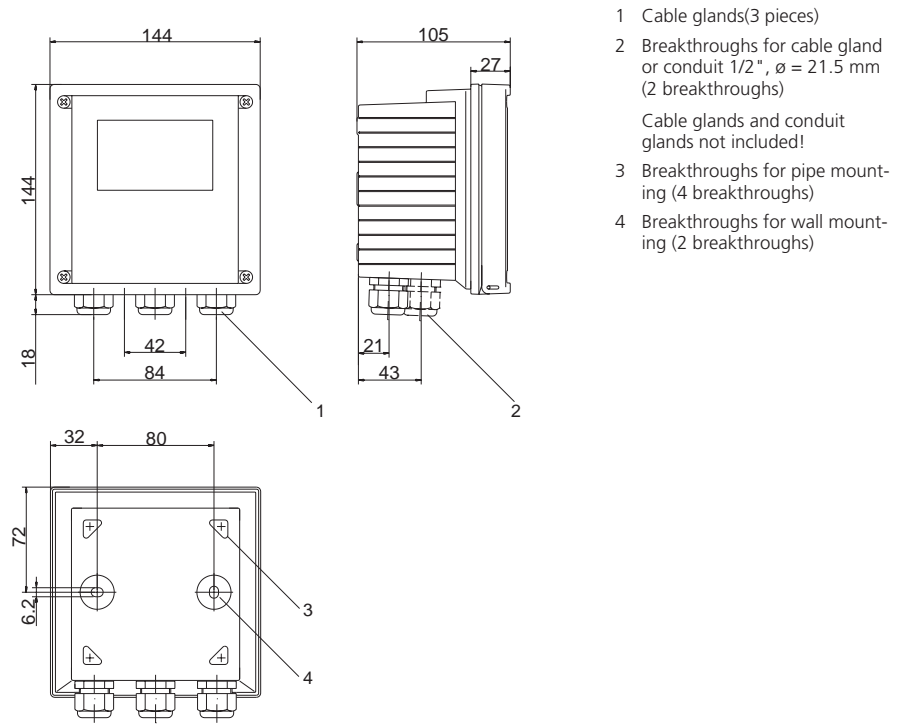
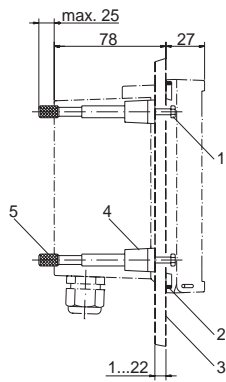
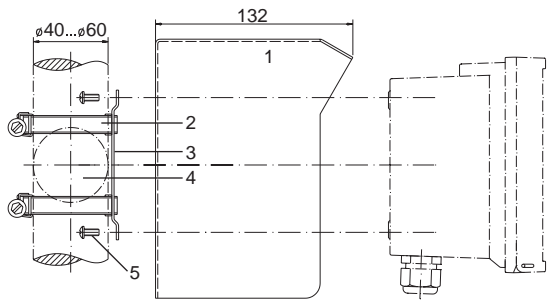


Fig. 5.2 Mounting plan



- 1 Screws (4 pieces)
- 2 Gasket (1 piece)
- 3 Panel
- 4 Span pieces (4 pieces)
- 5 Threaded sleeves (4 pieces)

Fig. 5.3 ZU 0275 panel-mount kit, panel cutout 138 x 138 mm (DIN 43700)



- 1 ZU 0276 protective hood (if required)
- 2 Hose clamps with worm gear drive to DIN 3017 (2 pieces)
- 3 Pipe-mount plate (1 piece)
- 4 For vertical or horizontal posts or pipes
- 5 Self-tapping screws (4 pieces)

Fig. 5.4 ZU 0274 pipe-mount kit

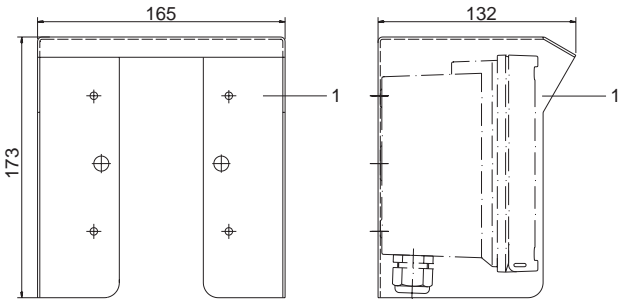


Fig. 5.5 ZU 0276 protective hood for wall and pipe mounting

6 Installation and connection

6.1 Information on installation



Installation may only be carried out by trained experts in accordance with this instruction manual and as per applicable local and national codes.



Be sure to observe the technical specifications and input ratings.



According to the PTB FISCO model, the limits of the permissible parameter range must be observed for connection in a hazardous location. See PROFIBUS Technical Guidelines PNO Order No.: 2.091



Be sure not to notch the conductor when stripping the insulation.

For easier installation, the terminal strips are of a plug-in design. The terminals are suitable for single wires and flexible leads up to 2.5 mm² (AWG 14).

A special twisted and shielded two-wire cable (e.g. Siemens) is used as bus cable.

Division 2 wiring

The connections to the Transmitter must be installed in accordance with the National Electric Code (ANSI-NFPA 70) Division 2 hazardous (classified) location non-incendive wiring techniques.

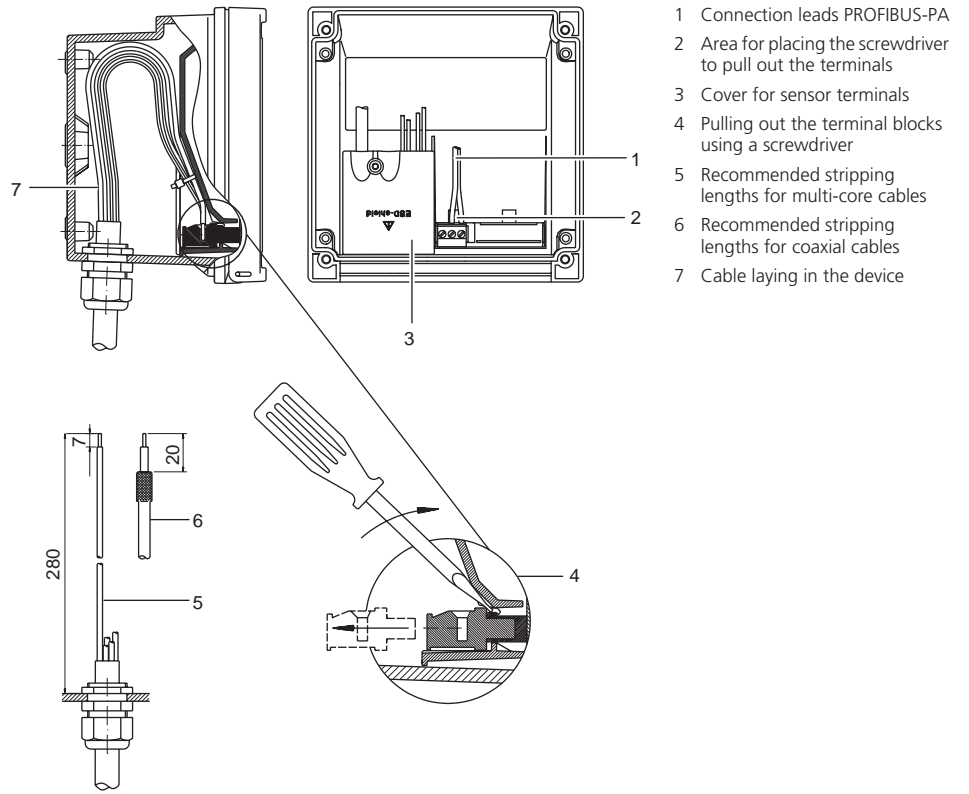
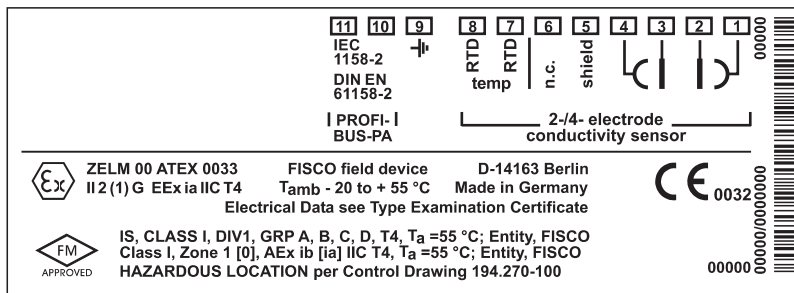


Fig. 6.1 Information on installation

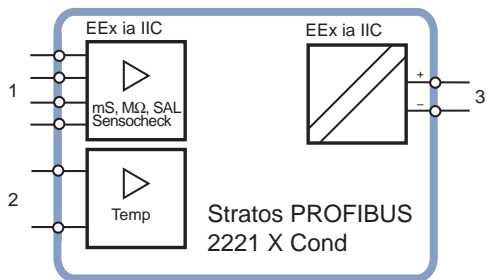
6.2 Terminal assignments



English

Fig. 6.2 Terminal assignments of Stratos

6.3 Overview of the Stratos



- 1 Input for 2- or 4-electrode sensor
- 2 Input for temperature probe
- 3 PROFIBUS-PA

Fig. 6.3 Inputs and outputs

6.4 Typical wiring

Conductivity measurement with the SE 604 2-electrode sensor

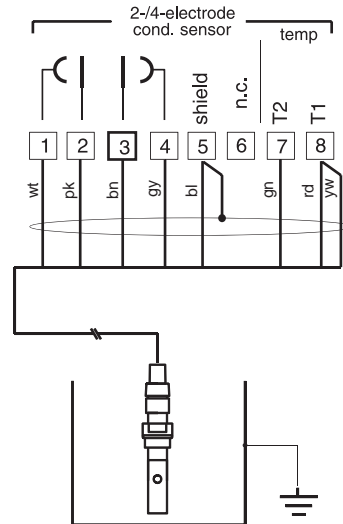
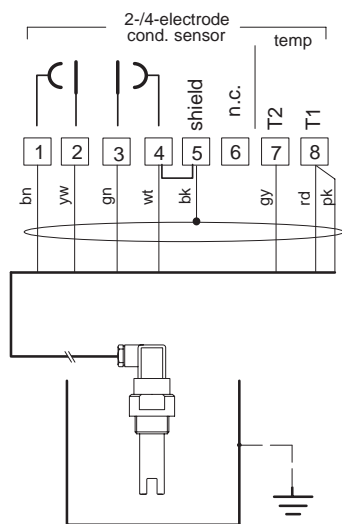


Fig. 6.4 Conductivity measurement with the SE 604 2-electrode sensor

The 2-electrode sensor is used to measure conductivity values from approx. 0 to 1000 $\mu\text{S}/\text{cm}$.

Combined with the AR 200 flow-through fitting it is particularly suited for measuring ultrapure water (boiler feed water), for example.

**Conductivity measurement with the ZU 0071
2-electrode sensor**



English

Fig. 6.5 Conductivity measurement with the ZU 0071 2-electrode sensor

The 2-electrode sensor is used to measure conductivity values from approx. 5 $\mu\text{S}/\text{cm}$ to 50 mS/cm .
The sensor is suited for measuring industrial water and waste water, for example.

**Conductivity measurement with the SE 600
4-electrode sensor**

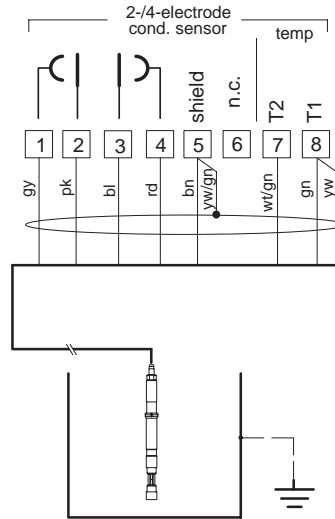


Fig. 6.6 Conductivity measurement with the SE 600 4-electrode sensor

The 4-electrode sensor is used to measure conductivity values from 0.5 $\mu\text{S}/\text{cm}$ to 300 mS/cm .

7 Commissioning

7.1 Checklist



Commissioning may only be carried out by trained experts.



Before commissioning the Stratos PROFIBUS 2221 X Cond, the following requirements must be met:

- The device must not show any damage.
- When recommissioning the device after a repair, a professional routine test in accordance with EN 61010-1 must be performed.
- It must be proved that the intrinsic safety is maintained when connecting the device to other equipment.
- It must be ensured that the device is configured in accordance with the connected peripherals.
- All connected voltage and current sources must correspond to the technical data of the device.
- The device must only be connected to explosion-proof segment couplers, power supplies ...

8 Operation

8.1 Operation possibilities

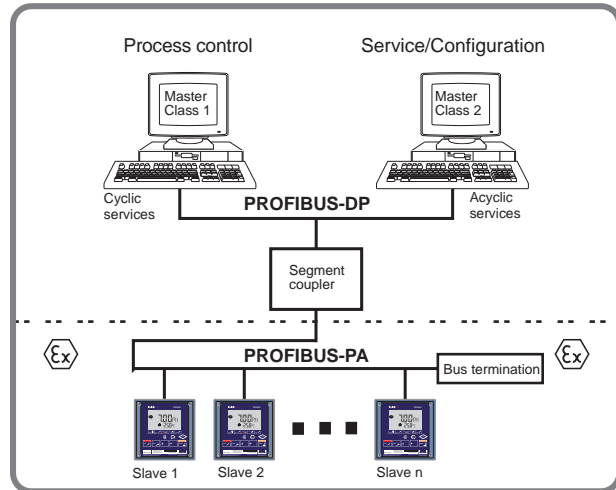
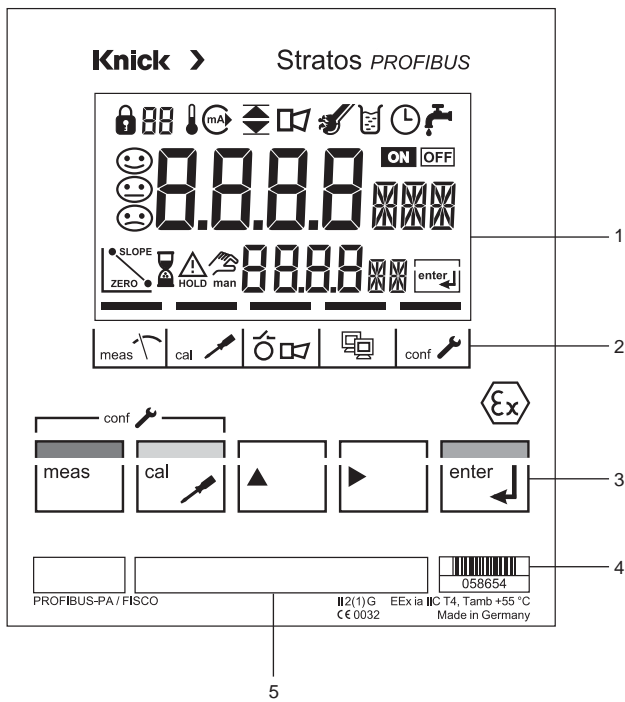


Fig. 8.1 System configuration

The device can be operated as follows:

- using the keypad on the device
- using an operating tool in the service station

8.2 Operation using keypad on the device



- 1 Display
- 2 Mode indicators
 - Measuring mode
 - Calibration mode
 - Alarm
 - PROFIBUS-PA communication
 - Configuration mode
- 3 Keypad
- 4 Coding
- 5 Rating plate

English

Fig. 8.2 Front view of Stratos

Display

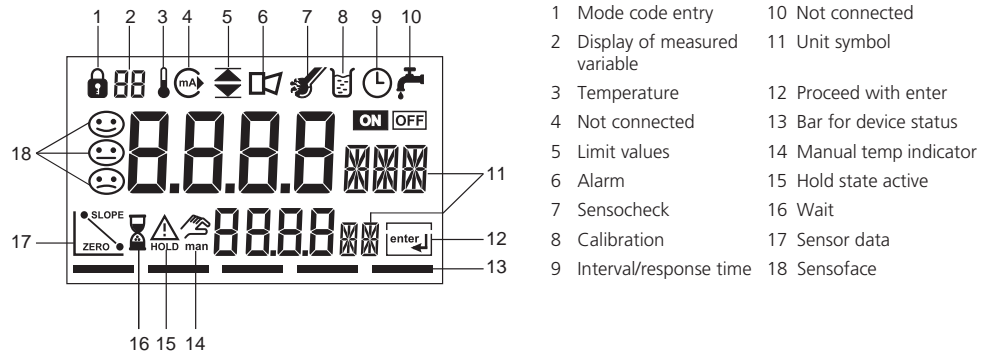
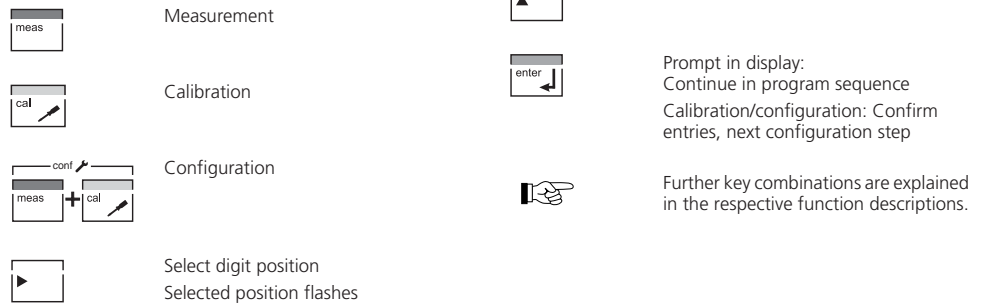


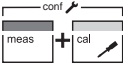

Fig. 8.3 Stratos display

Keypad functions



8.3 Mode code

After pressing conf or cal you can enter one of the following mode codes to access the designated mode:

	conf, 0000	Error Info		cal, 0000	Cal Info
	conf, 1200	Configuration mode		cal, 1015	Adjusting temp probe
				cal, 1100	Calibration mode
				cal, 2222	Test mode

English

8.4 Safety functions

Sensocheck, Sensoface sensor monitoring

Sensocheck continuously monitors the sensor. Sensocheck can be switched off.



Sensoface provides information on the sensor condition.

The monitoring function alerts for significant sensor polarization or excessive cable capacitance caused by an unsuitable cable or a cable that is too long.

Automatic device self-test

The automatic device self-test checks the memory and measured-value transfer. It runs automatically in the background at fixed intervals.

GainCheck manual device self-test

A display test is carried out, the software version is displayed and the memory and measured value transfer are checked. The GainCheck function ensures device operability.



Start GainCheck manual device self-test

Hold state

The Hold state is a safety state that is activated in the case of interventions such as configuration and calibration. The Stratos freezes the last valid measured value and sends a status message to the control system.



This symbol indicates that the device is in the "Hold" state.

The Hold state is activated by the following mode codes:

- Calibration
 - Mode code 1015
 - Mode code 1100
 - Mode code 2222

- Configuration
 - Mode code 1200

The measured value and Hold are displayed alternately

- Check whether the measured value is plausible
- End the Hold state



After 20 sec (for measured value stabilization) the Stratos returns to measuring mode.

8.5 Mode indicators

Measuring mode



The Stratos is in measuring mode.

Calibration mode



Calibration mode is active.

Alarm



During an error message the red alarm LED beneath the display flashes.

The alarm response time is permanently set to 10 sec.

PROFIBUS-PA communication



The Stratos communicates via PROFIBUS-PA and can be configured from the service station. Measured values, messages and device identification can be downloaded at any time. This allows integration in fully automatic process cycles.

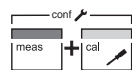
Configuration mode



The Stratos is in configuration mode.

8.6 Configuration

In the configuration mode the device parameters are set. The following steps must be executed:



- Activate configuration



- Enter mode code "1200"



- Confirm entry



Welcome text 3 sec



During configuration the Stratos remains in the Hold state for reasons of safety.



- Select or edit parameter



- Confirm entries

All configurable parameters are shown in the "Configuration parameters" table (See Page 28).



The configuration parameters are checked during the input.



In the case of an incorrect input "Err" is displayed for approx. 3 sec. The incorrect parameters cannot be stored. Input must be repeated.



- End configuration

The measured value and Hold are displayed alternately



- End the Hold state / accept configuration or



- Repeat configuration











- End the Hold state



The menus are cyclically displayed.

Configuration parameters

Pictograph/display	Parameter	Selection/input	Comment	Factory setting
	Sensor	2-EL 4-EL	Sensor selection: - 2-EL sensor - 4-EL sensor	2-EL
	Process variable and range	x.xxx µS / xx.xx µS / xxx.x µS / xxxx µS x.xxx mS / xx.xx mS / xxx.x mS / xxxx mS x.xxx MΩ / xx.xx MΩ / xxx.x MΩ xxx.x SAL	The selected process variable is shown in the display.	000.0 mS
	Temperature	°C °F	Temperature display selection	°C
	Temperature probe	Pt 100 Pt 1000 NTC 30 NTC 100 BUS EXT	Selection of temperature probe External temp during meas. [°C] Manual temp during calibration [°C]	Pt 100
	Temperature compensation (Step omitted for SAL.)	OFF LIN NLF -01- FCT -02- FCT -03- FCT	Temp compensation selection: Linear Nonlinear, natural waters Ultrapure water with NaCl traces Ultrapure water with HCl traces Ultrapure water with NH ₃ traces	OFF

Pictograph/display	Parameter	Selection/input	Comment	Factory setting
	Temperature coefficient	xx.xx %/K	Input of temperature coefficient Only with temp compensation LIN	02.00 %/K
	Sensocheck	ON OFF	Sensor monitoring on or off	OFF
	PROFIBUS device address	0001 to 0126	Entry of PROFIBUS address of device. Be sure that the device is not communicating via PROFIBUS.	0126

English

Tab. 8.1: Configuration parameters

8.7 Calibration

Calibration procedures (configurable)

- Calibration by specifying the cell constant of the sensor used (See Page 31)
- Calibration with calibration solution (See Page 32)
- Adjustment of temperature probe (See Page 33)



For keypad functions see Page 24.

Information on calibration

Calibration is performed by entering the cell constant or by determining the cell constant with a known calibration solution under consideration of the temperature.



All calibration procedures must be performed by trained personnel.



Incorrectly set parameters may go unnoticed, but change the measuring properties.



The calibration is directly conducted on the device.
Calibration via PROFIBUS-PA is not provided.



During calibration the Stratos remains in the Hold state for reasons of safety.



In the case of an incorrect input "Err" is displayed for approx. 3 sec. The incorrect parameters cannot be stored. Input must be repeated.

Calibration by input of cell constant

The following steps must be executed:



- Activate calibration



- Enter mode code "1100"



- Confirm entry



Welcome text 3 sec



- Enter cell constant

The lower display shows the conductivity value.



A change in the cell constant also changes the conductivity value.



When there has not been an entry for 6 sec, the lower display alternately shows the conductivity and temperature value.



- Confirm cell constant



- End the Hold state

After 20 sec (for measured value stabilization) the Stratos returns to measuring mode.

Calibration with calibration solution



Be sure to use known calibration solutions and the respective temperature-corrected conductivity values (See "Calibration solutions" Page 61).



During the calibration procedure the temperature must be kept constant.

The following steps must be executed:



- Activate calibration



- Enter mode code "1100"



- Confirm entry



Welcome text 3 sec



- Immerse sensor in calibration solution



When there has not been an entry for 6 sec, the lower display alternately shows the conductivity and temperature value.



- Read the conductivity value corresponding to the displayed temperature from the table of the calibration solution used (See "Calibration solutions" Page 61)



- Confirm cell constant



- End the Hold state

After 20 sec (for measured value stabilization) the Stratos returns to measuring mode.

Adjustment of temperature probe



Especially for Pt 100 temperature probes, it is advisable to perform an adjustment.

The following steps must be executed:



- Activate calibration



- Enter mode code "1015"



- Confirm entry



Welcome text 3 sec

- Measure the temperature of the process medium using an external thermometer



- Enter the determined temperature value in the main display



The lower display shows the measured temperature without adjustment. If this value is taken over for the upper display, the adjustment is without effect.



- Confirm the temperature value



- End the Hold state

After 20 sec (for measured value stabilization) the Stratos returns to measuring mode.

English

8.8 Operating tool

For parameter setting, commissioning and diagnostics of Stratos via PROFIBUS, we recommend operating tools such as SIMATIC-PDM Version 5 or higher.

The current device description is included.

8.9 Measurement

Measuring mode

In the measuring mode the main display shows the configured process variable and the lower display the temperature.



The Stratos returns to measuring mode, also from configuration or calibration mode (after a relax time for measured-value stabilization, if required).



- End "Cal Info"

Cal Info

"Cal Info" shows the current cell constant.



- Activate "Cal Info" function



- Mode code

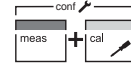


- Confirm

The current cell constant is displayed for approx. 20 sec.

Error Info

"Error info" shows the most recent error message.



- Activate "Error Info" function



- Mode code



- Confirm

The error message is displayed for approx. 20 sec. After that the message will be deleted.



- End error info

9 Diagnostics

9.1 Sensocheck, Sensoface

Sensocheck continuously monitors the sensor.

Sensocheck can be switched off.



A friendly Smiley can only be displayed when Sensocheck has been activated.



The Sensoface status does not influence the measured value display.



Sensoface provides information on the sensor condition.

The monitoring function alerts for significant sensor polarization or excessive cable capacitance caused by an unsuitable cable or a cable that is too long.

English

9.2 PROFIBUS-PA limit monitoring

The Stratos is equipped with two limit blocks that can be separately configured for the process variables conductivity, salinity or temperature.

Configuration is only performed via the bus.

The limit conditions are transmitted cyclically.

Hysteresis, effective direction, on and off delay can be configured.



Limit value setting and output of limit messages is via the PROFIBUS-PA.



When this symbol is displayed, limit block 1 is active.



When this symbol is displayed, limit block 2 is active.

9.3 Error messages

When one of the following error messages is displayed, the device can no longer determine the measured variable correctly.



The alarm response time is permanently set to 10 sec.



During an error message the red alarm LED beneath the display flashes.



The error messages in the display are sorted according to their priority. A higher-priority message overlays a lower-priority message.


Error No.	Display (flashing)	Problem	Possible causes
Err 01	1179 mS	Sensor	<ul style="list-style-type: none"> - Wrong cell constant - Conductivity ≥ 1000 mS/cm - SAL > 45 % - Sensor connection or cable defective
Err 02	1179 mS	Sensor	<ul style="list-style-type: none"> - Unsuitable sensor
Err 03		Temperature probe	<ul style="list-style-type: none"> - Outside temp range - Outside temp range for TC - Outside temp range for TC
Err 33		Sensocheck	<ul style="list-style-type: none"> - Wrong sensor - Sensor defective - Connecting cable too long or unsuitable - Connection cable or electrode cap defective - Connection terminals or electrode cap dirty
Err 98	CONF	System error	<ul style="list-style-type: none"> - Memory error in device program - Measured value transmission defective - Configuration or calibration data defective • Completely reconfigure and calibrate the device







Error No.	Display (flashing)	Problem	Possible causes
Err 99	FAIL	Factory settings	<ul style="list-style-type: none">- EEPROM or RAM defective- Error in factory settings <p>This error message normally should not occur as the data are protected from loss by multiple safety functions.</p> <ul style="list-style-type: none">• Send in the device for repair and recalibration.

English

Tab. 9.1: Error messages

9.4 Display messages and PROFIBUS communication

User interface / display of device				Cause	Communication via PROFIBUS				
Display pictograph	Display message	Sensoface	LED		No. of binary message (Logbook)	Analog input status	Physical Block (PB) Global status	Text of binary message (factory setting)	Logbook entry (factory setting)
FAIL	Err 99		X	Factory settings defective	1	0000 11xx	Failure	ERR SYSTEM	X
CONF	Err 98		X	Configuration data defective, Gaincheck	2	0000 11xx	Failure	ERR PARAMETERS	X
CONF	Err 98		X	Memory error (RAM, ROM, EPROM)	3	0000 11xx	Failure	ERR MEMORY	X
1179 mS	Err 01		X	Cond, sal range violation	4	0101 01xx	Failure	ERR MEAS VALUE	X
1179 mS	Err 02		X	Conductance range violation	5	0100 0111 0100 1111	Failure	ERR COND VALUE	X
	Err 03		X	Temp range violation Temperature probe	6	0100 0111 0100 1111	Failure	ERR TEMP VALUE	X

User interface / display of device				Cause	Communication via PROFIBUS					
Display pictograph	Display message	Sensoface	LED	Comments (see Page 36)	No. of binary message (logbook)	Analog input status	Physical Block (PB) Global status	Text of binary message (factory setting)	Logbook entry (factory setting)	
	Err 33		X	Sensocheck	7	0100 0111 0100 1111	Failure	CHK SENSOR	X	
				Cell constant	8	1010 01xx	Maintenance req.	CHK SLOPE	X	
				Calibration	9	0100 0111 0100 1111	Function check	CAL RUNNING	X	
				Configuration	10	1010 00xx	Function check	CONF RUNNING	X	
				HOLD (Device state = Maintenance)	11	0100 0111 0100 1111	Function check	HOLD	X	
				HI_HI_LIM FB analysis Cond/MΩ/SAL	12	1000 1110	Limit 1 Bit 1	HI_HI_LIMIT COND HI_HI_LIMIT MOcm HI_HI_LIMIT SAL		
				HI_LIM FB analysis Cond/MΩ/SAL	13	1000 1010	Limit 1 Bit 2	HI_LIMIT COND HI_LIMIT MOhm cm HI_LIMIT SAL		
				LO_LIM FB analysis Cond/MΩ/SAL	14	1000 1001	Limit 1 Bit 3	LO_LIMIT COND LO_LIMIT MOhm cm LO_LIMIT SAL		

English

User interface / display of device				Cause	Communication via PROFIBUS				
Display pictograph	Display message	Sensoface	LED	Comments (see Page 36)	No. of binary message (logbook)	Analog input status	Physical Block (PB) Global status	Text of binary message (factory setting)	Logbook entry (factory setting)
				LO_LO_LIM FB analysis Cond/M&2/SAL	15	1000 1101	Limit 1 Bit 4	LO_LO_LIMIT COND LO_LO_LIMIT MOcm LO_LO_LIMIT SAL	
				HI_HI_LIM FB temperature	16	1000 1110	Limit 2 Bit 1	HI_HI_LIMIT TEMP	
				HI_LIM FB temperature	17	1000 1010	Limit 2 Bit 2	HI_LIMIT TEMP	
				LO_LIM FB temperature	18	1000 1001	Limit 2 Bit 3	LO_LIMIT TEMP	
				LO_LO_LIM FB temperature	19	1000 1101	Limit 2 Bit 4	LO_LO_LIMIT TEMP	
				Logbook empty	20		Function check	EMPTY LOGBOOK	

9.5 Diagnostics functions

Cal Info

"Cal Info" shows the current cell constant.



- Activate "Cal Info" function



- Mode code



- Confirm

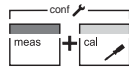
The current cell constant is displayed for approx. 20 sec.



- End "Cal Info"

Error Info

"Error info" shows the most recent error message.



- Activate "Error Info" function



- Mode code



- Confirm

The error message is displayed for approx. 20 sec. After that the message will be deleted.



- End error info

Test mode

In the "Test Mode" you can check the equipment for correct conductivity and temperature measurement using a resistor.



- Activate "Test Mode" function



- Enter mode code "2222"



- Confirm entry

The equivalent resistance value is shown in the main display in $k\Omega$:

- Without consideration of cell constant ($c = 1$)
- Without TC conversion ($TC = 0$)
- Display in the case of a resistance value $\geq 2 M\Omega$

OPEN

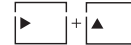


- End "Test Mode"

The device is in Hold state.

GainCheck manual device self-test

A display test is carried out, the software version is displayed and the memory and measured value transfer are checked.



Start GainCheck manual device self-test

Automatic device self-test

The automatic device self-test checks the memory and measured-value transfer. It runs automatically in the background at fixed intervals.

10 Maintenance and Cleaning

10.1 Maintenance

The Stratos contains no user repairable components.

10.2 Cleaning

To remove dust, dirt and spots, the external surfaces of the Stratos may be wiped with a soft cloth moistened with water.

A mild household cleaner may also be used if necessary.

11 Appendix

11.1 Product line

Devices

Model designation	Ref. No.
Stratos PROFIBUS 2221 X Cond for hazardous- and safe-area applications	2221 X Cond

Mounting accessories

Accessories	Ref. No.
Pipe-mount kit	ZU 0274
Panel-mount kit	ZU 0275

Accessories	Ref. No.
Protective hood	ZU 0276

Sensors

Model designation	Ref. No.
SE 604 2-electrode sensor	SE 604
ZU 0071 2-electrode sensor	ZU 0071
SE 600 4-electrode sensor	SE 600

11.2 Specifications

General

Manufacturer / ID	Knick Elektronische Meßgeräte GmbH / KNIC
Model designation / ID	Stratos PROFIBUS 2221 X Cond / 7533

Applications

Conductivity and temperature measurement
--

Input

Process variable	Cond input 2-/4- electrode sensors	Ranges	Conductivity	0.2 $\mu\text{S}\cdot\text{c}$ to 1000 $\text{mS}\cdot\text{c}^{\text{b}}$
		Display range ^{a)}	Conductivity	0.000 to 9.999 $\mu\text{S}/\text{cm}$
				00.00 to 99.99 $\mu\text{S}/\text{cm}$
				000.0 to 999.9 $\mu\text{S}/\text{cm}$
				0.000 to 9.999 $\mu\text{S}/\text{cm}$
				00.00 to 99.99 $\mu\text{S}/\text{cm}$
				000.0 to 999.9 $\mu\text{S}/\text{cm}$
		Resistivity	0.000 to 9.999 $\text{M}\Omega\text{ cm}$	
			00.00 to 99.99 $\text{M}\Omega\text{ cm}$	
	000.0 to 999.9 $\text{M}\Omega\text{ cm}$			
	Salinity	0.0 to 45.0 ‰ (0 to 35 °C)		
	Temperature input ^{a)}	Temperature sensor ^{a)}	Pt100 / Pt1000 / NTC 30 $\text{k}\Omega$ / NTC 100 $\text{k}\Omega$ (2-wire connection, adjustable)	
		Measurement range	Pt100 / Pt1000	-20.0 to +150.0 °C / -4 to +302 °F
			NTC 30 $\text{k}\Omega$ / NTC 100 $\text{k}\Omega$	-20.0 to +130.0 °C / -4 to +266 °F
		Resolution	0.1 °C / 1 °F	
Temperature compensation (reference temp 25 °C)		(LIN) linear characteristic	00.00 to 19.99 %/K	
		(NLF) nonlinear temperature compensation for natural waters to EN 27888 (0 to 36 °C)		
		(-01-) Ultrapure water with NaCl traces (0 to 120 °C)		
	(-02-) Ultrapure water with HCl traces (0 to 120 °C)			
(-03-) Ultrapure water with NH ₃ traces (0 to 120 °C)				

English

a) Configurable
b) c = cell constant

Accuracy (± 1 count)

Conductivity value	< 1 % of meas. value +0.4 $\mu\text{S}\cdot\text{cm}^2$)
Temperature	< 0.5 K (for Pt 100 ± 1 K, for NTC: Temp. > 100 °C < 1 K)

a) c = cell constant

Monitoring function

Sensor	Sensocheck (can be disabled)	Polarization detection
		Monitoring of cable capacitance

Sensor standardization

Standardization	Input of cell constant with simultaneous display of conductivity and temperature	
	Temperature probe adjustment	
	Adm. cell constant	0.0050 to 1.9999 cm^{-1}

Conditions for use

Temperature	Operation / environment	-20 to +55 °C	
	Transport / storage	-20 to +70 °C	
Electromagnetic compatibility	RFI suppression	EN 50 081-1, EN 61 326-1	
	Immunity to interference	EN 50 082-2, EN 61 326-1	
Ingress protection	Enclosure	IP65	
Explosion protection Stratos PROFIBUS 2221 X Cond	ATEX	II 2(1) G EEx ia IIC T4, FISCO	
	FM	IS, Class I Div1, Group A, B, C, D T4 FISCO I / 1[0] / AEx ib [ia] / IIC / T4 FISCO NI, Class I Div2, Group A, B, C, D T4 NIFW	
Data retention	Parameters and calibration data	> 10 years	EEPROM

Construction

Dimensions	Height	144 mm	
	Width	144 mm	
	Depth	105 mm	
Weight	Approx. 1 kg		
Material	PBT (polybutylene terephthalate)		
Color	Bluish gray	RAL 7031	
Assembly	Wall mounting		
	Post/pipe mounting	on pipe with 40 to 60 mm diameter on square post with 30 to 45 mm edge length	
	Panel mounting	Cutout to DIN 43 700 Sealed against panel	
Electrical connection	Cable glands	3 breakthroughs	for included cable glands
		2 breakthroughs	for NPT 1/2" or Rigid Metallic Conduit or cable glands

English

Display and user interface

Display	LC display, 7-segment	Measured value display	Conductivity value, temperature
		3 Sensoface states	Good / average / poor
		5 mode indicators	meas / cal / alarm / online / conf
	Alarm LED	Error message	
	Display range	3 1/2-digit display Automatic selection (Resolution determined by selected range)	
Operation	5 keys	meas / cal / up / right / enter	
Operating tool	Device description (DD) implemented in SIMATIC PDM		

Remote interface

PROFIBUS-PA communication	Digital communication by current modulation of supply current Reading of device identification, measured values, status and message Reading and writing of parameter and configuration data	
	Protocol	PROFIBUS-PA (DPV1)
	Connection	Via segment coupler to SPC, PC, PCS
	Profile	PNO directive: PROFIBUS-PA, Profile for Process Control Devices, Version 3.0
	Physical interface	To IEC 1158-2
	Address range	1 to 126, default: 126
	Supply voltage	FISCO bus supply: 9 to 17.5 V) Linear barrier: 9 to 24 V)
	Current consumption	< 13.2 mA
	Max. current in case of fault (FDE)	< 17.6 mA

11.3 ATEX EC-Type-Examination Certificate

 <p style="text-align: center;">Prüf- und Zertifizierungsstelle ZELM Ex</p>	
<p>(1) EC-TYPE-EXAMINATION CERTIFICATE (Translation)</p>	
<p>(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - Directive 94/9/EC</p>	
<p>(3) EC-TYPE-EXAMINATION CERTIFICATE Number: ZELM 00 ATEX 0033</p>	
<p>(4) Equipment: Transmitter Stratos PROFIBUS 221X Cond</p>	
<p>(5) Manufacturer: Knick Elektronische Meßgeräte GmbH & Co.</p>	
<p>(6) Address: Beuckestraße 22, D-14163 Berlin</p>	
<p>(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.</p>	
<p>(8) The Prüf- und Zertifizierungsstelle ZELM Ex, notified body No. 0820 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the confidential report ZELM Ex 0289914040.</p>	
<p>(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with: EN 50 014: 1997 EN 50 020: 1994</p>	
<p>(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.</p>	
<p>(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.</p>	
<p>(12) The marking of the equipment shall include the following:</p>	
 II 2 (1) G EEx ia IIC T4	
<p>Zertifizierungsstelle ZELM Ex</p>  <p>Dipl.-Ing. Harald Zelm</p>	 <p style="text-align: center;">Braunschweig, June 26, 2000</p>
<p>Sheet 1/3</p>	
<p>EC-type-examination Certificates without signature and stamp are not valid. The certificates may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM Ex. In the case of dispute, the German text shall prevail.</p> <p style="text-align: center;">Prof. und Zertifizierungsstelle ZELM Ex • Siekgarten 56 • D-38124 Braunschweig</p>	

English



SCHEDULE

(13)

(14) EC-TYPE-EXAMINATION CERTIFICATE ZELM 00 ATEX 0033

(15) Description of equipment

The Transmitter Stratos PROFIBUS 2221X Cond with Profibus - PA - communication interface is preferably used for the recognition and processing of electrochemical quantities and is equipped with an input for conductivity measurements and a temperature measuring input.

The maximum permissible ambient temperature is 55 °C.

Electrical data

BUS- / Supply loop (terminals 11 and 10)

type of protection Intrinsic Safety EEx ia IIC/IIB resp. EEx ib IIC/IIB

only for the connection to a certified intrinsically safe circuit (for example FISCO - supply unit) with the following maximum values:

	FISCO- supply unit	linear barrier
U _{max}	17,5 V	24 V
I _{max}	280 mA	200 mA
P _{max}	4,9 W	1,2 W

effective internal capacitance: C_i ≤ 1 nF
effective internal inductance: L_i ≤ 10 µH

conductivity measuring loop (terminals 1, 2, 3, 4 and 5)

type of protection Intrinsic Safety EEx ia IIC/IIB resp. EEx ib IIC/IIB

maximum values: U₀ = 11,8 V
I₀ = 145 mA
P₀ = 165 mW (linear characteristic)

effective internal capacitance: C_i ≤ 5 nF
The effective internal inductance is negligibly small.

	IC	resp.	IIB
max. permissible external inductance	1,3 mH		7 mH
max. permissible external capacitance	1,5 µF		9,9 µF

(only valid if external inductance and external capacitance do not exist in concentrated form at the same time)


	IC	resp.	IIB
max. permissible external inductance	1 mH		5 mH
max. permissible external capacitance	350 nF		977 nF

(also valid if external inductance and external capacitance exist in concentrated form at the same time)

Sheet 2/3


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Prüf- und Zertifizierungsstelle

ZELM Ex



SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE ZELM 00 ATEX 0033

<p>Temperature measuring loop (terminals 7 and 8)</p>	<p>type of protection Intrinsic Safety resp.</p>	<p>EEEx ia IIC/IIB EEEx Ib IIC/IIB</p>			
	<p>maximum values:</p>	<p>$U_o = 5,9 \text{ V}$ $I_o = 3,71 \text{ mA}$ $P_o = 5,5 \text{ mW}$ (linear characteristic)</p>			
	<p>effective internal capacitance: The effective internal inductance is negligibly small.</p>	<p>$C_i \leq 250 \text{ nF}$</p>			
	<table border="0" style="margin: auto;"> <tr> <td style="padding: 0 10px;">IIC</td> <td style="padding: 0 10px;">resp.</td> <td style="padding: 0 10px;">IIB</td> </tr> </table>	IIC	resp.	IIB	
IIC	resp.	IIB			
	<p>max. permissible external inductance 1000 mH</p>	<p>1000 mH</p>			
	<p>max. permissible external capacitance 42,7 µF</p>	<p>1000 µF</p>			
<p>(only valid if external inductance and external capacitance do not exist in concentrated form at the same time)</p>					
	<table border="0" style="margin: auto;"> <tr> <td style="padding: 0 10px;">IIC</td> <td style="padding: 0 10px;">resp.</td> <td style="padding: 0 10px;">IIB</td> </tr> </table>	IIC	resp.	IIB	
IIC	resp.	IIB			
	<p>max. permissible external inductance 1 mH</p>	<p>5 mH</p>			
	<p>max. permissible external capacitance 1,85 µF</p>	<p>6,85 µF</p>			
<p>(also valid if external inductance and external capacitance exist in concentrated form at the same time)</p>					

EP
(terminal 9) for the connection to the equipotential bonding system


References:
Connecting the equipotential bonding is absolutely required to guarantee electrostatic leakage.
The BUS- / Supply loop is safely electrically isolated from the other loops up to a voltage of 60 V.
The instruction manual has to be observed.

(16) Report No.
ZELM Ex 0289914040


(17) Special conditions for safe use
not applicable

(18) Essential Health and Safety Requirements
met by standards

Zertifizierungsstelle ZELM Ex



Dipl.-Ing. Harald Zeim



Braunschweig, June 26, 2000

Sheet 3/3

EC-type-examination Certificates without signature and stamp are not valid. The certificates may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM Ex. In the case of dispute, the German text shall prevail.
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Cond Transmitter
Stratos PROFIBUS PA 2231 Cond
Stratos FF 2231 Cond
NI/IZ/ABCD/74, Ta=55°C; FNCO

Entity Parameters:

Terminals 1, 2, 3, 4, 5 and 6
 $V_E = 118 \text{ V}$ $C_A = 15 \mu\text{F}$
 $I_E = 165 \text{ mA}$ $L_A = 13 \text{ mH}$
 $P_{\text{max}} = 165 \text{ mW}$

Terminals 7 and 8
 $V_{oc} = 59 \text{ V}$ $C_A = 427 \mu\text{F}$
 $I_{sc} = 331 \text{ mA}$ $L_A = 1 \text{ H}$
 $P_{\text{max}} = 55 \text{ mW}$

The equipment connecting to 1, 2, 3, 4, 5, 6 and 7, 8 must be FM Approved or be simple apparatus, a device which will neither generate nor store more than 15 V, 0.1 A, 25 mW.

Table 1

Concept	Groups	V _{max} (V)	C _A (μF)	L _A (mH)
FNCO	ABCD	17.5	12	7
Entity	ABCD	24		

FNCO rules
The FNCO Concept allows the interconnection of non-incendive apparatus to associated non-incendive apparatus not specifically mentioned in each condition. The criteria for such interconnection is that the voltage (V_{max}), which non-incendive apparatus can receive and contain non-incendive, must be equal or greater than the voltage (V_E), which can be provided by the associated non-incendive apparatus (Supply unit). In addition, the maximum permitted mutual capacitance (C_A) and inductance (L_A) of each apparatus (other than the transmitter) connected to the Fieldbus must be less than or equal to 5 μF and 20 μH respectively.
In case of FM Approval, only one active source, normally the associated non-incendive apparatus, is used. No Fieldbus segment is used for the Fieldbus system. The allowed voltage (V_E) of the associated non-incendive apparatus used to supply the line must be limited to the range of 14.4 V to 17.5 V d.c. All other equipment connected to the two cable legs is for passive, meaning that the apparatus is not allowed to provide energy to the system, except in a leakage current of 50 μA for each connected device. Specially prepared equipment needs a generic isolation to insure that the non-incendive Fieldbus circuit remains passive.
Line resistance R_L: 108 Ohm
Inductance per unit length L_L: 1 mH/km
Capacitance per unit length C_L: 200 pF/m
C_A + C_L (max) = 2.5 C_A (max), if each line is connected to one line
C_A + C_L (max) = C_A (max), if the screen is connected to one line
Length of open cable: max. 20 m
Length of loop cable: max. 1 km
Length of screen: max. 100 m
Termination
At each end of the two cables an approved termination with the following parameters is suitable:
R = 98 ± 20 Ω
C = 15 ± 2 μF
System evaluation
The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to FM reasons. Furthermore, if the above rules are respected, the inductance and capacitance of the cable need not be considered and will not impact the non-incendive safety of the installation.
Installation Notice for FNCO
1. The Non-incendive concept allows the interconnection of FM Approved Non-incendive devices with apparatus not specifically mentioned in combination as a system when:
- V_E ≤ V_{max}, C_A ≤ C_A (max), L_A ≤ L_A (max), C_L ≤ C_L (max), L_L ≤ L_L (max) or L_L ≤ L_L (max)
- For inductance see also L_L ≤ L_L (max) and C_L ≤ C_L (max) or L_L ≤ L_L (max) and C_L ≤ C_L (max) or L_L ≤ L_L (max) and C_L ≤ C_L (max)
2. The Non-incendive FNCO concept allows the interconnection of FM approved Non-incendive devices with FNCO parameters not specifically mentioned in combination as a system when:
- V_E ≤ V_{max}
3. Overlight conductive leads must be used when installed in Class I and Class II environments.
4. Control equipment connected to the associated non-incendive Apparatus must not use or generate more than 250 Vrms or 1 A.
5. Installation should be in accordance with the National Electrical Code (ANSI/NFPA 70 Section 501).
6. The modification of associated Non-incendive Apparatus must be FM Approved under the associated drawing.
7. Associated Non-incendive Apparatus manufacturer's installation drawing must be followed when installing the equipment.
8. No revision to drawing without prior FM Approvals authorization.

Supply Unit
Any FM FNCO Approved

Any FM Approved Terminator

Unclassified Locations

Hazardous (Classified) Locations
Class I, Division 2, Groups A, B, C and D

Stratos PROFIBUS PA 2231 Cond
Stratos FF 2231 Cond

Any FM Approved
Non-incendive Apparatus

Any FM Approved Terminator

Version: 1.0
 Rev. 01
 Date: 09/20/04
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14. Änderungen für: 14.01.04
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page 2/2

Control drawing
Stratos PROFIBUS PA 2231 (X) Cond
Stratos FF 2231 (X) Cond

194.270-100

Knick

11.6 Sensors

Specifications

SE 604 (2-electrode sensor)

Cell constant	0.029 cm ⁻¹	
Meas. range	Approx. 0 to 1000 µS/cm.	
Max. temperature	120 °C	
Max. pressure	25 bars	Sensor with external thread
	16 bars	Sensor with PN 16 flange
	10 bars	All other versions
Temp probe	Pt 1000	
Cable	Length	5 m
	Connection	Wire end ferrule
Material	Body	Stainless steel 1.4571
	Electrodes	Stainless steel 1.4571
Dimensions	see Fig. 11.1	

ZU 0071 (2-electrode sensor)

Cell constant	Approx. 1 cm ⁻¹
Meas. range	Approx. 5 µS/cm to 50 mS/cm
Max. temperature	150 °C
Max. pressure	16 bars
Temp probe	Pt 100

Cable	Length	5 m
	Connection	Wire end ferrule
Material	Body	PES
	Electrodes	Special graphite, titanium
Dimensions	see Fig. 11.4	

SE 600 (4-electrode sensor)

Cell constant	0.14 to 0.38 cm ⁻¹ (see sensor cap)	
Meas. range	Approx. 0.5 µS/cm to 300 mS/cm Up to 1000 mS/cm, with reduced accuracy	
Max. temperature	210 °C	
Max. pressure	40 bars	
Temp probe	Pt 1000 (IEC Class A)	
Cable	Length	5 m
	Connection	Wire end ferrule
Material	Body	PTFE, stainless steel 1.4401
	Electrodes	Stainless steel 1.4401
Dimensions	see Fig. 11.5	

Specifications of further sensors are available on request.

English

Dimension drawing

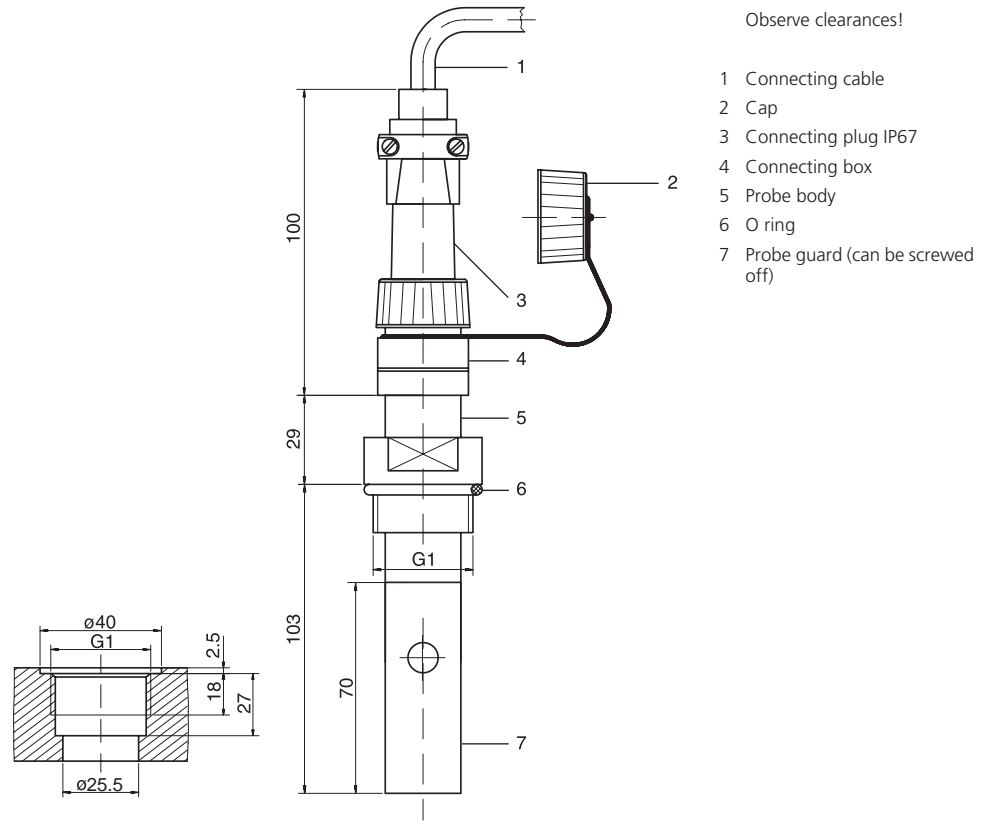
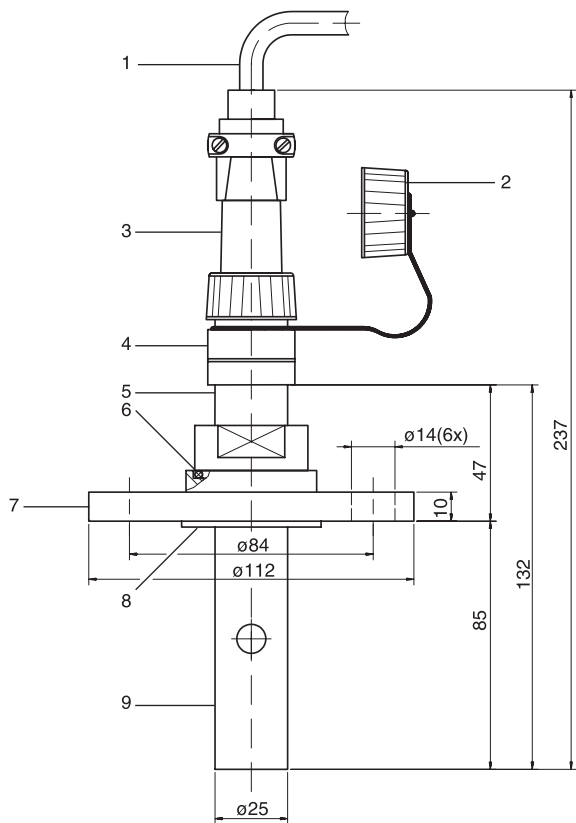


Fig. 11.1 Dimension drawing SE 604 2-electrode sensor with installation dimensions (e.g. for flange)



Observe clearances!

- 1 Connecting cable
- 2 Cap
- 3 Connecting plug IP67
- 4 Connecting box
- 5 Probe body
- 6 O ring
- 7 Flange
- 8 Flat gasket
- 9 Probe guard (can be screwed off)

English

Fig. 11.2 Dimension drawing SE 604 2-electrode sensor with flange

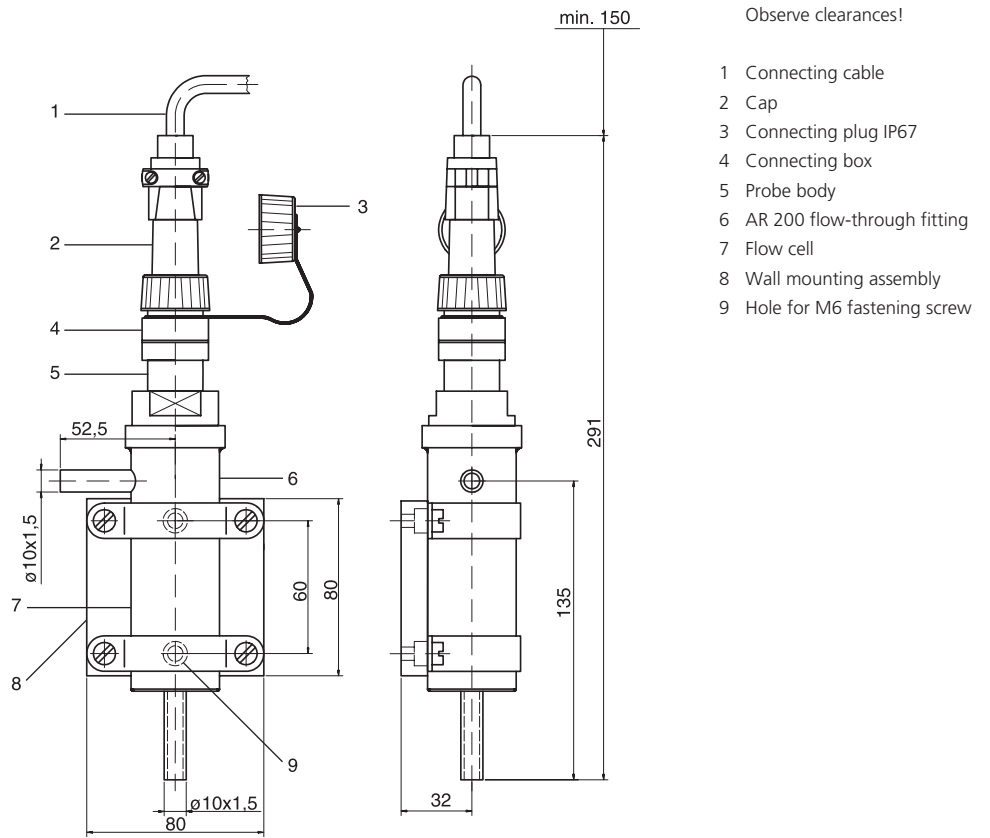
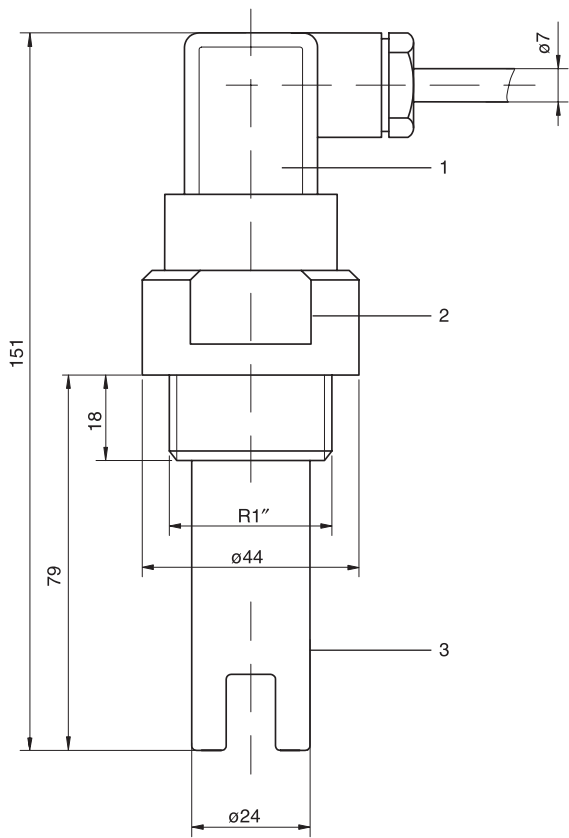


Fig. 11.3 Dimension drawing SE 604 2-electrode sensor with AR 200 flow-through fitting



- 1 Connecting plug
- 2 W 36
- 3 Material: Polyethersulfone

English

Fig. 11.4 Dimension drawing ZU 0071 2-electrode sensor

- 1 Cable length approx. 5 m
- 2 Sealing

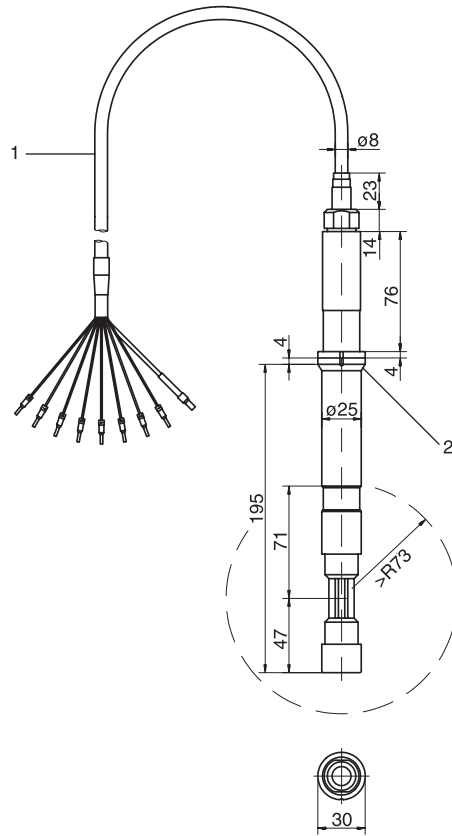


Fig. 11.5 Dimension drawing SE 600 2-electrode sensor

11.7 Calibration solutions

Potassium chloride solutions

Temperature [°C]	Concentration ^{a)}		
	0.01 mol/l	0.1 mol/l	1 mol/l
0	0.776	7.15	65.41
5	0.896	8.22	74.14
10	1.020	9.33	83.19
15	1.147	10.48	92.52
16	1.173	10.72	94.41
17	1.199	10.95	96.31
18	1.225	11.19	98.22
19	1.251	11.43	100.14
20	1.278	11.67	102.07
21	1.305	11.91	104.00
22	1.332	12.15	105.94
23	1.359	12.39	107.89
24	1.386	12.64	109.84
25	1.413	12.88	111.80
26	1.441	13.13	113.77
27	1.468	13.37	115.74
28	1.496	13.62	
29	1.524	13.87	
30	1.552	14.12	
31	1.581	14.37	
32	1.609	14.62	
33	1.638	14.88	
34	1.667	15.13	
35	1.696	15.39	
36		15.64	

a) Data source: K. H. Hellwege (Editor), H. Landolt, R. Börnstein:
Zahlenwerte und Funktionen ..., Volume 2, Part. Volume 6

Tab. 11.1: Potassium chloride solutions, conductivity in mS/cm

Sodium chloride solutions

Temperature [°C]	Concentration		
	Saturated ^{a)}	0.1 mol/l ^{b)}	0,01 mol/l ^{b)}
0	134.5	5.786	0.631
1	138.6	5.965	0.651
2	142.7	6.145	0.671
3	146.9	6.327	0.692
4	151.2	6.510	0.712
5	155.5	6.695	0.733
6	159.9	6.881	0.754
7	164.3	7.068	0.775
8	168.8	7.257	0.796
9	173.4	7.447	0.818
10	177.9	7.638	0.839
11	182.6	7.831	0.861
12	187.2	8.025	0.883
13	191.9	8.221	0.905
14	196.7	8.418	0.927
15	201.5	8.617	0.950
16	206.3	8.816	0.972
17	211.2	9.018	0.995
18	216.1	9.221	1.018
19	221.0	9.425	1.041
20	226.0	9.631	1.064
21	231.0	9.838	1.087
22	236.1	10.047	1.111
23	241.1	10.258	1.135
24	246.2	10.469	1.159
25	251.3	10.683	1.183
26	256.5	10.898	1.207
27	261.6	11.114	1.232
28	266.9	11.332	1.256
29	272.1	11.552	1.281
30	277.4	11.773	1.306
31	282.7	11.995	1.331
32	288.0	12.220	1.357
33	293.3	12.445	1.382
34	298.7	12.673	1.408
35	304.1	12.902	1.434
36	309.5	13.132	1.460

a) Data source: K. H. Hellwege (Editor), H. Landolt, R. Börnstein:
Zahlenwerte und Funktionen ..., Volume 2, Part. Volume 6

b) Data source: Test solutions calculated according to DIN IEC 746-3

Tab. 11.2: Sodium chloride solutions, conductivity in mS/cm

English

11.8 Glossary

2-electrode sensor

Conductivity sensor with two electrodes. Suitable for measuring low conductivity values.

4-electrode sensor

Conductivity sensor with four (2 current and 2 voltage) electrodes. Suitable for measuring high conductivity values.

Conductance

Conductance $G [S] = 1 / R [\Omega]$

Conductivity

Conductivity $\kappa [S/cm] = G [S] \cdot c [1/cm]$

Conductivity sensor

Either 2- or 4-electrode sensors can be connected. The cell constant of the sensor in use must be entered or be determined using a calibration solution taking account for the temperature.

A special device variant (Stratos Profibus CondI) is provided for electrodeless sensors.

FISCO Model (Fieldbus Intrinsically Safe Concept)

Permits connection of several devices to a common bus line and defines limit values for device and cable parameters. This model developed by the German PTB assumes that only one "active" device, i.e. the bus supply is connected to the field bus. All other devices are "passive" with regard to the power supply into the bus. Within the defined limits, the line characteristics have no influence on the intrinsic safety.

GSD file (device database file)

Contains the communication features of slave devices. During commissioning it is loaded in the process control system.

PROFIBUS-DP (decentralized peripherals)

Standardized specification (EN 50 170) of an open fieldbus system for binary and analog signals of sensors and actuators. It has been designed for high-speed data exchange at the device level.

PROFIBUS-PA (process automation)

Open fieldbus standard for process automation. It makes use of the transmission technology to IEC 1158-2 approved for operation in hazardous locations, which at the same time allows the field devices to be powered over the bus.

SIMATIC-PDM

Tool developed by Siemens for projecting, configuring, commissioning and diagnostic of smart process analyzers. The Stratos device description is implemented in the SIMATIC-PDM.

Temperature coefficient

With temperature compensation activated, the measured value is calculated to the value at the reference temperature using the temperature coefficient.

Temperature compensation

Calculates the measured conductivity value for a reference temperature.

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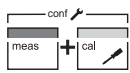
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English

Mode Codes



conf, 0000 Error Info
 conf, 1200 Configuration mode



cal, 0000 Cal Info
 cal, 1015 Temp probe adjustment
 cal, 1100 Calibration mode
 cal, 2222 Test mode

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