

Stratos® FF 2231 X Oxy

Instruction manual



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).
Sensors, fittings, and accessories: 1 year

Subject to change without notice.

Return of products under warranty

Please contact our Service Team before returning a defective device. Ship the cleaned device to the address you have been given. If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.

Disposal

Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

Knick Elektronische Messgeräte GmbH & Co. KG

P.O. Box 37 04 15
D-14134 Berlin, Germany

Phone: +49 (0)30 - 801 91 - 0
Fax: +49 (0)30 - 801 91 - 200
Internet: <http://www.knick.de>
knick@knick.de



Safety information	7
Intended use / Short description	9
Trademarks	10
Certificates	11
EC Declaration of Conformity	11
EC-Type-Examination Certificate	12
Fieldbus Foundation Device Registration	17
Foundation Fieldbus (FF) technology	18
Basic properties	18
Function blocks	19
Communication model	20
Commissioning and configuration via Foundation Fieldbus	22
(Identification of transmitter / Initial commissioning / Parameter setting: Resource Block, Analog Input Block / System configuration)	22-25
Overview of Stratos FF 2231 X Oxy	27
Assembly	28
Packing list	28
Mounting plan	29
Pipe mounting, panel mounting	30
Installation and connection	32
Information on installation	32
Terminal assignments	32
Connecting the VP cable	34
Wiring for low-level range	36
Wiring for high-level range	37
Wiring for high-level range (T82)	38
User interface, display	40

Contents

Operation: Keypad .....	.43
Safety functions .....	.44
Hold mode .....	.44
Alarm .....	.44
Sensocheck sensor monitoring, GainCheck automatic device self-test .....	.45
Configuration on the device .....	.46
Menu structure of configuration .....	.47
Overview of configuration steps .....	.48
Individual settings (for copy) .....	.49
Select input: Hi-Level / Lo-Level .....	.50
Sensor type .....	.52
Medium / Variable / Unit .....	.54
Input filter: Time constant .....	.56
Temperature unit / probe .....	.58
Polarization voltage / Process pressure / Salinity correction .....	.60
Calibration mode / Calibration interval .....	.62
Alarm settings .....	.64
Adjustment / Default bus address .....	.66
Calibration on the device .....	.68
Calibration to percent saturation (SAT) .....	.70
Calibration to concentration (Conc) .....	.72
Calibration to volume concentration .....	.74
Product calibration .....	.76
Zero calibration .....	.78
Temp probe adjustment .....	.80
Calibration error messages .....	.81
Measurement .....	.81
Cleaning .....	.81

Diagnostics functions .....	.83
Sensoface / Sensocheck .....	.84
Communication Fieldbus / Device .....	.87
Resource block	87
(Block status / Write protection / Key lock / Alarm)	
Bus parameters	88-89
Transducer block	90
(Configuration and calibration via bus / Error messages)	
Bus parameters	92-101
Analog Input blocks	102
(Operating mode / Process variables / Units /	
Linearization types / Diagnostics / Alarm handling) ..	102-104
Alarm diagnostics / Bus parameters	105
Bus parameters	106-107
Cyclic measured value status	108
Operating states / Measured value status	110- 111
Error messages / Measured value status	112-115
Appendix .....	.116
Product line and accessories	116
Specifications	117-123
Patents / Intellectual Property Rights	122
Division 2 wiring	123
FM Control Drawing	124
Index .....	.128

Safety information

Be sure to read and observe the following instructions!

The device has been manufactured using state of the art technology and it complies with applicable safety regulations. When operating the device, certain conditions may nevertheless lead to danger for the operator or damage to the device.

Caution!

Commissioning may only be carried out by trained experts. 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 stresses

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.

Caution!

Before commissioning it must be proved that the device may be connected with other equipment, such as coupling elements and cables.

Safety precautions for installation

- The stipulations of EN 60079-10 / EN 60079-14 must be observed during commissioning.
- The **Stratos FF 2231 X Oxy** is approved for installation in ATEX, FM Zone 1 with measurement in Zone 0, and FM Class I Div 1.

Connection to supply and coupling elements

- The **Stratos FF 2231 X Oxy** may only be connected to explosion-proof power supply and coupling elements (for input ratings refer to annex of Type Examination Certificate). Before commissioning it must be proved that the intrinsic safety is maintained when connecting the device to other equipment, such as supply elements and cables.

Terminals:

suitable for single wires / flexible leads up to 2.5 mm² (AWG 14)

Cleaning in a hazardous location

In hazardous locations the Stratos may only be cleaned with a damp cloth to prevent electrostatic discharge.

Intended use / Short description

Stratos FF 2231 X Oxy is an analyzing device with digital communication via Foundation Fieldbus (FF). It is used for measurement of dissolved and gaseous oxygen (O₂ saturation, O₂ concentration, and temperature) in biotechnology, chemical and pharmaceutical industry, as well as in the field of industry, environment, food processing, and waste-water treatment. 3 measured values can be cyclically transmitted at the same time (O₂ saturation (%), O₂ concentration (Conc), temperature, zero, slope, volume concentration).

The bus address is automatically assigned by the control system, but can also be adjusted on the device.

The rugged molded enclosure can be fixed into a control panel or mounted on a wall or at a post.

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

The Stratos has been designed for application with amperometric sensors, e.g. Knick SE 704 / SE 705, SE 706 / SE 707, Mettler Toledo InPro 6800 series, InPro 6900 series, as well as Hamilton Oxyferm.

- The **Stratos FF 2231 X Oxy** is an intrinsically safe equipment for operation in the following locations: ATEX, FM Zone 1 with measurement in Zone 0, and FM Class I Div 1.
Power is supplied (intrinsically safe) via the fieldbus.

Trademarks

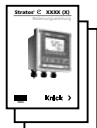
The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.

Stratos®, Sensocheck®, Sensoface®, Calimatic®, GainCheck®

InPro® is a registered trademark of Mettler Toledo.

Oxyferm® is a registered trademark of Hamilton.

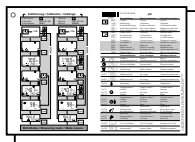
Provided documentation:



- **Instruction manual**



- **Safety instructions /
EC Declarations of Conformity**



- **Short instructions**

Devices only:



- **EC-Type Examination Certificate**

EC-Type-Examination Certificate



Prüf- und Zertifizierungsstelle

ZELM Ex



(1) **EC-TYPE-EXAMINATION CERTIFICATE**
(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-TYPE-EXAMINATION CERTIFICATE Number:

ZELM 01 ATEX 0069

(4) Equipment: **Transmitter Stratos PROFIBUS 2221 X Oxy**

(5) Manufacturer: **Knick Elektronische Meßgeräte GmbH & Co.**

(6) Address: **D - 14163 Berlin, Beuckestraße 22**

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(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 0290112097.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50 014: 1997+A1+A2

EN 50 020: 1994

(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.

(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.

(12) The marking of the equipment shall include the following:



II 2 (1) G EEx ia IIC T4

Zertifizierungsstelle ZELM Ex

Braunschweig, November 21, 2001


Dipl.-Ing. Harald Zelm



Sheet 1/3

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 case of dispute, the German text shall prevail.

Prüf- und Zertifizierungsstelle ZELM Ex • Siekgraben 56 • D-38124 Braunschweig



SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE ZELM 01 ATEX 0069**

(15) Description of equipment

The Transmitter Stratos PROFIBUS 2221 X Oxy with Profibus – PA – communication interface is preferably used for the recognition and processing of electrochemical quantities and is equipped with an input for measurements of the oxygen partial pressure 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

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

	FISCO- supply unit	linear barrier
U_{0max}	17,5 V	24 V
I_{0max}	280 mA	200 mA
P_{0max}	4,9 W	1,2 W

effective internal capacitance: $C_i \leq 1$ nF
effective internal inductance: $L_i \leq 10$ μ H

Oxygen measuring loop
(terminals 1/2, 4 and 5)

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

maximum values: $U_o = 10$ V
 $I_o = 11$ mA
 $P_o = 14$ mW
 $R = 475$ Ω
(linear characteristics)

	IIC	resp.	IIB
max. permissible external inductance	1 mH		5 mH
max. permissible external capacitance	925 nF		4 μ F

effective internal capacitance: $C_i \leq 25$ nF
The effective internal inductance is negligibly small.

Sheet 2/3

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 case of dispute, the German text shall prevail.

EC-Type-Examination Certificate



Prüf- und Zertifizierungsstelle
ZELM Ex



SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE ZELM 01 ATEX 0069

Temperature measuring loop
(terminals 7 and 8)

type of protection Intrinsic Safety
resp.

EEx ia IIC/IB
EEx ib IIC/IB

maximum values:

$U_o = 5$ V
 $I_o = 1$ mA
 $P_o = 2$ mW
 $R = 7,88$ k Ω
(linear characteristics)

	IIC	resp.	IIB	
max. permissible external inductance	1	mH	5	mH
max. permissible external capacitance	4	μ F	10	μ F

effective internal capacitance: $C_i \leq 120$ nF
The effective internal inductance is negligibly small.

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 peak value of the nominal voltage of 60 Volts.

The operation manual has to be considered.

- (16) Report No. ZELM Ex 0290112097
- (17) Special conditions for safe use
not applicable
- (18) Essential Health and Safety Requirements
met by standards

Zertifizierungsstelle ZELM Ex


Dipl.-Ing. Harald Zelm



Braunschweig, November 21, 2001

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 case of dispute, the German text shall prevail.

Prüf- und Zertifizierungsstelle ZELM Ex • Siekgraben 56 • D-38124 Braunschweig

EC-Type-Examination Certificate

1st supplement



Prüf- und Zertifizierungsstelle
ZELM Ex



1. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

to EC-type-examination Certificate

ZELM 01 ATEX 0069

Equipment: **Transmitter Stratos FF 2231 X Oxy**
Manufacturer: **Knick Elektronische Messgeräte GmbH & Co. KG**
Address: **D - 14163 Berlin, Beuckestraße 22**

Description of supplement

The Transmitter model Stratos PROFIBUS 2221 X Oxy was extended by the model Stratos FF 2231 X Oxy with Foundation Fieldbus communication interface.

The Transmitter Stratos FF 2231 X Oxy model differs from the previous model in some, not safety relevant parts added, changed or removed to the Transmitter. The protection concept of the equipment is not affected by these changes.

The type of protection, the electrical and all further data of the device remain unchanged.

The Foundation Fieldbus version of the Transmitter may be manufactured in future in consideration of this supplement.

References:

The Operating Instructions has to be considered.

Report No.: ZELM Ex 0380417288

Special conditions for safe use

not applicable

Essential Health and Safety Requirements

met by adherence to the standards

EN 50 014: 1997+A1+A2

EN 50 020: 1994

Zertifizierungsstelle **ZELM Ex**



Braunschweig, August 09, 2004


Dipl.-Ing. Harald Zelm

Sheet 1 / 1

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. This English version is based on the German text. In the case of dispute, the German text shall prevail.

Prüf- und Zertifizierungsstelle ZELM Ex • Siekgraben 56 • D-38124 Braunschweig

TM



FOUNDATION

FIELDBUS FOUNDATION DEVICE REGISTRATION

Presented To: Knick Elektronische Messgeräte GmbH & Co.KG
Modell: Stratos FF 2231X OXY
Device Type: OXY Transmitter
ITK_Ver: 4.51
IT Campaign Number: IT025300
Registration Date: 4/29/2004
DD Revision: 0x01
CFF Revision: 010101.cff

The above device has successfully completed rigorous testing by the Fieldbus Foundation and has received registration and the right to use the FF checkmark logo as specified by MT-045.



Heather Carnaud

Heather Carnaud
Test Technician

Richard J. Timmons

Richard J. Timmons
President

Foundation Fieldbus (FF) technology

General

Foundation Fieldbus (FF) is a digital communication system that connects different field devices over a common cable and integrates them into a control system.

Its application range covers manufacturing, process, and building automation.

As fieldbus standard according to EN 61158-2 (IEC 1158-2) the Foundation Fieldbus ensures the communication of different devices over one bus line.

Basic properties

The “Data Link Layer” of the Fieldbus Foundation protocol defines 3 device types:

The **Active Link Master** plans all activities as “Link Active Scheduler” (LAS). It controls the complete data traffic on the bus. Several Link Masters on one bus increase safety, but only one is active at a time.

Basic devices are peripheral devices such as valves, drives, transmitters, or analyzers. They can react acyclically to servicing, configuration and diagnostic tasks of the master. The Link Master cyclically reads the measurement data with status.

Bridges can connect a network from different bus systems.

Bus communication

Foundation Fieldbus (FF) permits cyclic and acyclic services:

Cyclic Services - Scheduled Communication

are used to transmit measurement data with status information.

The Link Active Scheduler maintains a list of transmission times for all data in all devices that need to be cyclically transmitted. When it is time to transmit data, the LAS issues a "Compel Data (CD)" start signal to the respective device. Upon receipt of the "Compel Data" signal, the device broadcasts the data to all devices on the fieldbus.

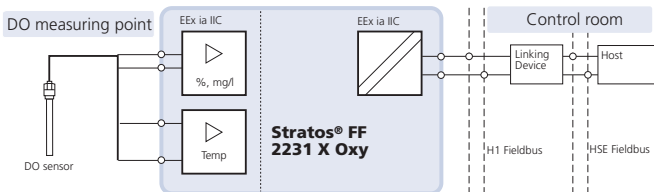
Acyclic Services - Unscheduled Communication:

are used for device configuration, remote maintenance, and diagnostics during operation.

All devices are given the chance to send acyclic (unscheduled) messages between transmissions of cyclic (scheduled) data. The LAS grants permission to a device to broadcast acyclic messages by issuing a "Pass Token (PT)" message. Upon receipt of the "Pass Token", the device starts data transmission.

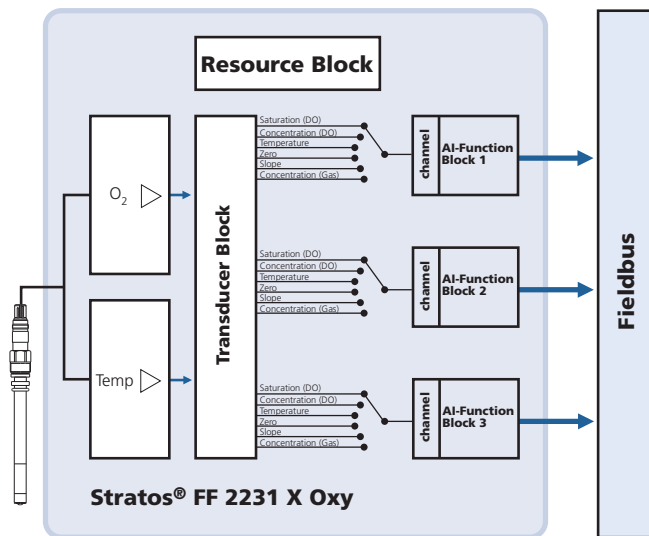
Technical features of Stratos FF 2231 X Oxy

Communication between the field devices and control room is effected by Foundation Fieldbus (FF). Data exchange is cyclic and acyclic.



Communication model

The device performance is described by function blocks according to the "Fieldbus Specification" for process control devices.



Function blocks

All variables and parameters of the transmitter are assigned to blocks. The Stratos FF 2231 X Oxy is equipped with the following blocks:

Standard Resource Block (RB)

describes the transmitter characteristics (manufacturer, device name, operating status, global status).

Standard Analog Input Block (AI)

Three Analog Input Function Blocks provide for cyclic transmission of measured values (currently measured value with status, alarm limits, freely selectable process variable).

Transducer Block (TB) with calibration possibility

provides for acyclic data transmission.

Calibration, configuration, and maintenance commands coming from the control station are processed in the Transducer Block.

The sensor signal is first preprocessed in the Transducer Block. From here, the measured value is sent to the Analog Input Blocks where it can be further processed (limit values, scaling).

Commissioning and configuration via Foundation Fieldbus

Commissioning on the Foundation Fieldbus

Only when the Stratos FF 2231 X Oxy is competently configured, can the Foundation Fieldbus communication function properly. Different configuration tools from different manufacturers are available (e.g. NI-FBUS Configurator). They can be used to configure the device and the Foundation Bus.

Note:

Be sure to observe the operating instructions and the menu guidance of the control system or the configuration tool during installation and configuration via the control system.

Installing the DD (Device Description):

During initial installation the device description (*.sym, *.ffo) must be installed in the control system

(e.g. Delta V from Emerson Process).

For network projecting, you require the CFF file (Common File Format).

These files can be obtained from:

- the included CD
- the www.knick.de website
- Foundation Fieldbus: www.fieldbus.org.

Identifying the transmitter

There are several possibilities to identify a FF transmitter in the network. The most important one is the “Device Identifier” or DEV_ID. It consists of the manufacturer ID, device type, and serial number XXXXXXXX.

The DEVICE_ID is: 0001025727 V2_01__XXXXXXXX00

Manufacturer ID Knick: MANUFAC_ID = 0x000102

Device type Stratos FF 2231 X Oxy: DEV_TYPE = 22311

Initial commissioning

1. Supply the device with power (see “Installation and wiring”, Pg 32).
2. Open the configuration program of the control system.
3. Load DD and CFF file.
After the first connection establishment, the device answers as follows:

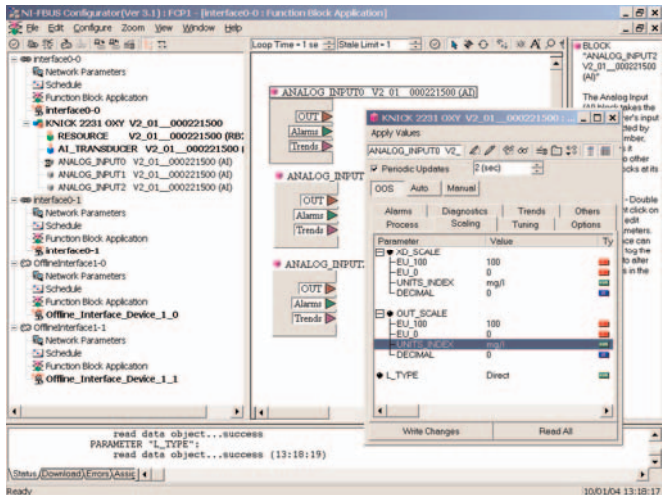
Knick 2231 Oxy V2_01__XXXXXXXX00- ID= 0001025727 V2_01__XXXXXXXX00

4. Assign the desired name to the field device.
(PD_TAG)

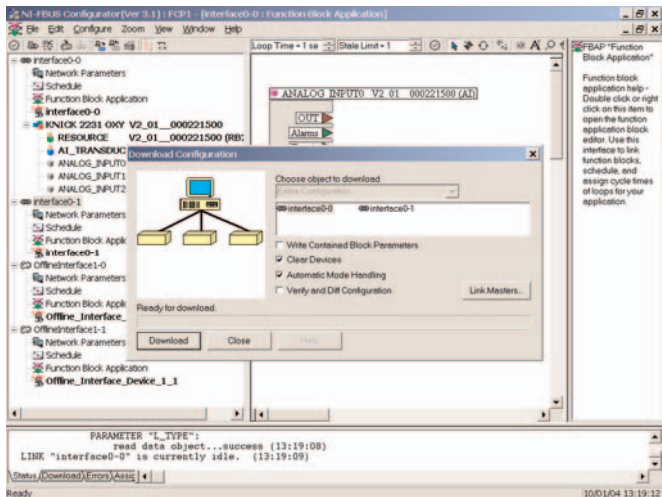
Setting the Resource Block (RB) parameters

5. Make sure that the WRITE_LOCK parameter is set to “NOT LOCKED”.
6. Set the MODE_BLK. TARGET to Auto.

Setting the Analog Input Block (AI) parameters



7. Set MODE_BLK_TARGET to OOS (Out Of Service).
8. Select the desired process variable from the CHANNEL parameter. See table on Page 102.
9. Select the unit belonging to the process variable from the XD_SCALE parameter.
10. Select the unit belonging to the process variable from the OUT_SCALE parameter.
11. Set the LIN_TYPE linearization type to Direct
12. If these steps are not properly executed, the "Block Configuration Error" is generated when the block is set to "Auto".

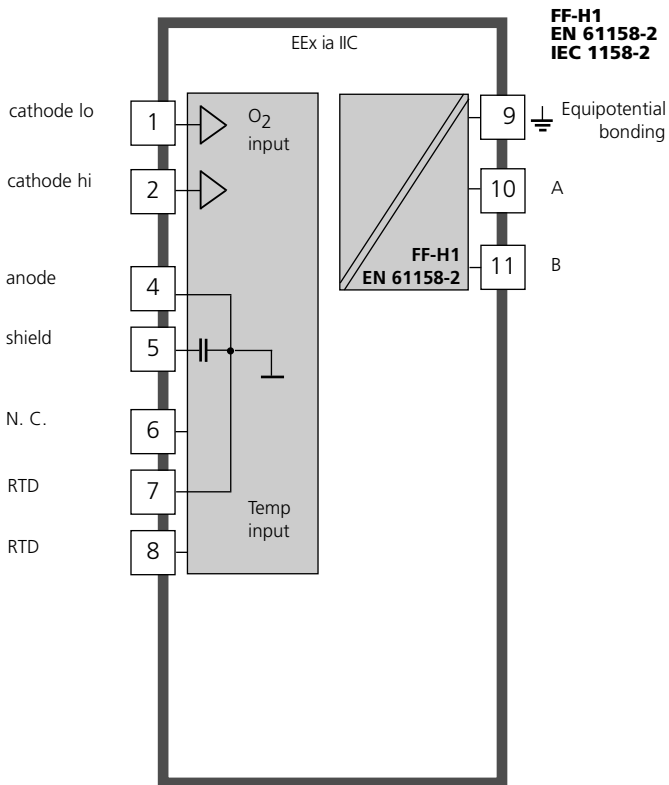


This step is mandatory since otherwise the target mode of the Analog Input Block cannot be set to “Auto”.

Using the NI-FBUS Configurator from National Instruments, for example, you can graphically connect the function blocks and then load the system configuration in the device.

13. Download all data and parameters to the field device.
14. Set the target modes of all Analog Input Blocks to “Auto”.

Overview of Stratos FF 2231 X Oxy



Assembly

Packing list

Check the shipment for transport damage and completeness.
The package should contain:

- Front unit of Stratos
- Lower case
- Bag containing small parts
- Instruction manual
- Specific test report
- CD with Device Description
* .sym, * .ffo
Common File Format
CFF-File

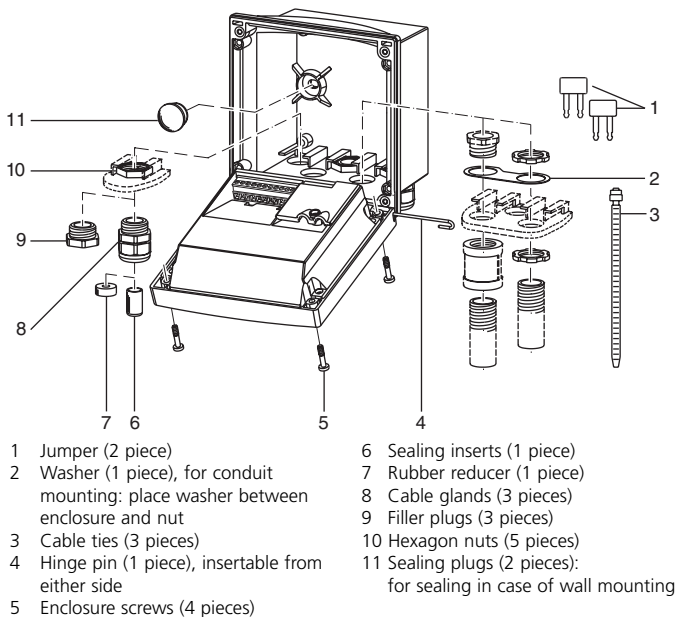


Fig.: Assembling the enclosure

Mounting plan

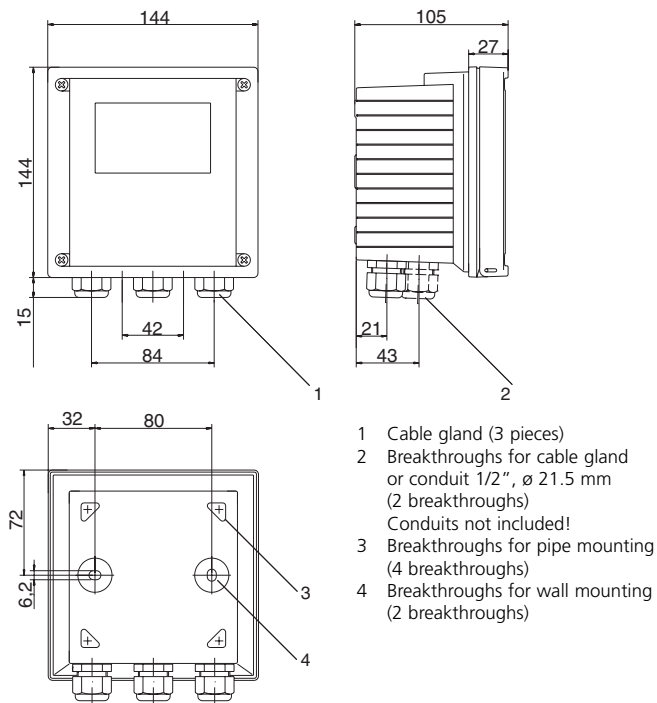
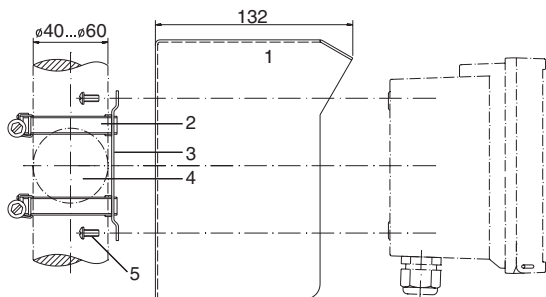


Fig.: Mounting plan

Pipe mounting, panel mounting



- 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.: ZU 0274 pipe-mount kit

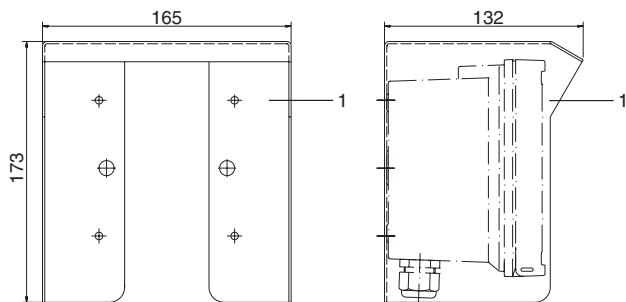
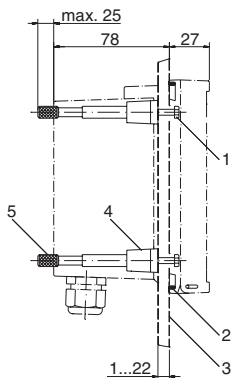


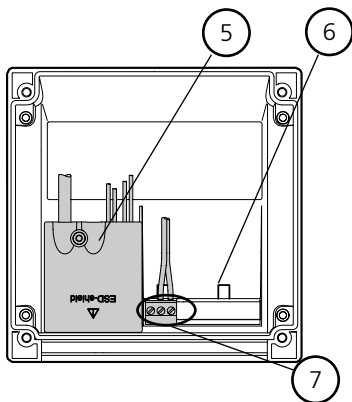
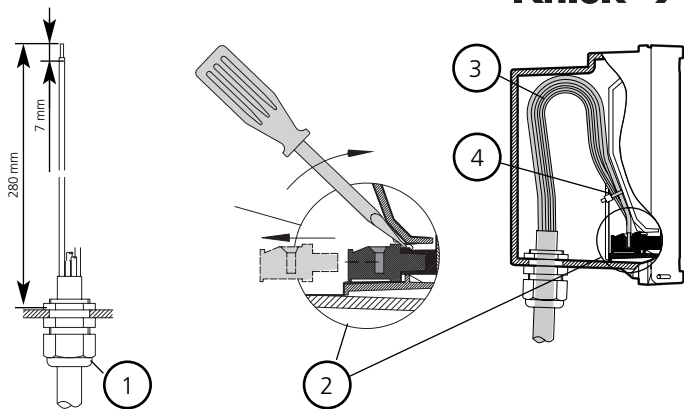
Fig.: ZU 0276 protective hood for wall and pipe mounting



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

Panel cutout 138 x 138 mm
(DIN 43700)

Fig.: ZU 0275 panel-mount kit

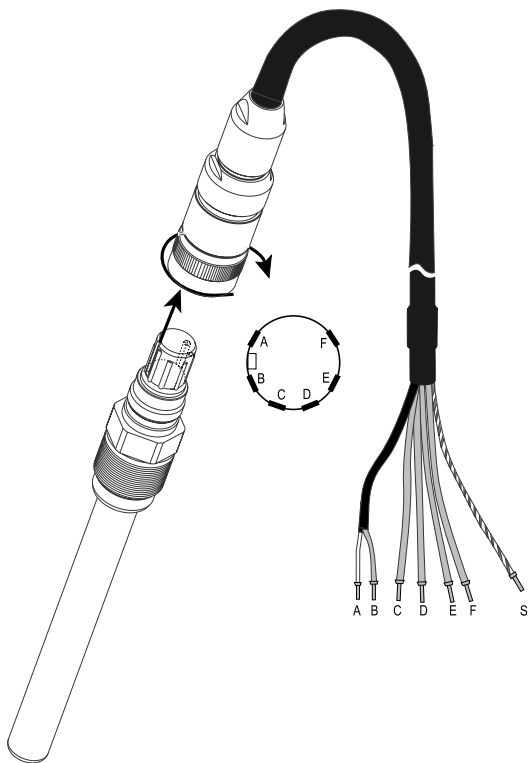


- 1** Recommended stripping lengths for multi-core cables
- 2** Pulling out the terminals using a screwdriver (also see **6**)
- 3** Cable laying in the device
- 4** Connecting lines for Fieldbus
- 5** Cover for sensor and temperature probe terminals
- 6** Area for placing the screwdriver to pull out the terminals
- 7** Terminals for Fieldbus

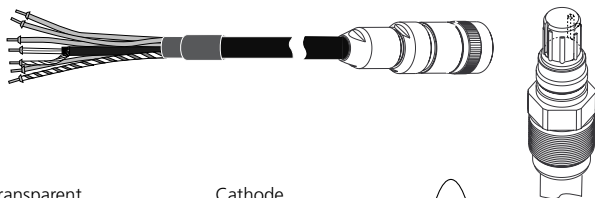
Fig.: Information on installation, rear side of device

Connecting the VP cable

Connecting the sensor to the VP cable



VP cable assignment



A transparent

Cathode

B red

Anode

C gray

Guard

D blue

Not connected

E white

(RTD)

F green

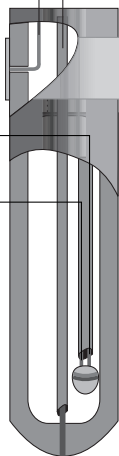
(RTD)

S green/yellow

Outer shield

$C = 220 \text{ nF}$

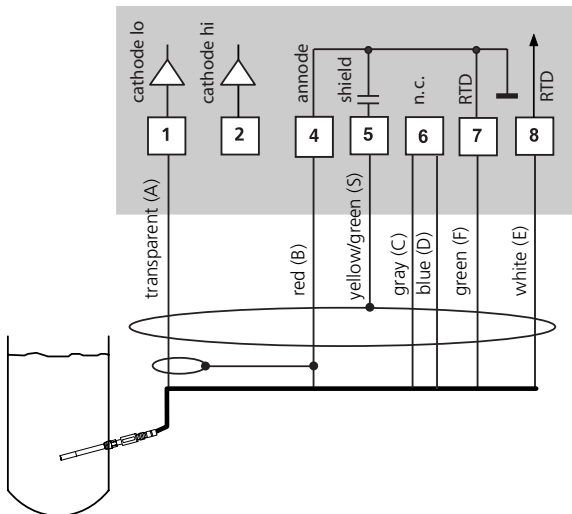
RTD = temperature probe



Wiring examples

Example 1:

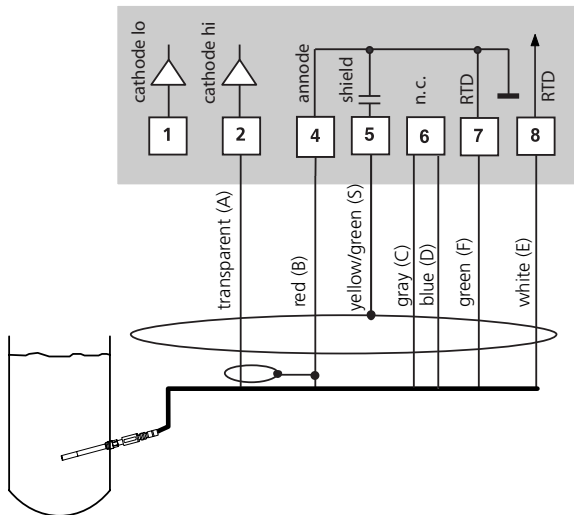
- Oxygen measurement with SE 707 (InPro6900) trace sensor for low-level range (see Pg 117)
(VP cable connection)



Connection	Terminal	Sensor SE 707/InPro6900 VP cable (e.g. ZU 0313)
cathode lo	1	transparent (coax core)
cathode hi	2	not connected
anode	4	red (coax shield)
shield	5	yellow/green (external shield)
n. c.	6	gray, blue
RTD	7	green
RTD	8	white

Example 2:

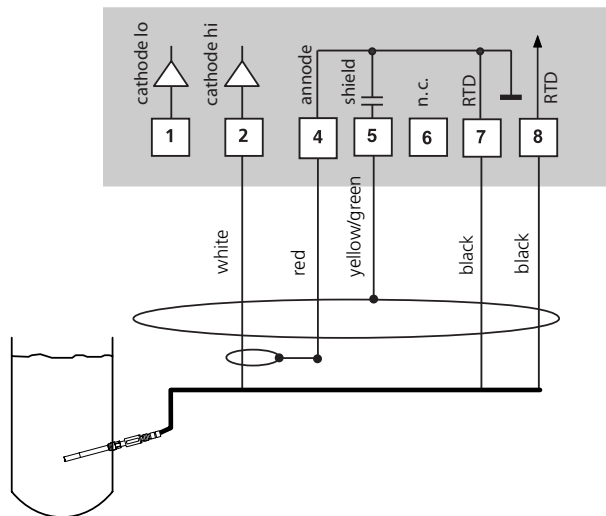
- Dissolved oxygen measurement with SE 706 (InPro6800) for high-level range (see Pg 118)
(VP cable connection)



Connection	Terminal	Sensor SE 706 / InPro6800 VP cable (e.g. ZU 0313)
cathode lo	1	not connected
cathode hi	2	transparent (coax core)
anode	4	red (coax shield)
shield	5	yellow/green (external shield)
n. c.	6	gray, blue
RTD	7	green
RTD	8	white

Example 3:

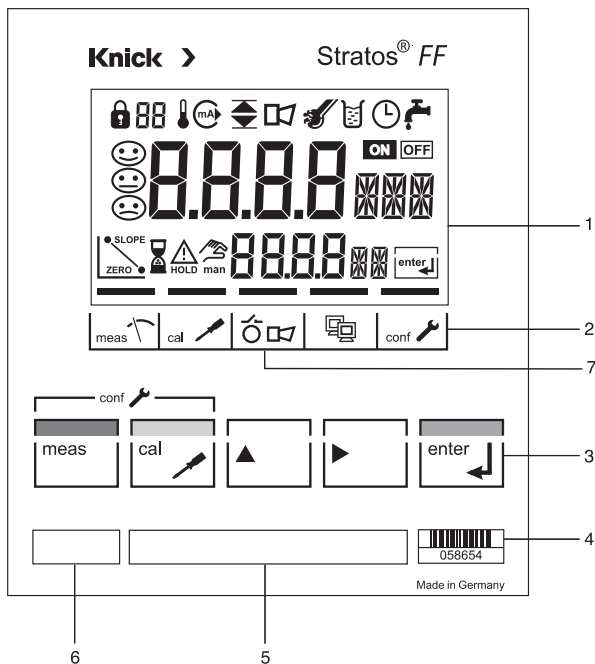
- Oxygen measurement with SE 704 / SE 705 (InPro6000) for high-level range, also see Pg 118 (connection via T82)



Connection	Terminal	SE 704/SE 705 sensor (or InPro6000) Cable (e.g. ZU 0231)
cathode lo	1	not connected
cathode hi	2	white (coax core)
anode	4	red (coax shield)
shield	5	yellow/green (external shield)
n. c.	6	not connected
RTD	7	black
RTD	8	black

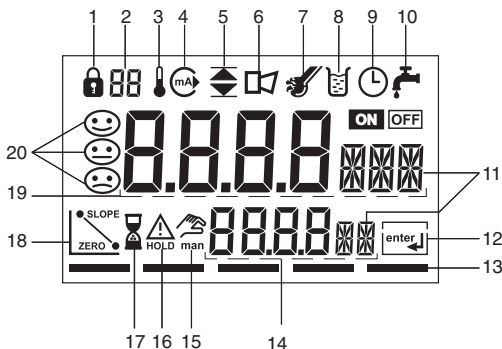
User interface and display

User interface


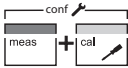






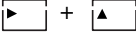


- | | | | |
|---|---|---|-------------------|
| 1 | Display | 3 | Keypad |
| 2 | Mode indicators (no keys),
from left to right: | 4 | Coding |
| | - Measuring mode | 5 | Rating plate |
| | - Calibration mode | 6 | Model designation |
| | - Alarm | 7 | Alarm LED |
| | - Foundation Fieldbus communication | | |
| | - Configuration mode | | |

Display




- | | |
|---|------------------------------|
| 1 Mode code entry | 14 Lower display |
| 2 Display of measured variable* | 15 Manual temp specification |
| 3 Temperature | 16 Hold mode active |
| 4 Current output | 17 Waiting time running |
| 5 Limit values | 18 Sensor data |
| 6 Alarm | 19 Main display |
| 7 Sensocheck | 20 Sensoface |
| 8 Calibration | |
| 9 Interval/response time | * Not in use |
| 10 Wash contact* | |
| 11 Measurement symbols | |
| 12 Proceed with enter | |
| 13 Bar for identifying the device status, above mode indicators from left to right: | |
| - Measuring mode | |
| - Calibration mode | |
| - Alarm | |
| - Foundation Fieldbus communication | |
| - Configuration mode | |

	<p>Start, end calibration</p>
	<p>Start configuration</p>
	<p>Abort configuration, calibration, then Hold mode is activated.</p>
	<p>Select digit position (selected position flashes)</p>
	<p>Edit digit</p>
	<ul style="list-style-type: none"> • Calibration: Continue in program sequence • Configuration: Confirm entries, next configuration step • End the Hold mode
	<p>Cal Info, display of asymmetry potential and slope</p>
	<p>Error Info: Display of last error message</p>
	<p>Start GainCheck device self-test</p>

Safety functions

Hold mode

Display:  HOLD

The Hold mode is a safety state during configuration and calibration. In Hold mode the last valid value (last usable value) is transmitted.

Measured value status = uncertain : Last_usable_value

If the calibration or configuration mode is exited, the Stratos remains in the Hold mode for safety reasons. This prevents undesirable reactions of the connected peripherals due to incorrect configuration or calibration. The measured value and "HOLD" are displayed alternately. The Stratos only returns to measuring mode after **enter** is pressed and 20 seconds have passed.

Configuration mode is also exited automatically 20 minutes after the last keystroke (timeout). The Stratos returns to measuring mode.

Timeout is not active during calibration.

Alarm on the device

During an error message the alarm LED flashes.

The alarm response time is permanently set to 10 sec.

(see Configuration on the device, Pg 65)

The alarm LED on the front panel can be configured as follows:

HOLD off: Alarm: LED flashing

HOLD on: Alarm: LED on. HOLD: LED flashing.

For alarm handling via Foundation Fieldbus, see Pg 104.

Sensocheck, Sensoface sensor monitoring

Sensocheck continuously monitors the sensor and lines. Sensocheck can be switched off (Configuration, Pg 65).



Sensoface provides information on the sensor condition.



The slope, response time and Sensocheck are evaluated.

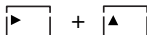


The three Sensoface indicators provide the user with information about wear and required maintenance of the sensor.

GainCheck 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 device self-test:



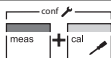
Automatic device self-test

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

Configuration on the device

In the configuration mode on the device you primarily set parameters for the display.

Activate



Activate with **meas + cal**



Enter mode code "1200".
Edit parameter with **▶** and **▲**,
confirm/continue with **enter**.
(End with **meas**, then **enter**.)

Hold



The last valid value (last usable value) is transmitted.

During configuration the device remains in the Hold mode.



Measured value status = uncertain:
Last_usable_value.
Sensoface is off, "Configuration"
mode indicator is on.
Red LED flashes when "HOLD ON"
has been set.

HOLD icon

Input errors



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



End with **meas**.

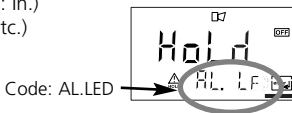
The measured value and Hold are displayed alternately, "enter" flashes. Sensoface is active.



Press **enter** to end the Hold mode.
The measured value is displayed.
Hold remains on for 20 sec (measured value status = uncertain: Last_usable_value). (HOLD icon is on, "hour glass" flashes).

The configuration steps are optically organized in menu groups:

- Select: Input signal level, sensor, process variable, process medium, input filter (code: In.)
- Temperature measurement (code: tc.)
- Correction (code: Co.)
- Calibration mode (code: CA.)
- Alarm settings (code: AL.)
- Input of bus address (code: FF.)



Pressing the **enter** key accesses the next configuration step. The values are edited using the arrow keys. Pressing **enter** confirms/stores the settings and opens the next configuration step. After the last configuration step the menu starts once more with the welcome text and the first step is opened again. Return to measurement: Press **meas**.

Code	Configuration step	Select next step
In.rNGE	Select input (Lo-/Hi-Level)	enter
In.SnSR	Select sensor type	enter
In.FCT	Medium: O ₂ dissolved /O ₂ gas	enter
In.UniT	Select variable/unit	enter
In.FtME	Time constant of input filter	enter
tc.UniT	Select temperature unit	enter
tc.rTD	Select temperature probe	enter
Co.UPOL	Enter polarization voltage	enter
Co.UniT	Select pressure unit	enter
Co.PrES	Enter process pressure correction	enter
Co.SAL	Enter salinity correction	enter
Ca.MOD	Select calibration mode	enter
Ca.tiME	Enter calibration interval	enter
AL.SnSo	Sensocheck On/Off	enter
AL.LED	LED in Hold mode	enter
FF.ADR	Enter default bus address	enter

Overview of configuration steps

Code	Menu	Selection / Default (Factory setting bold print)	BUS access
In.	Select meas. procedure / sensor, input filter		
In.rnGE	Select input level	Lo / Hi	X
In.SnSR	Select sensor type	Standard Type A / Traces Type B	X
In.FCT	Select process medium: O ₂ dissolved (DO) / gas	DO / GAS	X
In.UnIT	For DO: unit in display	% , mg/l, µg/l, ppm, ppb	X
In.UnIT	For GAS: unit in display	ppm , %	X
In.FtME	Time constant of input filter	0000 SEC (0000 ...0120 SEC)	X
tc.	Temp compensation		
tc.UnIT	Temperature unit	°C / °F	X
tc.rTD	Select temperature probe	22 NTC / 30 NTC	X
Co.	Correction		
Co.UPOL	Polarization voltage	-0675 mV (-1000 mV ... 0)	X
Co.UnIT	Select pressure unit	BAR / kPa / PSI	X
Co.PrES	Enter process pressure correction	1.013 BAR (0.000...9.999 BAR /999.9 kPa/ 145.0 psi)	X
Co.SAL	Enter salinity correction	00.00 mg/l (00.00...45.00 mg/l)	X
CA.	Calibration mode		
Ca.MOD	Select calibration mode	SA t / Conc	X
CA.tIME	Calibration interval	0000 ... 9999 h (0000 h)	X
AL.	Alarm settings		
AL.SnSO	Sensocheck On/Off	ON / OFF (OFF)	X
AL.LED	LED in HOLD mode	ON / OFF (OFF)	X
FF.	Bus address		
FF.ADR	Adjust default bus address	(0017 ... 0036) (0026)	X

Individual settings

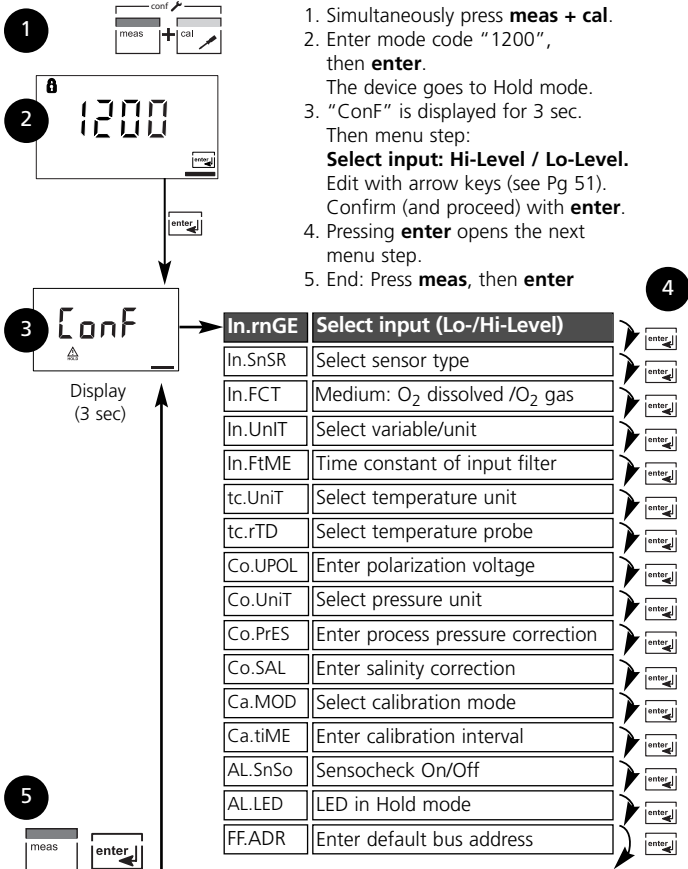
(Original for copy)


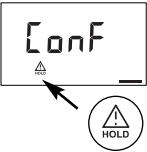
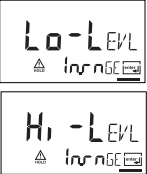
Knick >

Code	Parameter	Factory settings	Individual settings
In.rnGE	Select signal level	<u>Hi</u>	<u> </u>
In.SnSR	Sensor type	<u>Type A</u>	<u> </u>
In.FCT	Process medium	<u>DO</u>	<u> </u>
In.UnIT	For DO: Unit	<u>%</u>	<u> </u>
In.UnIT	For GAS: Unit	<u>ppm</u>	<u> </u>
In.FtME	Filter time	<u>0000 SEC</u>	<u> </u>
tc.UnIT	Temp unit	<u>°C</u>	<u> </u>
tc.rTD	Temperature probe	<u>22 NTC</u>	<u> </u>
Co.UPoL	Polarization voltage	<u>-0675 mV</u>	<u> </u>
Co.UnIT	Pressure unit	<u>BAR</u>	<u> </u>
Co.PrES	Process press. corr.	<u>1.013 BAR</u>	<u> </u>
Co.SAL	Salinity correction	<u>00.00 ppt</u>	<u> </u>
CA.MoD	Calibration mode	<u>SAt</u>	<u> </u>
CA.tiME	Calibration interval	<u>0000 h</u>	<u> </u>
AL.SnSO	Sensocheck	<u>OFF</u>	<u> </u>
AL.LED	LED in Hold mode	<u>OFF</u>	<u> </u>
FF.ADR	Default bus address	<u>0026</u>	<u> </u>

Configuration on the device

Select input: Hi-Level / Lo-Level

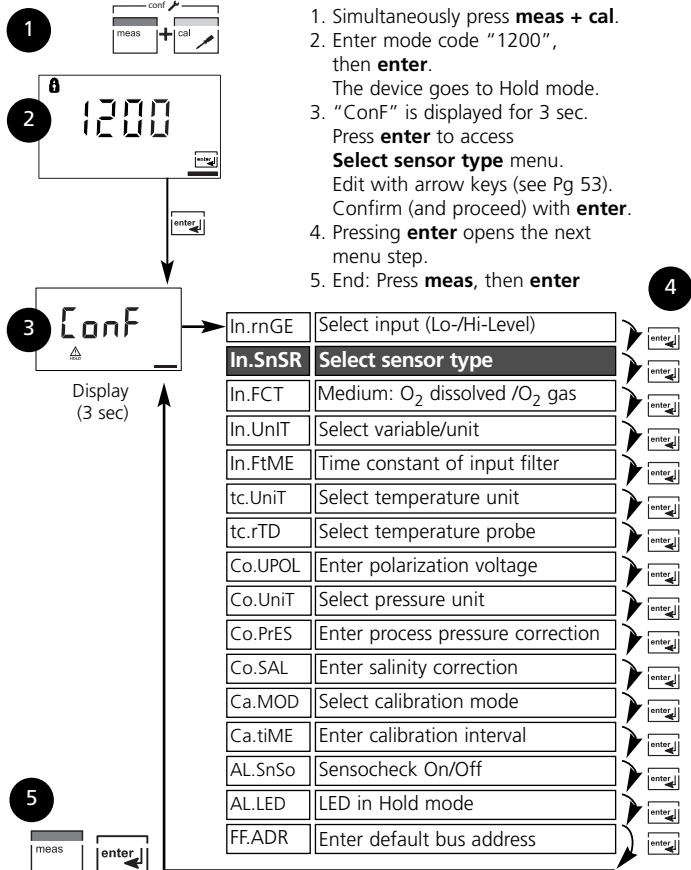



Code	Display	Action	Choices
In.		Select configuration: (Simultaneously press meas + cal.)	
		Enter mode code "1200" (Select position using arrow key ▶ and edit number using ▲ key. When the display reads "1200", press enter to confirm.) If an invalid code is entered, the device returns to measuring mode.	
		After correct input the welcome text is displayed for approx. 3 sec. The device is in HOLD mode (HOLD icon is active, red LED flashes when "HOLD ON" has been set.).	
		Select range for measuring current: Lo-level range: Measuring current -2 ... 600 nA, resolution 10 pA for measuring low oxygen concentrations Hi-level range: Measuring current -2 ... 1800 nA, resolution 30 pA	Hi (Lo/Hi)

Note: Characters represented in gray are flashing and can be edited.

Configuration on the device

Select sensor type.



Code	Display	Action	Choices
In.		Select sensor type A / B (see table on left-hand side) Select with arrow key ▶ Proceed with: enter	Type A (SE 704, SE 705, SE 706, InPro6000 ... 6800) Type B SE 707 InPro6900

** Type A sensors (standard applications)

Sensor type	Screw cap	Sensor current in air (25 °C)	Detection limit
SE 704 / SE 705 / SE 706	4-pole (T82)	30 to 65 nA	0.01 ppm
InPro6100 / InPro6200	4-pole	50 ... 110 nA	0.01 ppm
InPro6800	VP	typ. 60 nA	0.006 ppm

** Type B sensor (traces)

Sensor type	Screw cap	Sensor current in air (25 °C)	Detection limit
InPro6900 / SE 707	VP	typ. 350 nA	0.001 ppm

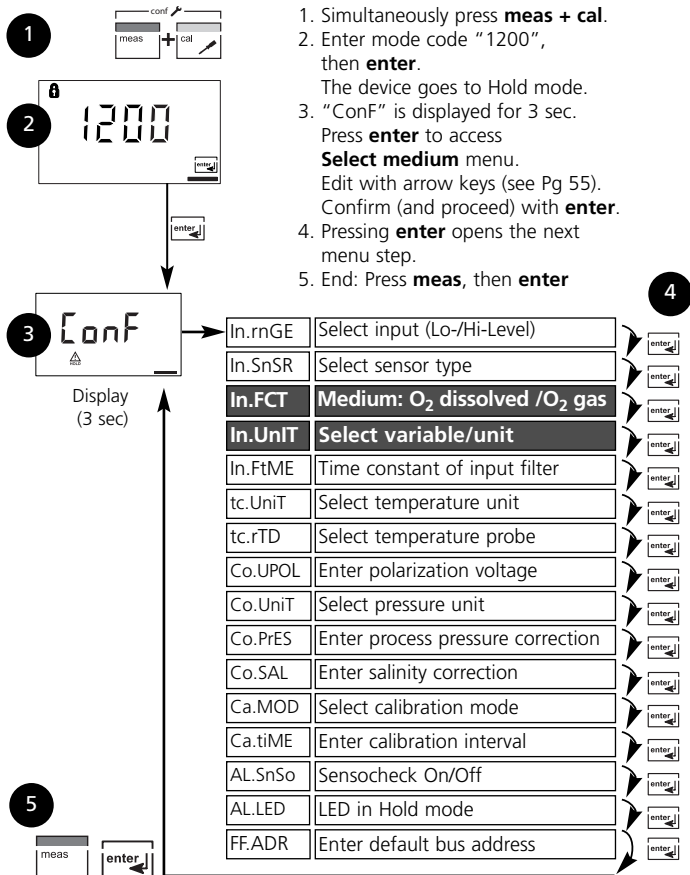
Note:











After sensor replacement you must perform a new calibration.

Note: Characters represented in gray are flashing and can be edited.

Configuration on the device

Select medium / variable / unit

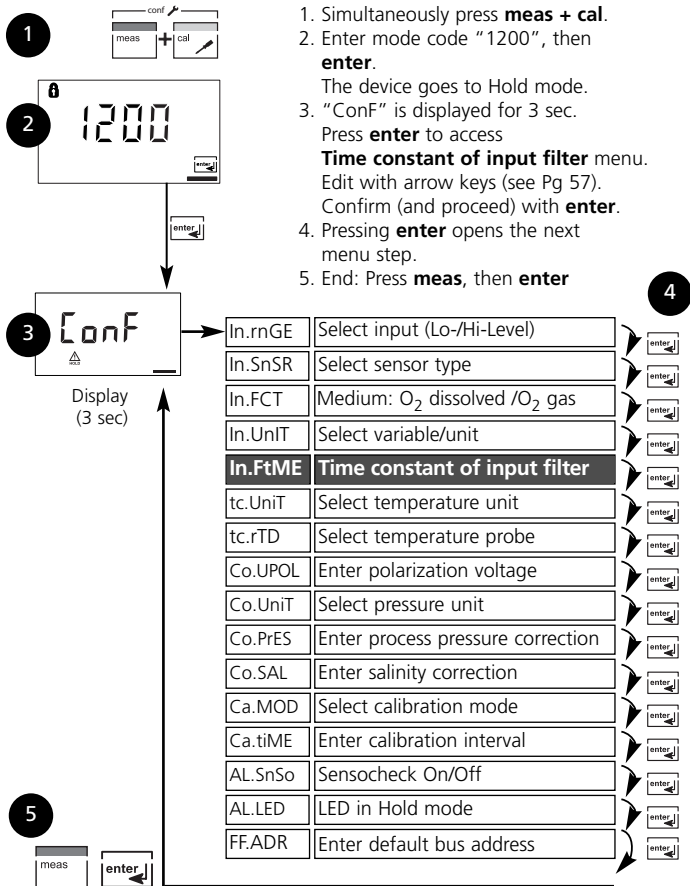



Code	Display	Action	Choices
In.		Select medium: • Dissolved oxygen (DO) / • Gas (GAS) Select with ▶ arrow key Proceed with enter	DO (GAS)
			
		Select variable / unit (valid for all following settings): Select with ▶ arrow key. Proceed: enter For input = Hi level: • SAt: Percent saturation: 0.0 ... 500 % • Conc: Concentration 0.00 ... 50.00 mg/l 0.00 ... 50.00 ppm For input = Lo level: • SAt: Percent saturation: 0.0 ... 120 % • Conc: Concentration 0000 ... 9999 µg/l 0.000 ... 9.999 mg/l 0000 ... 9999 ppb 0.000 ... 9.999 ppm	% (µg/l mg/l ppb ppm)
			
			
			
			
			
		Only with Measurement in gas selected (Select: GAS): Select variable (valid for all following settings): Select with ▶ arrow key. Proceed with: enter For ranges, see Pg 117 et seq.	% (ppm)
			

Note: Characters represented in gray are flashing and can be edited.

Configuration on the device

Input filter / Time constant

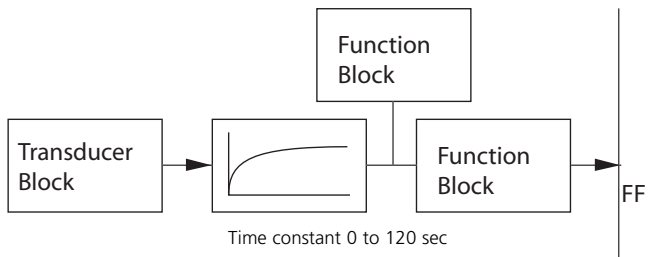


Code	Display	Action	Choices
In.		Time constant of input filter Default setting: 0 s (inactive). To specify a time constant: Select with ► key, edit number with ▲ key, proceed with enter .	0000 SEC (0000 ... 0120 SEC)

Time constant of input filter (attenuation)

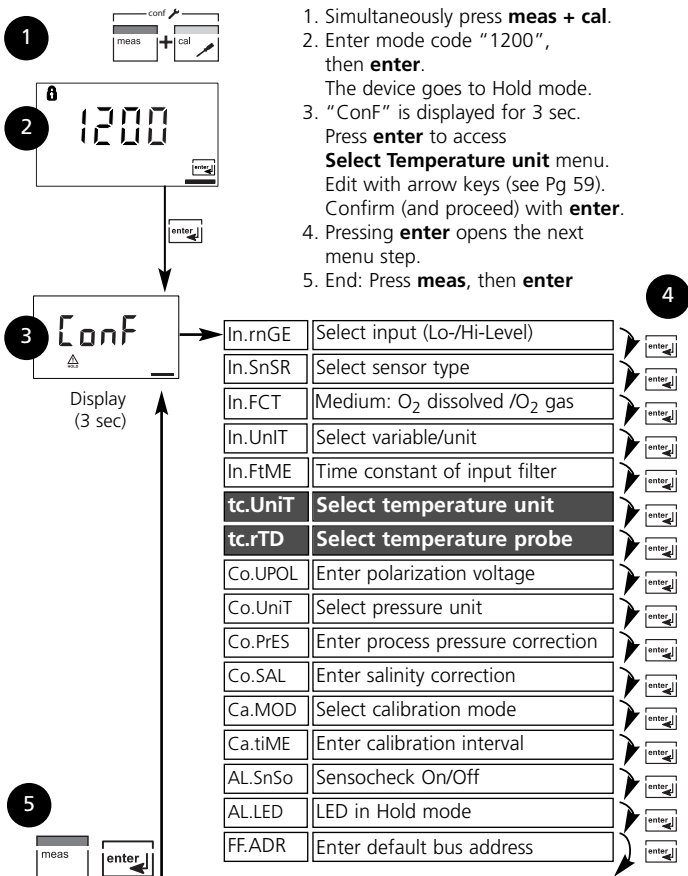
To smoothen the signal input, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time constant has been reached.






The time constant can be set from 0 to 120 sec. If the time constant is set to 0 sec, the filter is without effect.



Configuration on the device

Temperature unit / Temperature probe

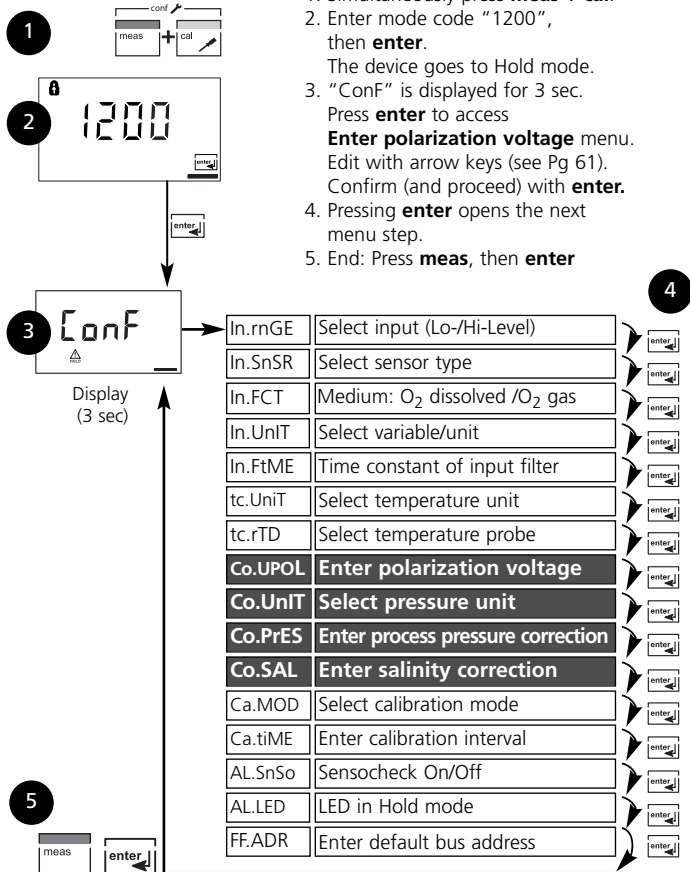






Code	Display	Action	Choices		
tc.		Specify temperature unit Select with ► arrow key. Proceed with enter	°C (°F)		
					
		Select temperature probe Select with ► arrow key. Proceed with enter	22NTC (30NTC)		
					

Configuration on the device

Polarization voltage / Process pressure / Salinity correction

1. Simultaneously press **meas + cal**.
2. Enter mode code "1200", then **enter**.
The device goes to Hold mode.
3. "ConF" is displayed for 3 sec.
Press **enter** to access **Enter polarization voltage** menu.
Edit with arrow keys (see Pg 61).
Confirm (and proceed) with **enter**.
4. Pressing **enter** opens the next menu step.
5. End: Press **meas**, then **enter**



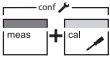
Code	Display	Action	Choices
Co.		Enter polarization voltage Select with ▶ key, edit number with ▲ key, proceed with enter .	-0675 mV (-1000 ... 0 mV)
		Select pressure unit Select with ▶ arrow key. Proceed with: enter	bar (kPa, PSI)
		Process pressure correction Enter process pressure. This value is used to correct oxygen saturation. It has no influence on concentration measurement (Conc). Select position with ▶ arrow key and edit number with ▲ key. Proceed with: enter	1.013 bar (0.000 ... 9.999 bar, 0.000 ... 999.0 kPa 0.000 ... 145.0 psi)
		Enter salinity correction (salinity) Select position with ▶ arrow key and edit number with ▲ key. Proceed with: enter	00.00 ppt* (00.00 ... 45.00 ppt)

* ppt (parts per thousand) - corresponds to g/kg


Configuration

Calibration mode / Calibration interval


1



















2



3




Display (3 sec)




In.rnGE	Select input (Lo-/Hi-Level)	
In.SnSR	Select sensor type	
In.FCT	Medium: O ₂ dissolved /O ₂ gas	
In.UniT	Select variable/unit	
In.FtME	Time constant of input filter	
tc.UniT	Select temperature unit	
tc.rTD	Select temperature probe	
Co.UPOL	Enter polarization voltage	
Co.UniT	Select pressure unit	
Co.PrES	Enter process pressure correction	
Co.SAL	Enter salinity correction	
Ca.MOD	Select calibration mode	
Ca.tiME	Enter calibration interval	
AL.SnSo	Sensocheck On/Off	
AL.LED	LED in Hold mode	
FF.ADR	Enter default bus address	

4

5

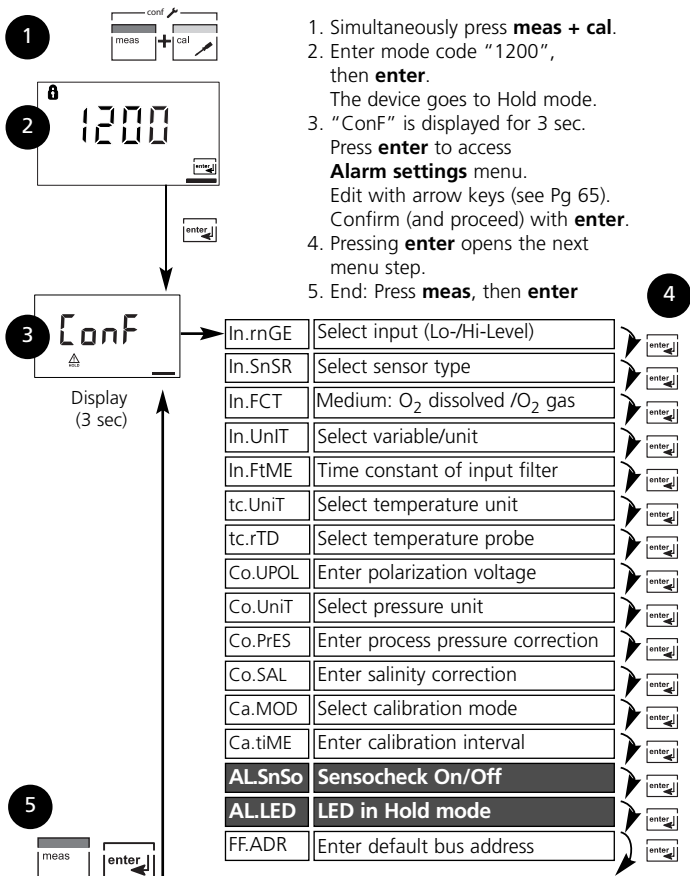




1. Simultaneously press **meas + cal**.
2. Enter mode code "1200", then **enter**.
The device goes to Hold mode.
3. "ConF" is displayed for 3 sec. Press **enter** to access **Select calibration mode** menu. Edit with arrow keys (see Pg 63). Confirm (and proceed) with **enter**.
4. Pressing **enter** opens the next menu step.
5. End: Press **meas**, then **enter**

Code	Display	Action	Choices
CA.		Specify calibration mode (Calibration to saturation or concentration) Select with ▶ , proceed with enter	SAt (Conc)
			
		Calibration interval The cal timer reminds you to calibrate in time. Select with ▶ key, edit number with ▲ key, proceed with enter .	0000 h (0000 ... 9999 h)

Configuration on the device

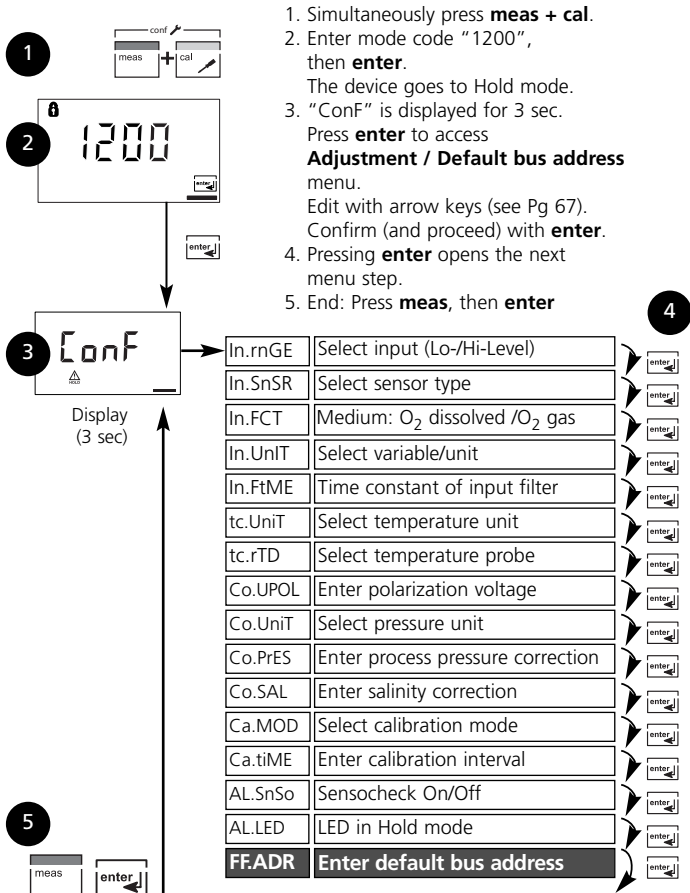
Alarm settings




Code	Display	Action	Choices								
AL.		<p>Sensocheck On/Off (continuous monitoring of sensor) Select with ► key. Proceed with enter With sensor type B Sensocheck must be switched off.</p>	ON / OFF								
		<p>LED in HOLD mode Select with ► key, edit number with ▲ key, proceed with enter.</p> <p>LED state:</p> <table border="1"> <thead> <tr> <th>Parameter setting</th> <th>Alarm</th> <th>HOLD</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>on</td> <td>flashes</td> </tr> <tr> <td>OFF</td> <td>flashes</td> <td>off</td> </tr> </tbody> </table>	Parameter setting	Alarm	HOLD	ON	on	flashes	OFF	flashes	off
Parameter setting	Alarm	HOLD									
ON	on	flashes									
OFF	flashes	off									

Configuration on the device

Adjustment / Default bus address



Code	Display	Action	Choices
FF.		<p>Only when there is <u>no</u> bus connection: The bus address can be manually adjusted from 0017 ... 0036. Select with ▶ key, edit number with ▲ key, proceed with enter.</p> <p>When the bus address has been changed, the device automatically restarts to re-initialize the bus parameters.</p>	<p>0026 (0017 ...0036)</p>

Adjusting a new default bus address

The Fieldbus Foundation automatically assigns an address. Therefore it is not required to manually adjust the bus address.

If the bus address has been changed, the bus configuration is reset to the default values during device restart. All bus parameters are set to their default values.

Note:

When the bus address has been changed, the bus configuration is automatically reset. All bus parameters are set to their default values. All individual settings have to be entered once more. The configuration must be reloaded into the device.

Calibration on the device

Calibration adjusts the device to the sensor.

Activate



Activate with **cal**



Enter mode code:

- 1001: Zero calibration
- 1100: Saturation/Concentration
Volume concentration (GAS)
- 1105: Product calibration
- 1015: Temperature probe adjustment

Change parameter with **▶** and **▲**,
confirm/continue with **enter**.

(End with **cal** and **enter**.)

Hold



During configuration the device remains in the Hold mode.



HOLD icon

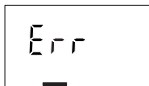
The last valid value (last usable value) is transmitted.

Measured value status = uncertain:
Last_usable_value.

Sensoface is off, "Calibration" mode indicator is on.

Red LED flashes when "HOLD ON" has been set.

Input errors



The calibration 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



End with **cal**.

Safety prompt:

The measured value and Hold are displayed alternately, "enter" flashes. Sensoface is active.



Press **enter** to end the Hold mode.

The measured value is displayed.

Measured value status = uncertain:
Last_usable_value. (HOLD icon is on, "hourglass" flashes).

Calibration

It is always recommended to calibrate in air.

Compared to water, air is a calibration medium which is easy to handle, stable, and thus safe. In the most cases, however, the sensor must be dismounted for a calibration in air.

When dealing with biotechnological processes which require sterile conditions, the sensor cannot be removed for calibration. Here, calibration must be performed with aeration directly in the process medium (e.g. after sterilization).

In the field of biotechnology, for example, often saturation is measured and calibration is performed in the medium for reasons of sterility.

For other applications where concentration is measured (water control etc.), calibration in air has proved to be useful.

Common combination: process variable / calibration mode

Measurement	Calibration
Saturation	Water
Concentration	Air (synthetic air)
Volume concentration	Air






The calibration procedures for these two common applications are described on the following pages. Of course, other combinations of process variable and calibration mode are possible.




Note:

When a 2-point calibration is required, the zero calibration should be performed prior to saturation or concentration calibration, resp (see Pg 78).

All calibration procedures must be performed by trained personnel.

Calibration to percent saturation (SAT)






Display	Action	Remark
	Activate calibration (Press cal.) Enter mode code 1100 Select with ▶ key, edit number with ▲ key, proceed with enter	Configuration: Select "DO", then set calibration mode to Sat. If an invalid code is entered, the device returns to measuring mode.
	Place sensor in calibration medium Start with enter	Welcome (3 sec) Device is in Hold mode
	Enter relative humidity Select with ▶ key, edit number with ▲ key, proceed with enter	Default for relative humidity in aqueous media: rH = 100 % (in air approx. 50 %)
	Enter calibration pressure Select with ▶ key, edit number with ▲ key, proceed with enter	Default for calibra- tion pressure is the process pressure configured
	Automatic drift check Display of sensor current (related to 25 °C and 1013 mbars normal pressure) and measuring temperature. The drift check might take some time.	Drift check can be stopped after > 10 sec by pressing cal (accuracy reduced).




Display	Action	Remark
	<p>Enter desired value for saturation</p> <p>Select with ▶ key, edit number with ▲ key, proceed with enter</p>	<p>Default: last value entered</p>
	<p>Display new slope and zero (related to 25 °C and 1013 mbars).</p> <p>End calibration with enter.</p>	
	<p>Place sensor in process.</p> <p>Safety prompt: The percent saturation is shown in the main display alternately with "Hold"; enter flashes. Sensoface is active. Stop Hold with enter.</p>	<p>After end of calibration, the outputs remain in Hold mode for approx. 20 sec.</p>

Information on saturation calibration (SAT)

- The calibration medium must be in equilibrium with air (percent saturation for water is 100 %). Oxygen exchange between water and air is very slow. To speed up the adjustment processes, make sure that there is a steady medium flow during calibration.
- If the percent saturation is known from a simultaneous measurement, it can be entered manually.
- For 2-point calibration, perform zero calibration first (see Pg 78).

Calibration to concentration (Conc)

Display	Action	Remark
	Activate calibration (Press cal.) Enter mode code 1100 (Press ▶ key to select position, enter number using ▲ key, confirm with enter)	Configuration: Select "DO", then set calibration mode to Conc. If an invalid code is entered, the device returns to measuring mode.
	Place sensor in air Start with enter	Device is in Hold mode
	Enter relative humidity (Press ▶ key to select position, enter number using ▲ key, confirm with enter)	Default for relative humidity in air: rH = 50 %
	Enter calibration pressure (Press ▶ key to select position, enter number using ▲ key, confirm with enter)	Default for calibra- tion pressure is normal pressure 1.013 bars.
	Automatic drift check Display of input current (related to 25 °C and 1013 mbars) and measuring temperature. The drift check might take some time.	Drift check can be stopped after > 10 sec by pressing cal (accuracy reduced).






Display	Action	Remark
	Enter default for concentration (Press ▶ key to select position, enter number using ▲ key, confirm with enter)	Default value is calculated from rel. humidity, cal pressure, and cal temperature. (The unit of measure- ment, ppm or mg/l, ... is preset during configuration.)
	Display of new slope and zero (related to 25 °C and 1013 mbars) Press enter to end concentra- tion calibration.	
	Place sensor in process. Safety prompt: The new value is shown in the main display alternately with "Hold"; "enter" flashes. Sensoface is active. End with enter .	After end of calibra- tion, the outputs remain in Hold mode for approx. 20 sec.



Information on concentration calibration (Conc)

- Calibration in air. This calibration method is recommended when the sensor can be removed for calibration. Air has a stable oxygen content. Therefore the adjustment processes during calibration run more quickly.
- For 2-point calibration, perform zero calibration first (see Pg 78).

Calibration to volume concentration (GAS)

Cal medium: Air

Display	Action	Remark
	Activate calibration (Press cal .) Enter mode code 1100 (Press ▶ key to select position, enter number using ▲ key, confirm with enter)	Configuration: Gas is selected as medium (select "GAS") If an invalid code is entered, the device returns to measuring mode.
	Place sensor in air	Welcome (3 sec) Device is in Hold mode
	Enter relative humidity (Press ▶ key to select position, enter number using ▲ key, confirm with enter)	Default for relative humidity in air: rH = 50 %
	Enter calibration pressure (Press ▶ key to select position, enter number using ▲ key, confirm with enter)	Default for calibra- tion pressure is normal pressure 1.013 bars.
	Automatic drift check of input current (related to 25 °C and 1013 mbars) and measuring temperature. The drift check might take some time.	Drift check can be stopped after > 10 sec by pressing cal (accuracy reduced).

Display	Action	Remark
	<p>Display of new slope and zero (related to 25 °C and 1013 mbars)</p> <p>Press enter to end concentration calibration.</p>	
	<p>Place sensor in process. Safety prompt: The new value is shown in the main display alternately with "Hold"; "enter" flashes. Sensoface is active. Stop Hold with enter.</p>	<p>After end of calibration, the outputs remain in Hold mode for approx. 20 sec.</p>

Information on calibration

- For 2-point calibration, perform zero calibration first (see Pg 78).

Product calibration

Calibration with sampling


1. The type of product calibration (SAT, Conc, Volume concentration) is selected during configuration.
2. For product calibration via Foundation Fieldbus, see Pg 90.








During product calibration the sensor remains in the process. The measurement process is only interrupted briefly.

Procedure: During sampling the currently measured value is stored in the Stratos. The device immediately returns to measuring mode. The calibration mode indicator flashes and reminds you that calibration has not been terminated. The comparison value is measured on the site, e.g. using a portable DO meter in a bypass. This value is then entered in the Stratos. The new value for slope or zero is calculated from the stored value and the comparison value. From the measured value, the device automatically recognizes whether a new slope or zero must be calculated (above approx. 5 % saturation: slope, below: zero).

If the sample is invalid, you can take over the measured value stored during sampling instead of the comparison value. In that case the old calibration values remain stored. Afterwards, you can start a new product calibration.

The following describes a product calibration with slope correction – a product calibration with zero correction is performed correspondingly.


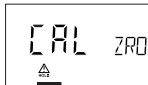
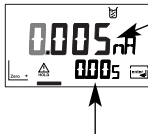


Display	Action	Remark
	<p><u>Product calibration step 1:</u> Activate calibration (Press cal key). Enter mode code 1105 Select with ▶ key, edit number with ▲ key. Proceed with enter)</p>	<p>The type of product calibration (SAT, Conc, Volume conc) is selected during configuration.</p>

Display	Action	Remark
	Welcome text	Display for approx. 3 sec
	Take sample and store the currently measured value. Proceed with enter	Now the comparison value must be determined. The Stratos goes to measuring mode.
	Measuring mode	From the flashing CAL mode indicator you see that product calibration has not been terminated.
	Product calibration 2nd step: When a comparison value has been determined, call up the product calibration once more (cal key, mode code 1105).	Display (approx. 3 sec)
	Enter the comparison value. Confirm with enter .	New calibration: Press cal key.
	Display of new slope and zero point (related to 25 °C at 1013 mbars) End calibration with enter	
	The measured value is shown in the main display alternately with "Hold". "enter" flashes, Sensoface is active. Stop Hold with enter .	Safety prompt After end of calibration, the outputs remain in Hold mode for approx. 20 sec.




Zero calibration



Zero calibration

The sensor models SE 704, SE 705 and InPro6000 have a very low zero point current. Therefore, a zero point calibration is only recommended for measurement of oxygen traces. If a zero calibration is performed, the sensor should remain for at least 10 to 30 minutes (InPro6900 at least 60 minutes) in the calibration medium in order to obtain stable, non-drifting values. During zero point calibration, a drift check is not performed. Zero point current of a properly functioning sensor is notably less than 0.5 % of air current. The display (secondary: measured value, main: entered value) does not change until an input current is entered for the zero point. When measuring in an oxygen-free medium, the displayed current can be taken directly.


Display	Action	Remark
	<p>Activate calibration (Press cal key). Enter mode code 1001 Select with ▶ key, edit number with ▲ key, proceed with enter</p>	<p>Stratos is in the Hold mode. If an invalid code is entered, the device returns to measuring mode.</p>
	<p>Place sensor in oxygen-free medium</p>	<p>Welcome (3 sec)</p>
	<p>Main display: Zero point current; store with enter or correct with arrow keys and then store with enter. Lower display: Sensor current measured</p>	
	<p>Display of slope Display of new zero point current End calibration with enter key, place sensor in process</p>	
	<p>The oxygen value is shown in the main display alternately with "Hold", "hourglass" and "enter" are flashing. Sensoface is active.</p> <p>Stop Hold with enter.</p>	<p>Safety prompt</p> <p>The outputs remain in Hold mode for approx. 20 sec.</p>

Temp probe adjustment

Display	Action	Remark
	Activate calibration (Press cal key). Enter mode code 1015 Select with ▶ key, edit number with ▲ key, proceed with enter	Wrong settings change the measurement properties! If an invalid code is entered, the device returns to measuring mode.
	Ready for calibration	Stratos is in the Hold mode. Display for approx. 3 sec
	Measure the temperature of the process medium using an external thermometer. Enter measured temperature value: Select with ▶ , edit number with ▲ , proceed with enter . End adjustment with enter . HOLD will be deactivated after 20 sec.	Default: Current value of secondary display



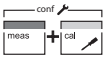

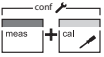

Symbol flashes:	Problem, possible cause
	<p>Slope out of range</p> <ul style="list-style-type: none"> • Wrong calibration values specified (relative humidity, pressure, saturation, concentration) • Wrong calibration medium
 <p>In addition "CAL Err" flashes. is flashing</p>	<p>Calibration aborted after 12 minutes</p> <ul style="list-style-type: none"> • Sensor defective or dirty • No electrolyte in the sensor • Sensor cable insufficiently shielded or defective • Strong electric fields influence the measurement • Temperature fluctuation of calibration solution

Measurement

Display	Remark
	<p>In the measuring mode the main display shows the configured process variable (% , mg/l, or ppm) and the lower display the temperature.</p> <p>During calibration you can return to measuring mode by pressing the cal, then the enter key, during configuration by pressing meas, then enter.</p> <p>(Waiting time for measured value stabilization approx. 20 sec).</p>

Cleaning

To remove dust, dirt and spots, the external surfaces of the device may be wiped with a damp, lint-free cloth. A mild household cleaner may also be used if necessary.

Display	Remark
 <p>Code: 0000</p> 	<p>Cal info Display of calibration data</p> <p>Press cal while in measuring mode and enter mode code "0000". The slope is shown in the main display, the zero current in the secondary display.</p> <p>After 20 sec the device returns to measuring mode (immediate return at pressing enter).</p>
 <p>Code: 2222</p> 	<p>Sensor monitor Display of sensor current</p> <p>(Sensor monitoring for validation of sensor and complete measured-value processing)</p> <p>Press meas + cal while in measuring mode and enter mode code "2222".</p> <p>The (uncompensated) sensor current is shown in the main display, the measuring temperature in the secondary display.</p> <p>Press enter to return to measurement.</p>
 <p>Code: 0000</p> 	<p>Error Info Display of last error message</p> <p>Press meas + cal while in measuring mode and enter mode code "0000". The last error message is displayed for approx. 20 sec. After that the message will be deleted (immediate return to measurement at pressing enter).</p>

Sensoface












(Sensochek must have been activated during configuration.)

The smiley in the display (Sensoface) alerts to sensor problems (defective cable, maintenance request).

The permitted calibration ranges and the conditions for a friendly, neutral, or sad Sensoface are summarized in the following chart. Additional icons refer to the error cause.

Replace membrane module or filling solution, if required.














Type A sensors (SE 704, SE 705, SE 706
InPro6000 ... 6800)

	Slope	Zero point	Response time	Cal timer
Adm. range	25 ... 130 nA	-2 ... +2 nA	max. 720 s	
	> 35 ... < 90 nA	> -0.3 ... < 0.3 nA	≤ 300 s	≤ 80 % expired
	 30 ... 35 nA or 90 ... 110 nA	 -0.6 ... -0.3 nA or +0.3 ... +0.6 nA	 300 ... 600 sec	 80 ... ≤ 100 % expired
	 < 30 nA or > 110 nA	 < -0.6 nA or > +0.6 nA	 > 600 s	 Timer expired


Note

The worsening of a Sensoface criterion leads to the devaluation of the Sensoface indicator (Smiley becomes "sad"). An improvement of the Sensoface indicator can only take place after calibration or removal of a sensor defect.

Type B sensor (SE 707, InPro6900)

	Slope	Zero point	Response time	Cal timer
Adm. range	200 ... 550 nA	-2 ... +2 nA	max. 720 s	
	> 250 ... < 500 nA	> -0,5 ... < 0.5 nA	< 300 s	< 80 % expired
 <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>220 ... 250 nA or 460 ... 525 nA</p> </div> </div>	<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>-1.0 to -0.5 nA or +0.5 ... +1.0 nA</p> </div> </div>			80 ... ≤ 100 % expired
 <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>< 220 nA or > 525 nA</p> </div> </div>	<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>< -1.0 nA or > +1.0 nA</p> </div> </div>			Timer expired
  Thermometer and Sensoface: Temperature out of concentration or saturation range				

Sensocheck

Continuously monitors the sensor and leads for short circuits or open circuits. Critical values make the Sensoface "sad" and the corresponding icon flashes: 

The Sensocheck message is also output as error message Err 33.

Sensocheck can be switched off during configuration (then Sensoface is also disabled). Exception: After a calibration a Smiley is always displayed for confirmation.

Block status

The RS_STATE parameter indicates the operating status of the resource block:

- Standby The resource block is in OOS mode. The other blocks cannot be executed.
- Online The resource block is in Auto mode, that is normal state.

Write protection

With the WRITE_LOCK parameter, you can set a write protection for the device.

- UNLOCKED Device can be written to (default)
- LOCKED Device is locked.

Key lock

With the DEVICE_LOCK parameter, you can set a key lock.

- UNLOCKED Device can be operated via keypad.
- LOCKED Key lock is active.

Alarms

The BLOCK_ALM parameter sends the status of the process alarms to the control system. This parameter specifies whether an alarm must be acknowledged via the control system.

For bus parameters of resource block, see Pg 88.

Communication Fieldbus / Device

Bus Parameters Resource block (RB)

Index	Parameter	Description	Default	R/W
1	ST_REV	Static revision	0	R
2	TAG_DESC	TAG description	'	R/W
3	STRATEGY	Strategy	0	R/W
4	ALERT_KEY	Alert key	0	R/W
5	MODE_BLK	Target	OOS	R/W
		Actual	-	
		Permitted	OOS, Auto	
		Normal	Auto	
6	BLOCK_ERR	Block error		R
7	RS_STATE	Resource state	1	R
8	TEST_RW	Test		R/W
9	DD_RESOURCE	DD resource	'	R
10	MANUFAC_ID	Manufacturer ID	0x000102 for Knick	R
11	DEV_TYPE	Device type	2231	R
12	DEV_REV	Device revision	1	R
13	DD_REV	DD revision	1	R
14	GRANT_DENY	Grant	0	R/W
		Deny	0	R/W
15	HARD_TYPES	Hardware type	1	R
16	RESTART	Restart		R/W
17	FEATURES	Feature supported	Reports/ Soft W Lock	R
18	FEATURES	Feature selected	Reports/ Soft W Lock	R/W
19	CYCLE_TYPE	Cycle type	Scheduled/ Block Execution	R
20	CYCLES_SEL	Cycle selected	Scheduled/ Block Execution	R/W
21	MIN_CYCLE_T	Min cycle time	1600 1/32 msec (50ms)	R
22	MEMORY_SIZE	Memory size		R
23	NV_CYCLE_T	Non-volatile cycle time		R

Index	Parameter	Description
42	DEVICE_LOCK	Locks the device for local access.

Index	Parameter	Description	Default	R/W
24	FREE_SPACE	Free space		R
25	FREE_TIME	Free time		R
26	SHED_RCAS			R/W
27	SHED_ROUT			R/W
28	FAULT_STATE	Fault state		R
29	SET_FSTATE	Set fault state	1	R/W
30	CLR_FSTATE	Clear fault state	1	R/W
31	MAX_NOTIFY	Max notifications	20	R
32	LIM_NOTIFY	Limit of notification	8	R/W
33	CONFIRM_TIME	Confirmation time	640000 1/32ms	R/W
34	WRITE_LOCK	Write locking	1 (Unlocked)	R/W
35	UPDATE_EVT	Unacknowledged	0	R/W
		Update state	0	R
		Time stamp	0	R
		Static revision	0	R
		Relative index	0	R/W
36	BLOCK_ALM	Unacknowledged		R/W
		Alarm state		R
		Time stamp		R
		Sub-code		R
		Value		R
37	ALARM_SUM	Current		R
		Unacknowledged		R
		Unreported		R
		Disabled		R/W
38	ACK_OPTION	Automatic acknowledge option	0 (Disabled)	R/W
39	WRITE_PRI	Write priority	0	R/W
40	WRITE_ALM	Unacknowledged		R/W
		Alarm state		R
		Time stamp		R
		Sub-code		R
		Value		R
41	ITK_VER	ITK_version	4	R

Default Value	R/W	Bytes	Data type	Range
0 = Unlocked	R/W	1	uns8	0 = Unlocked 1 = Locked

Communication Fieldbus / Device

Transducer Block (TB)

Configuration

In the Transducer Block you can configure the device via Fieldbus. The required parameters are listed in the table on Pg 92.

Calibration

Depending on the configuration the product calibration for SAT, CONC, or volume concentration can be performed via Fieldbus using 3 parameters.

Product calibration CONC/ SAT of dissolved oxygen

Configuration for CONC:

PRIMARY_VALUE_TYPE = DO_mg/l, DO_μg/l, DO_ppm,
DO_ppb

APPLICATION = "Dissolved oxygen"

CALIBRATION_MODE = Conc

Configuration for SAT:

PRIMARY_VALUE_TYPE = DO_%

APPLICATION = "Dissolved oxygen"

CALIBRATION_MODE = Sat

1. Set CAL_SAMPLE_PRD parameter to Sample.
The device stores the conc value of the sample.
After the writing, the parameter is automatically reset to NOP.
2. Read out CAL_SAMPLE_PRD_STORED_VAL parameter.
It contains the stored value.

3. Write lab value of the sample in the CAL_PRODUCT parameter. The CAL_SAMPLE_PRD_STORED_VAL parameter is reset to zero. Now the device is calibrated.

Note:

When step 1 has been performed directly on the site on the device, the operation on the Fieldbus as described in point 1 is omitted.

Product calibration of gaseous oxygen via Fieldbus

Configuration for CONC/SAT:

PRIMARY_VALUE_TYPE = GAS_ppm or GAS_%

APPLICATION= "measurement in gases"

Procedure as with dissolved oxygen steps 1 to 3.

The calibration values can also be entered directly in the CAL_HIGH, CAL_ZERO parameters.

Error messages

The LAST_ERROR parameter always indicates the last error:

01	Measurement range violation
02	Measurement range violation
03	Temperature probe
33	Membrane defective
98	System error
99	Factory settings

If now a "bad" status occurs for the OUT_Value in the Analog Input, the user can take this parameter to draw conclusions about the problem.

For bus parameters of transducer block, see Pg 92.

Communication Fieldbus / Device

Bus Parameters of Standard Transducer Block (TB)

Index	Parameter	Description
1	ST_REV	The revision of the static data associated with the function block. Used by the host to determine when to re-read the static data.
2	TAG-DESC	The user description of the intended application of the block.
3	STRATEGY	The strategy field can be used to identify a grouping of blocks. Can be used for any purpose by the user.
4	ALERT_KEY	Identification number that may be used by the host system to sort alarms and other device information.
5	MODE_BLK	Allows the user to set the Target, Permitted, and Normal device mode. Displays the Actual mode. Target Actual Permitted Normal
6	BLOCK_ERR	Reflects the error status associated with the hardware or software of the block. It is a bit string so multiple errors may be shown.
7	UPDATE_EVENT	Unacknowledged Update State Time Stamp Static Rev Relative Index
8	BLOCK_ALM	Unacknowledged Alarm State Time Stamp Subcode Value
9	TRANSDUCER_DIRECTORY	Directory that specifies the number and the starting indices of the transducers in the transducer block.

	Default Value	R/W	Bytes	Data type	Range
	The revision value is incremented every time a static parameter in the block is changed.	R	2		
	Text	R/W	32		
	0	R/W	2		
	0	R/W	1		
	Available Modes: Automatic, Out Of Service (OOS), Manual	R/W R R/W R/W	1 1 1 1		
		R	2		
	0 0 0 0 0	R	1 1 8 2 2		
	0 0 0 0 0	R	1 1 8 2 1		
		R	4		

Communication Fieldbus / Device

Bus Parameters of Standard Transducer Block (TB)

Index	Parameter	Description
10	TRANSDUCER_TYPE	Identifies the transducer type.
11	XD_ERROR	A transducer block sub-code. XD_ERROR contains the highest priority alarm that has been activated in the TB_DETAILED_STATUS parameter.
12	COLLECTION_DIRECTORY	A directory that specifies the number, starting indices, and DD item of ID's of the data collection in each transducer within a transducer block. Used by the host for efficient transfer of information.
Knick-Specific Parameters – Output		
13	INPUT_RANGE	Selects the connection of the sensor
14	POLARIZATION_VOLTAGE	Sets the polarization voltage
15	SENSOR_TYPE	Selects the used sensor type.
16	APPLICATION	Selects the measurement method (DO/ GAS)
17	PRIMARY_VALUE	Shows the primary value and status Value Status
18	PRIMARY_VALUE_TYPE	Selects the displayed primary value depending on the selected measuring method in APPLICATION parameter
19	FILTER_TIME	Sets the filter time of the input filter

	Default Value	R/W	Bytes	Data type	Range
	65535 = other	R	2		
	0	R	1		
		R	36		
	1 = HI_LEVEL	R/W	2	uns 16	0 = LO_LEVEL 1 = HI_LEVEL
	-675mV	R/W	4	float	-1000 ... 0
	0 = Standard	R/W	2	uns 16	0 = Standard 1 = Traces
	0 = Dissolved oxygen	R/W	2	uns16	0 = Dissolved oxygen 1 = Measurement in gases
		R	4 1	DS-65	
	DO : DO_% GAS : GAS_ppm	R/W	2	uns16	0 = DO_% 1 = DO_mg/l 2 = DO_µg/l 3 = DO_ppm 4 = DO_ppb 5 = GAS_ppm 6 = GAS_%
	0s	R/W	2	uns16	0...120

Communication Fieldbus / Device

Bus Parameters of Standard Transducer Block (TB)

Index	Parameter	Description	
20	IMPEDANCE	Shows the impedance of the sensor	
21	SENSOR_CURRENT	Shows the momentary current of the sensor	
Knick-Specific Parameters – Temperature			
22	SECONDARY_VALUE_2	Process temperature value and status Value Status	
23	SECONDARY_VALUE_UNIT_2	Degree C or degree F. Changes the unit of temperature being displayed and transmitted.	
24	TEMP_SENSOR_TYPE	Type of temperature sensor. The value entered must correspond to the temp. sensor being used.	
25	TEMP_WIRE_IMPEDANCE	Sets the wire impedance of the temp sensor. Typically 0 unless the wire of the sensor gets too long	
26	TEMP_SENSOR_CAL	Desired temperature reading, used for temperature measurement calibration.	
Knick-Specific Parameters – Concentration/Saturation			
27	PROCESS_PRESSURE_UNIT	Selects the process pressure measurement unit	
28	PROCESS_PRESSURE	Sets the process pressure	
29	SALINITY	Sets the salinity value	

	Default Value	R/W	Bytes	Data type	Range
		R	4	float	
		R	4	float	
		R R	4 1	DS- 65	
	1001 = °C	R/W	2	uns16	1001 = °C 1002 = °F
	1000 = NTC30	R/W	2	uns16	1000 = NTC30 1002 = NTC22
	0 Ohm	R/W	4	float	
	0	R/W	4	float	-10 ... +10K
	1137 = BAR	R/W	2	uns16	1133 = kPa 1137 = BAR 1141 = PSI
	1.013 BAR	R/W	4	float	0...9.999 BAR 0...999.9 kPa 0...145 PSI
	0 g/kg	R/W	4	float	0...45 g/kg

Communication Fieldbus / Device

Bus Parameters of Standard Transducer Block (TB)

Index	Parameter	Description	
Knick-Specific Parameters – Calibration			
30	CALIBRATION_MODE	Sets the calibration mode	
31	CAL_HIGH	The slope of the Oxy electrode in Ampere	
32	CAL_ZERO	The zero offset resulting from a calibration in Ampere	
33	CAL_SETTLINGTIME	Shows the settling time in seconds	
34	CAL_RH	Shows the relative humidity in %	
35	CAL_PRESSURE	Shows the pressure	
36	CAL_TEMP	Shows the temperature which was used during calibration	
37	CAL_VALUE_SAT	Shows the value of saturation calibration	
38	CAL_VALUE_CONC	Shows the value of concentration calibration	
39	CALIBRATION_TIMER	Sets the calibration timer (time in which the device should be calibrated).	
40	CAL_SAMPLE_PRD	Starts the 1st part of Oxy product calibration.	
41	CAL_SAMPLE_PRD_STORED_VAL	Shows the stored value of the first step of Oxy product calibration	
42	CAL_PRODUCT	Sets the value for the 2nd part of Oxy product calibration.	

Default Value	R/W	Bytes	Data type	Range
0 = Sat	R/W	1	uns8	0 = Sat 1 = Conc
60 E-9A	R/W	4	float	30 ... 110 Sensor A 220 ... 525 Sensor B
0 E-9A	R/W	4	float	-2 ... +2
0 s	R	4	float	
	R	4	float	
	R	4	float	
	R	4	float	
	R	4	float	
0000 h = disable	R/W	4	float	000...9999h
0 = Nop	R/W	1	uns8	0 = Nop 1 = Sample
0 if step 1 of product calibration was not started	R	4	float	
	R/W	4	float	

Communication Fieldbus / Device

Bus Parameters of Standard Transducer Block (TB)

Index	Parameter	Description	
Knick-Specific Parameters – Alert			
43	HOLD	Sets the device to HOLD mode	
44	SENSOCHECK	Enables or disables Sensocheck.	
45	ALARM_LED_MODE	Sets the LED to HOLD mode.	
46	LAST_ERROR	Shows the last error.	
47	SENSOFACE_STATUS	Shows the current status of the Sensoface.	
Knick-Specific Parameters – Identification and Local Parameter Setting			
48	SW_REV_LEVEL	Software revision number	
49	HW_REV_LEVEL	Hardware revision number	

	Default Value	R/W	Bytes	Data type	Range
	0 = Off	R/W	1	uns8	0 = Off 1 = On
	0 = Off	R/W	1	uns8	0 = Off 1 = On
	0 = Off	R/W	1	uns8	0 = Off 1 = On
	0 = None	R	2	uns16	0...100
	0 = Good	R	1	uns8	0 = Good 1 = Neutral 2 = Bad
		R	2	uns16	
		R	1	uns8	

Communication Fieldbus / Device

Analog Input Blocks (AI) of Stratos FF 2231 X Oxy

Setting the operating mode

The following operating modes can be set in the MODE_BLK parameter:

- OOS
- MAN
- Auto

When there is no write protection, the OOS mode allows unlimited access to all parameters.

Selecting the process variables and units

The Stratos FF 2231 X Oxy provides 3 Analog Input blocks. The respective process variable can be selected in the CHANNEL parameter.

The corresponding measurement unit is selected in the UNITS subparameter of the XD_SCALE parameter.

The following variables are available:

CHANNEL	Function	Unit	Unit_Value
1	Saturation	% percent	1342
2	Concentration	mg/l µg/l ppm ppb	2001 2002 1423 1424
3	Temperature	°C °F	1001 1002
4	Zero	A	1209
5	Slope	A	1209
6	Volume concentration	% percent ppm	1342 1423

Linearization types

The input value can be linearized in the AI with the LIN_TYPE parameter:

- **Direct:**

The measured value is directly led from the Transducer block to the Analog Input block, avoiding the linearization function. Here, you must make sure that the units in the XD_SCALE and OUT_SCALE parameters are identical.

- **Indirect**

Here, the measured value of the TB is linearly scaled over the input scale (XD_SCALE) to the output scale (OUT_SCALE).

- **Indirect Square Root**

The input value is rescaled over the XD_SCALE parameter and recalculated using a root function. Then the value is further scaled to OUT_SCALE.

Diagnostics

The BLOCK_ERR parameter indicates the current block status.

Communication Fieldbus / Device

Analog Input Blocks (AI) of Stratos FF 2231 X Oxy

Alarm handling

The process control system receives the alarm status via the BLOCK_ALM parameter. In the ACK_OPTION parameter you specify whether an alarm must be acknowledged via the control system.

Block alarms

An AI can generate the following block alarms via the BLOCK_ERR parameter:

- Simulate Active
- Block Configuration Error
- Input Failure
- Out Of Service

Limit alarms

If an OUT measured value falls below or exceeds the defined limit, the control system is alerted.

The following limit parameters are defined:

- HI_HI_LIM
- LO_LIM
- HI_LIM
- LO_LO_LIM

The behavior is defined by the respective priorities.

Examples of alarm handling in the Stratos FF 2231 X Oxy

Example 1: Device failure ERR 99

During measurement a device failure occurs.

The measured value is given the BAD_DEVICE_FAILURE status. The BLOCK_ERROR parameter (Diagnostics parameter of AI) changes to INPUT_FAILURE. The Analog Input Block generates the "Input Failure" block alarm.

When the LAST_ERROR parameter is read out in the Transducer Block, the Err99 error is detected.

Measure: Replace device.

Example 2: Calibration timer expired

(Prerequisite: The CALIBRATION_TIMER parameter has been set to a value > 0 or the cal timer interval has been preset on the device to a time > 0 s.) If the calibration timer has expired, the measured-value status changes to

UNCERTAIN_SENSOR_CONVERSION_NOT_ACCURATE

(see Pg 114). To see how far the calibration timer has expired, the SENSOFACE_STATUS parameter can be read out in the TB (Good, Neutral = 80% expired, Bad = 100% expired).

Measure: Calibration

Example 3: Slope error

After a product calibration the measured value is given the UNCERTAIN_SENSOR_CONVERSION_NOT_ACCURATE status (Zero and/or slope and/or response of the sensor are not okay (see Pg 114).

Measure: Replace sensor.

Alarm diagnostics / Bus parameters

In the case of an alarm the following bus parameters must be evaluated:

- AI block OUT parameter (currently measured value)
- TD LAST_ERROR parameter (error indication 1 ... 100)
- TD SENSOFACE_STATUS parameter
(0 = Good, 1 = Neutral, 2 = Bad)


Communication Fieldbus / Device Bus Parameters / Analog Input Blocks (AI)

Index	Parameter	Description	Default	R/W
1	ST_REV	Static Revision	0	R
2	TAG_DESC	TAG Description		R/W
3	STRATEGY	Strategy	0	R/W
4	ALERT_KEY	Alert Key	0	R/W
5	MODE_BLK	Target	OOS	R/W
		Actual	-	
		Permitted	OOS, Auto	
		Normal	Auto	
6	BLOCK_ERR	Block Error		R
7	PV	Process Value		R
		Status		R
8	OUT	Measured Value		R
		Status		R
9	SIMULATE	Simulate Status		R/W
		Simulate Value		R/W
		Transducer Status		R
		Transducer Value		R
		Simulate Enable/ Disable		R/W
10	XD_SCALE	High Range	100	R/W
		Low Range	0	R/W
		Units Index	0	R/W
		Decimal Point	0	R/W
11	OUT_SCALE	High Range	100	R/W
		Low Range	0	R/W
		Units Index	0	R/W
		Decimal Point	0	R/W
12	GRANT_DENY	Grant	0	R/W
		Deny	0	R/W
13	IO_OPTS	IO Block Options	0	R/W
14	STATUS_OPTS	Status Options		
15	CHANNEL	Channel	1	R/W
16	L_TYPE	Linearization Type	0	R/W
17	LOW_CUT	Low Cut Off	0	R/W
18	PV_TIME	Filter Time	0	R/W
19	FIELD_VAL	Percent Value		R
		Status		R
20	UPDATE_EVT	Unacknowledged	0	R/W
		Update State	0	R
		Time Stamp	0	R
		Static Revision	0	R
		Relative Index	0	R

Index	Parameter	Description	Default	R/W
21	BLOCK_ALM	Unacknowledged	0	R/W
		Alarm State	0	R
		Time Stamp	0	R
		Subcode	0	R
22	ALARM_SUM	Current	0	R
		Unacknowledged	0	R
		Unreported	0	R
		Disabled	0	R/W
23	ACK_OPTION	Automatic Acknowledge Option	0	R/W
24	ALARM_HYS	Alarm Hysteresis	0.50%	R/W
25	HI_HI_PRI	High High Priority	0	R/W
26	HI_HI_LIM	High High Limit	INF	R/W
27	HI_PRI	High Priority	0	R/W
28	HI_LIM	High Limit	INF	R/W
29	LO_PRI	Low Priority	0	R/W
30	LO_LIM	Low Limit	- INF	R/W
31	LO_LO_PRI	Low Low Priority	0	R/W
32	LO_LO_LIM	Low Low Limit	- INF	R/W
33	HI_HI_ALM	Unacknowledged	0	R/W
		Alarm State	0	R
		Time Stamp	0	R
		Subcode	0	R
		Value	0	R
34	HI_ALM	Unacknowledged	0	R/W
		Alarm State	0	R
		Time Stamp	0	R
		Subcode	0	R
		Value	0	R
35	LO_ALM	Unacknowledged	0	R/W
		Alarm State	0	R
		Time Stamp	0	R
		Subcode	0	R
		Value	0	R
36	LO_LO_ALM	Unacknowledged	0	R/W
		Alarm State	0	R
		Time Stamp	0	R
		Subcode	0	R
		Value	0	R

Communication Fieldbus / Device

Cyclic measured value status

Priority	Quality	Sub-status	Bin-coding without limit bits	Hex-coding
Low  High	Good	Good Non-Specific	10 00 00 00	0 x 80
		Good Active Advisory Alarm	10 00 10 xx	0 x 88
		Good Active Critical Alarm	10 00 11 xx	0 x 8C
	Uncertain	Uncertain Non-Specific	01 00 00 xx	0 x 40
		Last Usable Value (LUV)	01 00 01 xx	0 x 44
		Substitute Set	01 00 10 xx	0 x 48
		Initial Value	01 00 11 xx	0 x 4C
		Sensor Conversion Not Accurate	01 01 00 xx	0 x 50
		Engineering Unit Violation	01 01 01 xx	0 x 54
		Sub-Normal	01 01 10 xx	0 x 58
	Bad	Non-Specific	00 00 00 xx	0 x 00
		Sensor Failure	00 01 00 xx	0 x 10
		Device Value	00 00 11 xx	0 x 0C
Out of Service		00 01 11 xx	0 x 1C	

The respective status bit is set when the condition occurs. It is reset as soon as the condition does not exist any more.

Measured-value limits: Limit bits

Bin-coding of limit bits	Meaning of limit bits
00	ok
01	Low limited
10	High limited
11	constant

When the measured-value status is "BAD", the AI block BLOCK_ERR parameter indicates an "Input Failure".

Operating states / Measured value status

Operating state (Activation)	Red LED	Time out	Status AI 1
Measuring	live	-	good
Cal Info (cal) 0000	live	20 sec	good
Error Info (meas + cal) 0000	live	20 sec	good
Configuration (meas + cal) 1200	Hold ¹⁾	20 min	uncertain last usable value
Calibration (cal) 1001	Hold ¹⁾	-	uncertain last usable value
Calibration (cal) 1100	Hold ¹⁾	-	uncertain last usable value
Temp probe adjust- ment (cal) 1015	Hold ¹⁾	-	uncertain last usable value
Product calibration (SAT + Conc) Step 1 (cal) 1105	live	-	good
Step 2 (cal) 1105	Hold ¹⁾	-	uncertain last usable value
Sensor monitor (meas + cal) 2222	Hold ¹⁾	20 min	good

1) LED flashes when "HOLD ON" has been set (see Pg 65).






	Status AI 2	Status AI 3
	good	good
	good	good
	good	good
	uncertain last usable value	uncertain last usable value
	uncertain last usable value	uncertain last usable value
	uncertain last usable value	uncertain last usable value
	uncertain last usable value	uncertain last usable value
	good	good
	uncertain last usable value	uncertain last usable value
	good	good

Error messages / Measured value status

Error	Display	Problem Possible causes	Sensoface	Red LED
ERR 99	"FAIL" flashes	Factory settings EEPROM or RAM defective This error message only occurs in the case of a total defect. The device must be repaired and recalibrated at the factory.		X
ERR 98	"Conf" flashing	System error Configuration or calibration data defective; completely reconfigure and recalibrate the device. Memory error in device program		X
ERR 01	Measured value flashes	Sensor defective, wrong sensor connected, measurement range exceeded <u>With "DO" selected:</u> SAT range Lo level: < 0; > 120 % Hi level: < 0; > 500 %		X
		<u>With "GAS" selected:</u> Volume conc range Lo level: < 0; > 9999 ppm < 0; > 120% Hi level: < 0; > 9999 ppm < 0; > 120%		X
ERR 02	Measured value flashes	Sensor defective, wrong sensor, measurement range exceeded <u>Only with "DO" selected:</u> Conc range Lo level: < 0; > 9999 ppb / µg/l < 0; > 9.999 ppm / mg/l Hi level: < 0; > 50 ppm / mg/l		X

	Status AI Sat	Status AI Conc	Status AI Temp	Status Volume Concentration	Status AI Zero	Status AI Slope
	bad device_ failure	bad device_ failure	bad device_ failure	bad device_ failure	bad device_ failure	bad device_ failure
	bad device_ failure	bad device_ failure	bad device_ failure	bad device_ failure	bad device_ failure	bad device_ failure
	bad sensor_ failure	good	good	-	good	good
			good	bad sensor_ failure	good	good
	good	bad sensor_ failure	good	-	good	good

Error messages / Measured value status

Error	Display	Problem Possible causes	Sensoface	Red LED	
ERR 03	 flashes	Temperature range Open or short circuit Temperature range exceeded: Temperature input: < -20 ... > +150.0°C < -4 ... > +302°F		X	
ERR 33	 flashes	Sensocheck Sensor: Connecting cable defective see Pg 84	X	X	
	 flashes	Zero point error see Pg 84		X	
	 flashes	Slope error see Pg 84		X	
	 flashes	Cal timer exceeded see Pg 84		X	

	Status AI Sat	Status AI Conc	Status AI Temp	Status Volume Concentration	Status AI Zero	Status AI Slope
	bad Sensor_ failure	bad Sensor_ failure	bad Sensor_ failure	bad Sensor_ failure	good	good
	bad 1) Sensor_ failure	bad 1) Sensor_ failure	bad 1) Sensor_ failure	bad 1) Sensor_ failure	good	good
	uncertain Sensor_ conversion_ not _accurate	uncertain Sensor_ conversion_ not _accurate	uncertain Sensor_ conversion_ not _accurate	uncertain Sensor_ conversion_ not _accurate	bad Sensor_ failure	good
	uncertain Sensor_ conversion_ not _accurate	uncertain Sensor_ conversion_ not _accurate	uncertain Sensor_ conversion_ not _accurate	uncertain Sensor_ conversion_ not _accurate	good	bad Sensor_ failure
	2) uncertain Sensor_ conversion_ not _accurate	2) uncertain Sensor_ conversion_ not _accurate	2) uncertain Sensor_ conversion_ not _accurate	2) uncertain Sensor_ conversion_ not _accurate	2) uncertain Sensor_ conversion_ not _accurate	2) uncertain Sensor_ conversion_ not _accurate

- 1) When Sensocheck has been set to "ON"
 2) When cal timer \neq 0000 h

Appendix

Product line and accessories

Devices	Order no.
---------	-----------

Stratos FF 2231 X Oxy	2231 X Oxy
-----------------------	------------

Mounting accessories

Pipe-mount kit	ZU 0274
----------------	---------

Panel-mount kit	ZU 0275
-----------------	---------

Protective hood	ZU 0276
-----------------	---------

For more information concerning our sensors and fittings product line please refer to our website or request our "Sensors, Fittings, Accessories" catalog:

Phone: +49 (0)30 - 801 91 - 0

Fax: +49 (0)30 - 801 91 - 200

E-mail: knick@knick.de

The Device Description (DD file) and the Common File Format (CFF file) for network projecting are included in the shipment.

They can also be downloaded at:

<http://www.knick.de>

O₂ input

Sensor Type A:	SE 704 / SE 705 / SE 706 (InPro6000 ... 6800) Hamilton Oxyferm
Sensor Type B:	InPro6900 / SE 707

Lo-level range

Measuring current

-2 ... 600 nA,	Resolution: 10 pA
<u>Saturation (-10 ... 80 °C):</u>	0.0 ... 120 %
Measurement error ^{1,2,3}	0.5 % meas.val. +0.1 %
<u>Concentration (-10 ... 80 °C)</u>	
	0000 ... 9999 µg/l
	0.000 ... 9.999 mg/l
	0000 ... 9999 ppb
	0.000 ... 9.999 ppm
Measurement error ^{1,2,3)}	0.5 % meas.val. +5 µg/l or 5 ppb
<u>Volume concentration in gas</u>	(-10...80 °C)
	0000 ... 9999 ppm
	0.00 % ... 120,0 %
	(0.00 % ... 29,99 %
	30.0 % ... 120.0 %)
Measurement error ^{1,2,3)}	0.5 % meas.val. +0.02 % or 200 ppm

Hi-level range

Measuring current

-2 ... 1800 nA,	Resolution: 30 pA
<u>Saturation (-10 ... 80 °C):</u>	0.0 ... 500 %
Measurement error ^{1,2,3)}	0.5 % meas.val. + 0.5 %
<u>Concentration (-10 ... 80 °C):</u>	0.0 ... 50.0 mg/l
	0.0 ... 50.0 ppm
Measurement error ^{1,2,3)}	0.5% meas.val.+ 0.05mg/l or 0.05 ppm

Specifications

Measuring range 2 (high level)

<u>Volume concentration in gas:</u> (-10...80 °C)	0000 ... 9999 ppm
	0.00 % ... 120.0 %
	(0.00 % ... 29,99 %
	30.0 % ... 120.0 %)
Measurement error ^{1,2,3)}	0.5 % meas.val.+0.1 % or 1000 ppm

Polarization voltage*	-1000 ... 0 mV
Process pressure*	0.000 ... 9.999 bars (... 999.9 kPa / ... 145.0 psi)
Salinity correction*	00.00 ... 45.00 g/kg

Sensor standardization

Operating modes*	<ul style="list-style-type: none">• O₂ saturation (automatic calibration)• O₂ concentration (automatic calibration)• Volume concentration (gas)• Product calibration• Zero calibration
Calibration range Sensor type A	Zero point ± 2 nA Slope 25 ... 130 nA (at 25°C, 1013 mbars)
Calibration range Sensor type B	Zero point ± 2 nA Slope 200 ... 550 nA (at 25°C, 1013 mbars)
Cal timer*	0000 ... 9999 h
Pressure correction*	0.000 ... 9.999 bars (... 999.9 kPa / ... 145.0 psi)

Specifications

Display

Main display

Secondary display

Sensoface

LC display, 7-segment with icons

Character height 17 mm, unit symbols 10 mm

Character height 10 mm, unit symbols 7 mm

3 status indicators

(friendly, neutral, sad)

Mode indicators

5 mode indicators "meas", "cal", "alarm",
"FF communication", "config"

Alarm indication

18 further icons for configuration and messages

Red LED in case of alarm or HOLD, user defined

Keypad

5 keys: [cal] [conf] [▶] [▲] [enter]

Service functions

Device self-test

Display test

Last Error

Sensor monitor

Automatic memory test (RAM, FLASH, EEPROM)

Display of all segments

Display of last error occurred

Display of direct, uncorrected sensor
signal (sensor current / temperature)

* User-defined

1) To IEC 746 Part 1, at nominal operating conditions

2) ± 1 count

3) Plus sensor error

Data retention	Parameters and calibration data > 10 years (EEPROM)
EMC	EN 61326
Emitted interference:	Class B (residential area)
Immunity to interference:	Industry
USA:	FCC: FCC rules part 15/B class A
Lightning protection	EN 61000-4-5, Installation Class 2
Explosion protection	ATEX: II 2(1)G EEx ia IIC T4
USA:	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
Nominal operating conditions	
Ambient temperature	-20 ... +55 °C
Transport/Storage temp	-20 ... +70 °C
Enclosure	Molded enclosure made of PBT (polybutylene terephthalate)
Color	Bluish gray RAL 7031
Mounting	<ul style="list-style-type: none"> • Wall mounting • Pipe mounting: <ul style="list-style-type: none"> Ø 40 ... 60 mm, □ 30 to 45 mm • Panel mounting, cutout to DIN 43 700 Sealed against panel
Dimensions	H 144 mm, W 144 mm, D 105 mm
Protection	IP 65/NEMA 4X (USA, Canada: indoor use only)
Cable glands	3 breakthroughs for M20x1.5 cable glands 2 breakthroughs for NPT 1/2" or
Rigid Metallic Conduit	
Weight	Approx. 1 kg

Patents/ Intellectual Property Rights

Patent/Application	Title
U.S. 6,424,872	Block Oriented Control System
U.S. 6,594,530	Block Oriented Control System, Cont'd.
U.S. App. 09/598,697	Block Oriented Control System on High Speed Ethernet
European Patent App.* 941594.4	Block Oriented Control System on High Speed Ethernet
China Patent App.* 00809263.X	Block Oriented Control System on High Speed Ethernet
Hong Kong Patent App.* 2107127.9	Block Oriented Control System on High Speed Ethernet
U.S. App. 10/453596	Flexible Function Blocks
U.S. App. 10/826,576	System and Method for Implementing Safety Instrumented Systems in a Fieldbus Architecture
PCT App. US/04/11616	System and Method for Implementing Safety Instrumented Systems in a Fieldbus Architecture
U.S. 5,909,368	Process Control System Using a Process Control Strategy Distributed among Multiple Control Elements
U.S. 5,333,114	Field Mounted Control Unit
U.S. 5,485,400	Field Mounted Control Unit
U.S. 5,825,664	Field Mounted Control Unit
Japan Patent # 3137643	
Australian Patent # 638507	
Canadian Patent # 2,066,743	
European Patent # 0495001	
Validated in:	
UK Patent # 0495001	
France Patent # 0495001	
Germany Patent # 69032954T	
Netherlands Patent # 0495001	
U.S. 6,055,633	Method of Reprogramming Memories in Field Devices Over a Multidrop Network
European Patent App.* Publication No. EP1029406A2	

U.S. 6,104,875

Method for Field Programming an Industrial
Process Transmitter

Australian Patent App.*

Publication No. AU9680998A1

The Foundation may acquire or hold patent rights in addition to those listed.

FOUNDATION:
FIELDBUS FOUNDATION, a Minnesota
not-for-profit corporation

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.

FM Control Drawing

Copying of this document and giving it to others and use or communication for the contents hereof, are forbidden without express authority.

Oxy Transmitter
 Stratos PROFIBUS PA 2221 X Oxy
 Stratos FF 2231 X Oxy
 IS/I/1/ABCD/T4, Ta=55°C; Entity; FISCO
 I/1/AEx ib [ia]/IIC/T4, Ta=55°C; Entity; FISCO

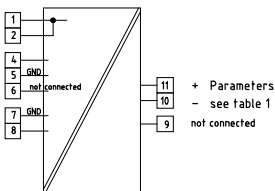
Entity Parameters:

Terminals 1/2, 4, 5 and 6

$V_t = 10 \text{ V}$ $C_a = 925 \text{ nF}$
 $I_t = 11 \text{ mA}$ $L_a = 1 \text{ mH}$
 $P_{\text{max}} = 14 \text{ mW}$

Terminals 7 and 8

$V_{oc} = 5 \text{ V}$ $C_a = 4 \mu\text{F}$
 $I_{sc} = 1 \text{ mA}$ $L_a = 1 \text{ H}$
 $P_{\text{max}} = 2 \text{ mW}$



The intrinsically safe equipment connecting to 1, 2, 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.

O₂ sensor series InPro 6xxx

Cable max 10 m

Mit dieser Zeichnung wird die Verantwortung für die Einhaltung der Vorschriften und Normen übertragen. Diese Zeichnung stellt keine Garantie dar, sondern nur eine Richtlinie.

Oxy Transmitter
 Stratos PROFIBUS PA 2221 Oxy
 Stratos FF 2231 Oxy
 NI/1/2/ABCD/T4, Ta=55°C; FNICO
 NI/1/2/AEx nA IIC/T4, Ta=55°C; FNICO

Entity Parameters:

Terminals 1/2, 4, 5 and 6

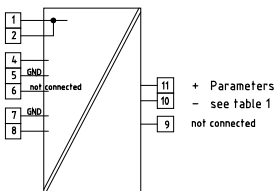
$V_t = 10 \text{ V}$
 $I_t = 11 \text{ mA}$
 $P_{max} = 14 \text{ mW}$

$C_a = 925 \text{ nF}$
 $L_a = 1 \text{ mH}$

Terminals 7 and 8

$V_{oc} = 5 \text{ V}$
 $I_{sc} = 1 \text{ mA}$
 $P_{max} = 2 \text{ mW}$

$C_a = 4 \text{ }\mu\text{F}$
 $L_a = 1 \text{ H}$



The equipment connecting to 1, 2, 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.

O₂ sensor series InPro 6xxx

Cable max 10 m

table 1

Concept	Groups	V _{max} (V)	C _i (nF)	L _i (µH)
FNICO	ABCD	17.5	1.2	7
Entity	ABCD	24		

FNICO rules

The FNICO Concept allows the interconnection of non-incendive apparatus to associated non-incendive apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (V_{max}), which non-incendive apparatus can receive and remains non-incendive, must be equal or greater than the voltage (V_{in}), which can be provided by the associated non-incendive apparatus (supply unit). In addition, the maximum unprotected residual capacitance (C_i) and inductance (L_i) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5 nF and 20 µH respectively.

In each NI Fieldbus segment only one active source, normally the associated non-incendive apparatus, is allowed to provide the necessary voltage for the Fieldbus system. The allowed voltage (V_{in}) of the associated non-incendive apparatus used to supply the bus must be limited to the range of 14 V d.c. to 17.5 V d.c. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50 µA for each connected device. Separately powered equipment needs a galvanic isolation to insure that the non-incendive Fieldbus circuit remains passive.

The cable used to interconnect the devices needs to comply with the following parameters:

Loop resistance R: 15 ... 150 Ω/km
Inductance per unit length L': 0.4 ... 1 mH/km

Capacitance per unit length C': 80 ... 200 nF/km

C' = C' linein + 0.5 C' linescreen, if both lines are floating

or

C' = C' linein + C' linescreen, if the screen is connected to one line

Length of spur cable: max. 30 m

Length of trunk cable: max. 1 km

Length of splice: max. 1 m

Terminators

At each end of the trunk cable an approved line terminator with the following parameters is suitable:

R = 90 ... 150 Ω

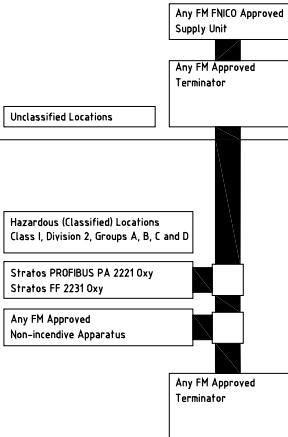
C = 0 ... 2.2 µF

System evaluation

The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to NI reasons. Furthermore, if the above rules are respected, the inductance and capacitance of the cable need not to be considered and will not impair the non-incendive safety of the installation.

Installation Notes for FNICO

- The Non-incendive concept allows the interconnection of FM Approved Non-incendive devices with parameters not specifically examined in combination as a systems when:
V_{in} ≤ V_{max}, C_i ≤ C_i and L_i ≤ L_i.
For inductance use either L_i or L_i + Σ(L_i of L_i or L_iRe) ≤ (L_iRe or L_iRe) and L_iRe ≤ (L_iRe or L_iRe)
- The Non-incendive FNICO concept allows the interconnection of FM approved Non-incendive devices with FNICO parameters not specifically examined in combination as a system when:
V_{in} ≤ V_{max}
- Dust-tight conduit seals must be used when installed in Class II and Class III environments.
- Control equipment connected to the Associated Non-incendive Apparatus must not use or generate more than 250 Vrms or V_{in}.
- Installation should be in accordance with the National Electrical Code® (ANSI/NFPA 70) Section 501.
- The configuration of associated Non-incendive Apparatus must be FM Approved under the associated concept.
- Associated Non-incendive Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- No revision to drawing without prior FM Approvals authorisation.



Verteiler: FUL (2x)		Zul. Abweichungen für Maße ohne Toleranzangabe		Oberfläche	Maßstab	page 2/2
		ISO 2768 - m			Hotzzeug	
		Datum	Name	Benennung		
		19.05.04	dam	Control drawing		
		Gepr. (KON)		Stratos PROFIBUS PA 2221 (X) Oxy		
		Freigabe(FGL)		Stratos FF 2231 (X) Oxy		
		Schutzmerk nach DIN 34 beachten		Zeichnungsnummer		
3	Texte geändert	30.11.04	gr	194.470-120		
2	Texte Haz. Loc.	19.10.04	dam			
1	page 2	09.09.04	dam			
Nr. 1AE		Datum	Bereiter	Elektronische Messgeräte GmbH & Co. KG		Ungef./lig. ab:
						Ersetzt durch:

Index

2-point calibration69

A

Accessories116

Alarm LED44

Alarm settings64

Alarm via Fieldbus87

 Alarm handling104

Analog Input Block (AI)21, 102

 Bus Parameters106

 Configuration24

Assembly28

Attenuation57

Automatic device self-test45

B

Block alarms104

Bus communication18

Bus Parameters88

 Analog Input Blocks (AI)106

 Resource block88

 Standard Transducer Block92, 94, 96, 98, 100

C

Calibration on the device68

 Cal timer63

 Calibration to concentration (Conc)72

 Calibration to percent saturation (SAT)70

 Calibration to volume concentration (GAS)74

 Configuration62

 Display of calibration data83

 Error messages81

 Product calibration76

 Temp probe adjustment80

 Zero calibration78

Calibration via Fieldbus	90
CFF-File	28
CHANNEL parameter	102
Cleaning	81
Commissioning via Fieldbus	22
Communication Fieldbus / Device	87
Communication model	20
Configuration on the device	46
Alarm settings	64
Calibration interval	62
Calibration mode	62
Default bus address	66
Factory settings	48
Hi-level / Lo-level input	50
Individual settings	49
Input filter	56
Medium	54
Menu structure	47
Polarization voltage	60
Process pressure	60
Process variable	54
Salinity correction	60
Sensor type	52
Temperature probe	58
Temperature unit	58
Time constant of input filter	56
Unit	54
Configuration via Fieldbus	22, 90
Connection	32
VP cable	34
Connection to supply and coupling elements	8
Cyclic measured value status	108

Index

D

Device Description	22
Device Identifier	23
Device Registration	17
Diagnostics	83, 103
Display	41
Disposal	2
Division 2 wiring	123

E

EC Declaration of Conformity	11
EC-Type-Examination Certificate	12
Error messages	112
Display of last error message	83
LAST_ERROR parameter	91
Explosion protection	121
Cleaning in a hazardous location	8

F

FM	121
FM Control Drawing	124
Foundation Fieldbus	18
Basic properties	18
Commissioning on the Foundation Fieldbus	22
Function blocks	21

G

GainCheck device self test	45
----------------------------	----

H

Hold mode	44
LED in HOLD mode	65

I

Installation	32
Intellectual Property Rights	122
Intended use	9

K

Key lock	87
Keypad	43

L

Limit alarms	104
Linearization types	103

M

Measured value status	110
Cyclic	108
Operating states	110
Measurement	81
Mode codes	132
Mounting plan	29

O

Operating states	110
Error messages	112, 114
OUT_SCALE parameters	103
Overview	27

P

Packing list	28
Panel-mount kit	31
Patents	122
Pipe-mount kit	30
Polarization voltage	61
Pressure correction	61
Process variables	54, 102
Product calibration	76
Product calibration via Fieldbus	90
Product line	116
Protective hood	30

Index

R

Resource Block (RB)	.21, 87
Bus parameters	.88
Configuration	.23
Return of products	.2

S

Safety functions	.44
Safety information	.7
Installation	.8
Salinity correction	.61
Sensocheck	.45, 85
On/Off	.65
Sensoface	.45, 84
Sensor monitor	.83
Sensors	.53
Calibration ranges	.84
Display of sensor current	.83
Trace sensor	.36
Short description	.9
Specifications	.117
System configuration	.25

T






Table of contents	.3
Temp probe adjustment	.80
Temperature measurement	.58
Terminal assignments	.32
Time constant of input filter	.57
Trademarks	.10
Transducer Block (TB)	.21, 90
Bus Parameters	.92

U	
User interface	.40
V	
VP cable	.34
W	
Warranty	.2
Wiring examples	.36
High-level range (T82)	.38
High-level range (VP)	.37
Low-level range (VP)	.36
Write protection	.87
X	
XD_SCALE parameter	.102
Z	
Zero calibration	.78

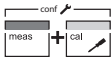
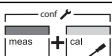

Mode codes

Mode codes allow fast access to the functions

Calibration

Key + Code	Description	Page
 0000	Cal Info	83
 1001	Zero calibration	78
 1100	Slope calibration: for saturation	70
	for concentration	72
	Volume concentration (GAS)	74
 1105	Product calibration Adjusting the zero / slope (product)	76
 1015	Temp probe adjustment	80

Configuration

Keys + Codes	Description	Page
 0000	Error Info Display last error and erase	83
 1200	Configuration	46
 2222	Sensor monitor Display sensor current and temp	83