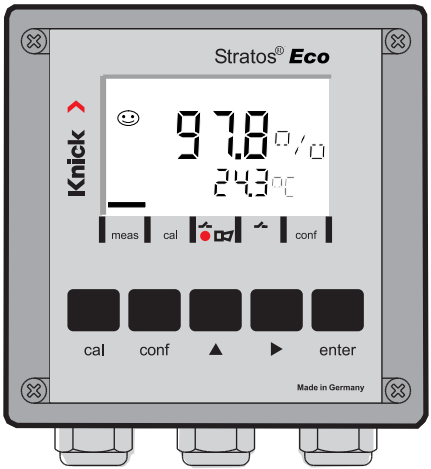
Stratos® Eco 2405 Oxy

Instruction Manual



Latest Product Information:

www.knick.de

75501

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

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

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Contents

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 must 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 at the manufacturer's factory.

Caution!
Before commissioning it must be proved that the device may be connected with other equipment.

Intended Use

Stratos Eco 2405 Oxy is used for dissolved oxygen and temperature measurement in biotechnology, pharmaceutical industry, as well as in the field of environment, food processing, and sewage treatment.
The sturdy 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 device has been designed for application with amperometric sensors, e.g. Knick SE 703 / SE 706. It provides two current outputs (for transmission of measured value and temperature, for example), two contacts, and a universal power supply 24 ... 230 V AC/DC, AC: 45 ... 65 Hz.

Registered Trademarks

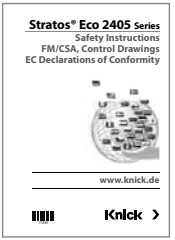
The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.
Stratos®
Sensocheck®
Sensoface®
Calimatic®
GainCheck®

Provided Documentation:

CD-ROM

Complete documentation:

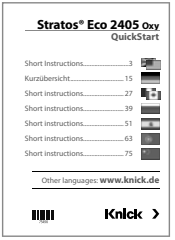
- Instruction manuals
- Safety instructions
- Short Instructions



Safety Instructions

In official EU languages and others.

- FM / CSA and Control Drawings
- EC Declarations of Conformity

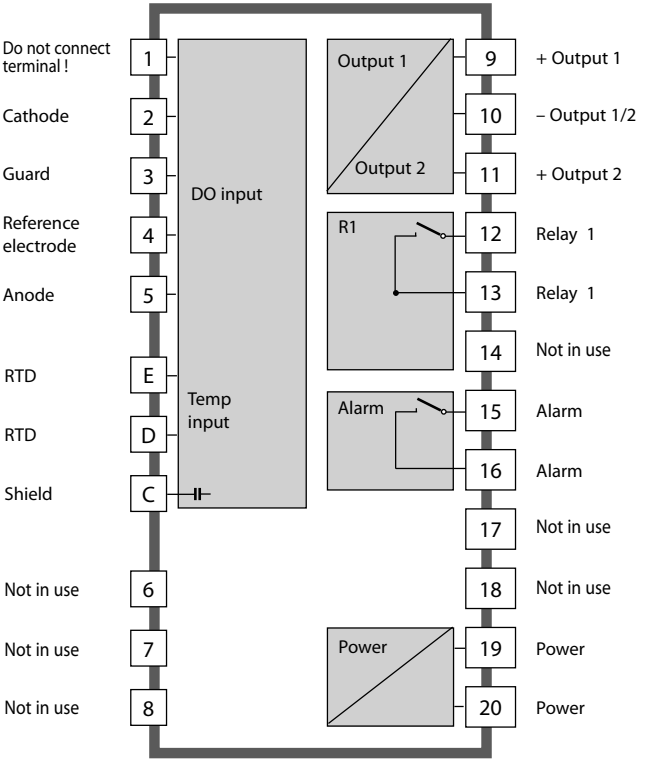


Short Instructions

In German, English, French, Russian, Spanish, Portuguese, and Chinese.
More languages on CD-ROM and on our website: www.knick.de

- Installation and commissioning
- Operation
- Menu structure
- Calibration
- Error messages and recommended actions

Overview of Stratos Eco 2405 Oxy

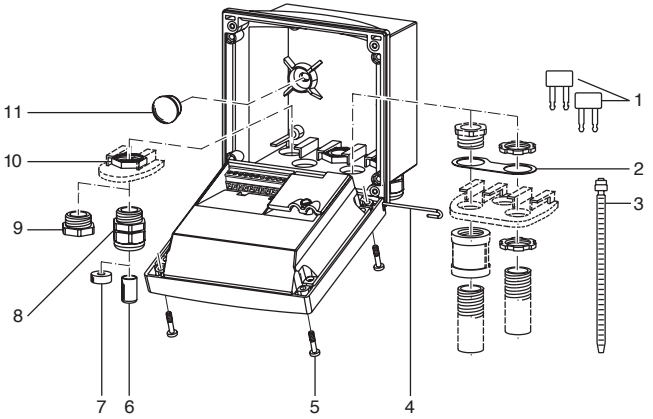


Assembly

Package Contents

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

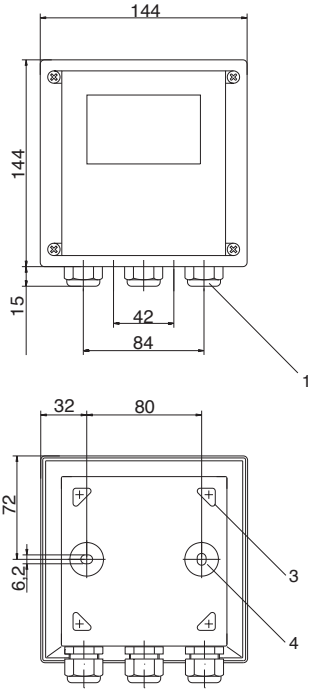
- Front unit
- Rear unit
- Bag containing small parts
- CD-ROM with documentation
- Specific test report
- Passcode sticker



1 Jumper (2 x)
2 Washer (1 x), for conduit mounting: Place washer between enclosure and nut
3 Cable tie (3 x)
4 Hinge pin (1 x), insertable from either side
5 Enclosure screw (4 x)
6 Sealing insert (1 x)
7 Rubber reducer (1 x)
8 Cable gland (3 x)
9 Filler plug (3 x)
10 Hexagon nut (5 x)
11 Sealing plug (2 x), for sealing in case of wall mounting

Fig.: Assembling the enclosure

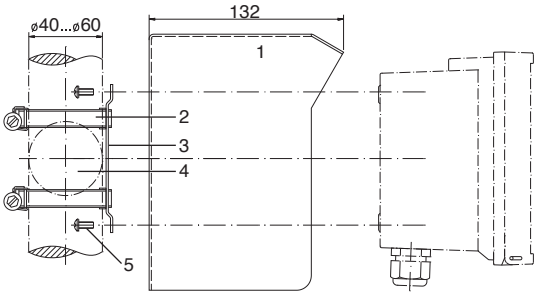
Mounting Plan



1 Cable gland (3 x)
2 Knockouts for cable gland or 1/2" conduit, ø 21.5 mm (2 knockouts) Conduits not included!
3 Knockout for pipe mounting (4 x)
4 Knockout for wall mounting (2 x)

Fig.: Mounting plan (All dimensions in mm!)

Pipe Mounting, Panel Mounting



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

Fig.: ZU 0274 pipe-mount kit (All dimensions in mm!)

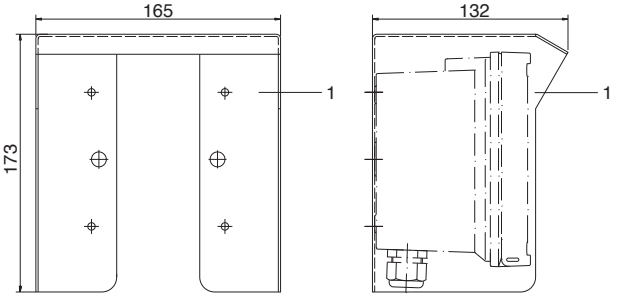
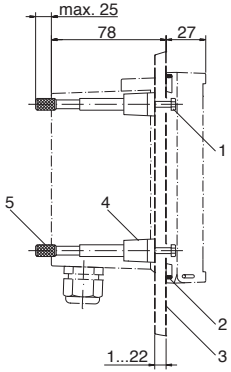


Fig.: ZU 0276 protective hood for wall and pipe mounting
(All dimensions in mm!)



1 Screw (4 x)
2 Gasket (1 x)
3 Control panel
4 Span piece (4 x)
5 Threaded sleeve (4 x)

Panel cut-out
138 x 138 mm (DIN 43700)

Fig.: ZU 0275 panel-mount kit (All dimensions in mm!)

Installation and Connection

Installation Instructions

Caution!

- Installation of the Stratos must be carried out by trained experts in accordance with this instruction manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings during installation.
- Be sure not to notch the conductor when stripping the insulation.
- Before connecting the device to the power supply, make sure that its voltage lies within the range 20.5 to 253V AC/DC.
- All parameters must be set by a system administrator prior to commissioning.

The terminals are suitable for single wires and flexible leads up to 2.5 mm^2 (AWG 14).

Caution!
Additional safety precautions have to be taken for operation in hazardous locations CSA (CLI, DIV2, GPA,B,C,D T4 and Ex nA IIC T4) (see Appendix: Approvals)!

Terminal Assignments

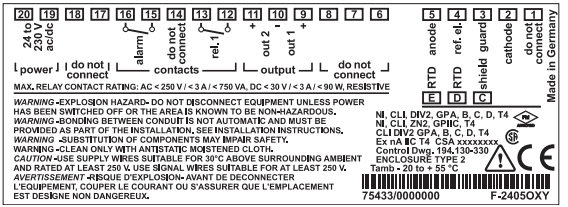
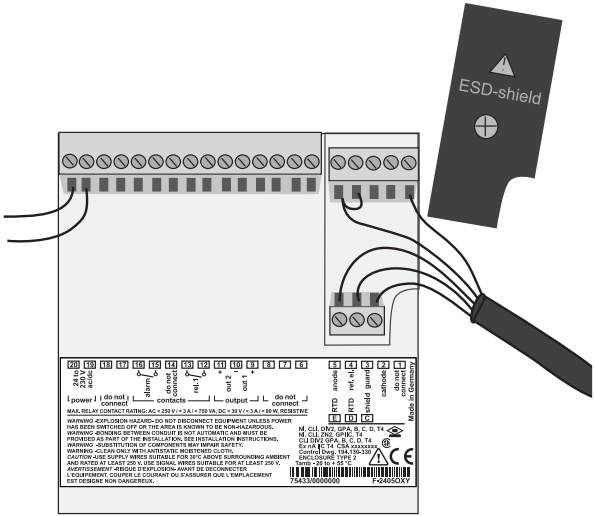


Fig.: Stratos Eco 2405 Oxy terminal assignments



1 ESD shield covering the signal inputs (Screw off for assembly)
Note: The cable shield must end under the ESD shield. (Cut lines if required.)
2 Terminals for temperature probe
3 Terminals for sensor
4 Power supply connection

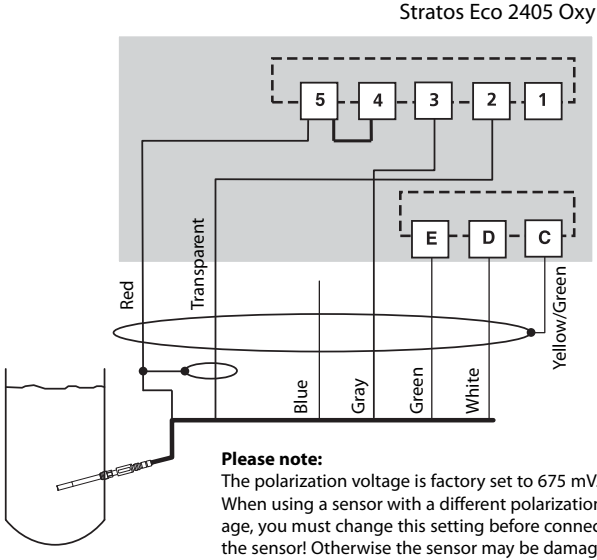
Fig.: Information on installation, rear side of device

Division 2 Wiring

FM

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

Sensors with Connection via VP Cable



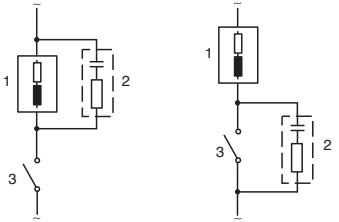
Please note:
The polarization voltage is factory set to 675 mV. When using a sensor with a different polarization voltage, you must change this setting before connecting the sensor! Otherwise the sensor may be damaged!

Connection	Terminal	SE 703/SE 706 sensor VP cable (e.g. ZU 0313)
	1	Do not connect!
cathode	2	Transparent (coax core)
guard	3	Gray
ref. el.	4	(Jumper 4-5)
anode	5	Red (coax shield)
RTD	E	Green
RTD	D	White
shield	C	Yellow/Green

Protective Wiring of Relay Outputs

Protective Wiring of Relay Contacts

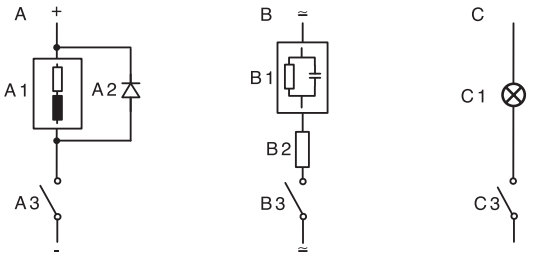
Relay contacts are subjected to electrical erosion. Especially with inductive and capacitive loads, the service life of the contacts will be reduced. For suppression of sparks and arcing, components such as RC combinations, nonlinear resistors, series resistors and diodes should be used.



AC applications with inductive load

1 Load
2 RC combination, e.g. RIFA PMR 209
Typical RC combinations for 230 V AC:
Capacitor 0.1 µF / 630 V Resistor 100 ohms / 1 W
3 Contact

Typical Protective Wiring Measures



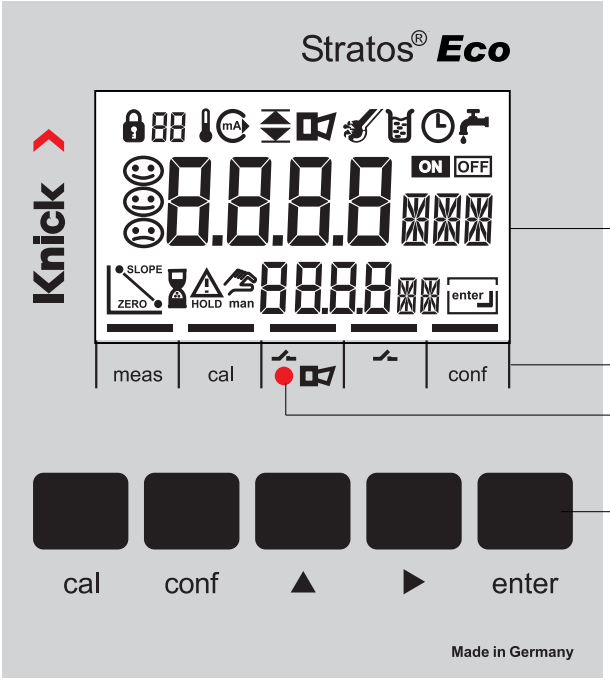
A: DC application with inductive load
B: AC/DC applications with capacitive load
C: Connection of incandescent lamps

A1 Inductive load
A2 Free-wheeling diode, e.g. 1N4007 (Observe polarity)
A3 Contact
B1 Capacitive load
B2 Resistor, e.g. 8 Ω / 1 W at 24 V / 0.3 A
B3 Contact
C1 Incandescent lamp, max 60 W / 230 V, 30 W / 115 V
C3 Contact

Warning!
Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!

User Interface and Display

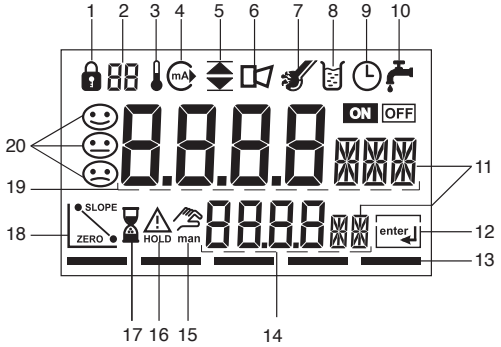
User Interface



1 Display
2 Mode indicators (no keys), from left to right:
- Measuring mode
- Calibration mode
- Alarm
- Not in use
- Configuration mode

3 Alarm LED
4 Keypad

Display



1 Passcode entry
2 Not in use
3 Temperature
4 Current output
5 Limit values
6 Alarm
7 Sensocheck
8 Calibration
9 Interval/response time
10 Not in use
11 Measurement symbol
12 Proceed with enter
13 Bar for identifying the device status, above mode indicators, from left to right:
- Measuring mode
- Calibration mode
- Alarm
- Not in use
- Configuration mode

14 Secondary display
15 Manual temperature specification
16 Hold mode active
17 Waiting time running
18 Sensor data
19 Main display
20 Sensoface

Operation: Keypad

cal	Start, end calibration
conf	Start, end configuration
▸	• Select digit position (selected position blinks) • Menu navigation
▲	• Edit digit • Menu navigation
enter	• Calibration: Continue in program sequence • Configuration: Confirm entries, next configuration step • Measuring mode: Display output current

cal → **enter**	Cal Info: Display of zero point and slope
conf → **enter**	Error Info: Display of last error message
▸ + ▲	Start GainCheck device self-test

Sensocheck, Sensoface Sensor Monitoring

Sensocheck continuously monitors the sensor and its wiring. Sensocheck can be switched off (Configuration, Pg 48).

Sensoface provides information on the sensor condition. The slope and response time during calibration are evaluated. The three Sensoface indicators provide the user with information on 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.

Hold Mode

Display: 

The Hold mode is a safety state during configuration and calibration. Output current is frozen (Last) or set to a fixed value (Fix). Alarm and limit contacts are disabled.
If the calibration or configuration mode is exited, the device 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 device only returns to measuring mode after **enter** is pressed and 20 seconds have passed.

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

Timeout is not active during calibration.

Behavior of output signal:

Last: The output current is frozen at its last value.
Recommended for short configuration procedures.
The process should not change decisively during configuration.
Changes are not noticed with this setting!

Fix: The output current is set to a value that is noticeably different from the process value in order to signal the control system that the device is being worked at.

See Configuration Pg 36.

Alarm

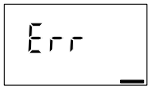
Alarm delay is 10 seconds.
During an error message the alarm LED blinks.

Error messages can also be signaled by a 22 mA output current.

The alarm contact is activated by alarm or power failure,
see also Pg 49.

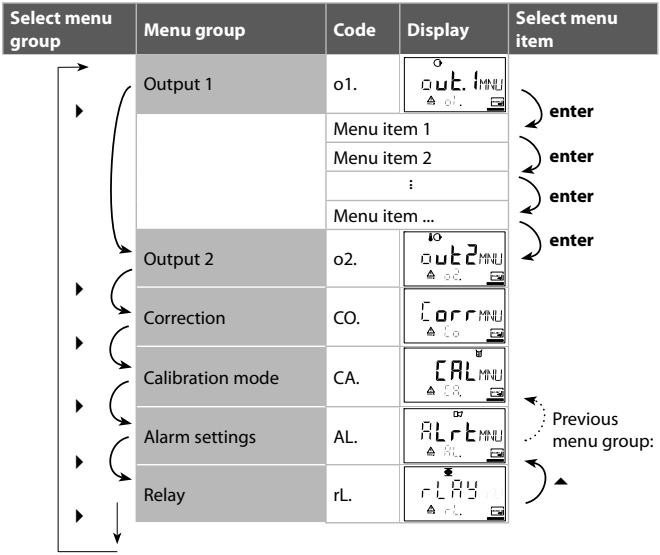
Configuration

In the Configuration mode you set the device parameters.

Activation	**conf**	Activate with **conf**
		Enter passcode "1200" Edit parameter using ▸ and ▴, confirm/proceed using **enter**. (End with **conf**, then **enter**.)
HOLD During configuration the device remains in the Hold mode.	 HOLD icon	The output current is frozen (at its last value or at a preset fixed value, depending on the configuration), limit and alarm contacts are inactive. Sensoface is off, "Configuration" mode indicator is on.
Input errors		The configuration parameters are checked during the input. In the case of an incorrect input "Err" is displayed for approx. 2 sec. The incorrect parameters cannot be stored. Input must be repeated.
End	**conf** **enter**	End with **conf**. The measured value and Hold are displayed alternately, "enter" blinks. Press **enter** key to end the Hold mode. The measured value is displayed. The output current remains frozen for another 20 sec (HOLD icon on, "hourglass" blinks).

Menu Structure of Configuration

The configuration steps are assigned to different menu groups.
With the arrow keys you can jump between the individual menu groups.
Each menu group contains menu items for setting the parameters.
Pressing **enter** opens a menu item.
The values are edited using the arrow keys.
Pressing **enter** confirms/stores the settings.
Return to measurement: Press **conf**.

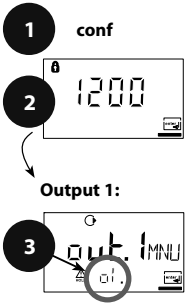


Overview of Configuration Steps

Code	Menu	Selection / Default
out1	**Output 1**	
o1.SnSR	Select sensor type	Standard (Type A) / Traces (Type B)
o1.UnIT	Select saturation / concentration	% / mg/l, ppm
o1.rNG	Select current range	0-20 mA / 4-20 mA
o1. 4mA	Enter current start	xxxx
o1.20mA	Enter current end	xxxx
o1.FtME	Time constant of output filter	xxxx sec
o1.FAIL	22 mA signal in the case of error	ON / OFF
o1.HoLD	Signal behavior during HOLD	Last / Fix
o1.FIX	Enter fixed value	xxx.x mA
out2	**Output 2**	
o2.UnIT	Select temperature unit	°C / °F
o2.rTD	Select temperature probe	22NTC / 30NTC
o2.rNG	Select current range	0-20 mA / 4-20 mA
o2. 4mA	Enter current start	xxx.x
o2.20mA	Enter current end	xxx.x
o2.FtME	Time constant of output filter	xxxx sec
o2.FAIL	22 mA signal for temp error	ON / OFF
o2.HoLD	Signal behavior during HOLD	Last / Fix
	Enter fixed value	xxx.x mA
Corr	**Correction**	
Co.UPOL	Enter polarization voltage	0675 mV / xxxx mV
Co.UnIT	Select pressure unit	bar / kPa / PSi
Co.PrES	Select process pressure correction	x.xxx bar / 1.013 bar
Co.SAL	Enter salinity correction	xx.xx mg/l

Code	Menu	Selection / Default
CAL	**Calibration mode**	
Ca.MOD	Select saturation / concentration	SAt / Conc
CA.tiME	Enter cal timer interval	xxxx h
ALrt	**Alarm settings**	
AL.SnSO	Select Sensocheck	ON / OFF
rLAY	**Relay 1: Limit**	
L1.FCT	Select contact function	Lo / Hi
L1.tYP	Select contact response	N/O / N/C
L1.LEVL	Enter setpoint	xxxx
L1.HYS	Enter hysteresis	xxxx
L1.dLY	Enter delay	xxxx SEC

Output 1
Select sensor type. Process variable



1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 31).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

enter →

o1.SnSR	Select sensor type*
o1.UnIT	Select process variable
o1.rNG	Select 0-20 / 4-20 mA
o1.4mA	Enter current start
o1.20mA	Enter current end
o1.FtME	Set output filter
o1.FAIL	22 mA for error
o1.HoLD	HOLD mode

enter ↓

5 **conf** **enter**

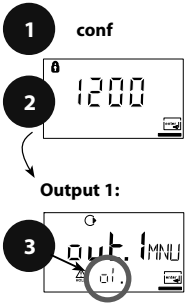
* Sensor type		Screw cap	Sensor current in air (25 °C)	Detection limit
A (standard applications)	SE 703	VP	40 ... 110 nA	0.030 ppm
	SE 706	VP	50 ... 110 nA	0.006 ppm
B (traces)	SE 707	VP	290 ... 500 nA	0.001 ppm

Note: Stratos Eco 2405 Oxy has as device a resolution of 0.01 ppm.

Code	Display	Action	Choices
o1.		Select sensor type A / B (see table on left-hand side) Select with ▸. Proceed with **enter**.	**Type A** (SE 703/ SE 706) Type B (SE 707)
	 	Select process variable (valid for all following settings): • SAt: Saturation (%) • Conc: Concentration (mg/l or ppm) Select with ▸. Proceed with **enter**.	**%** mg/l ppm

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

Output 1
Output current range, current start, current end



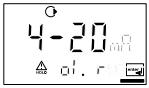
1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 33).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

o1.SnSR	Select sensor type
o1.UnIT	Select process variable
o1.rNG	Select 0-20 / 4-20 mA
o1.4mA	Enter current start
o1.20mA	Enter current end
o1.FtME	Set output filter
o1.FAIL	22 mA for error
o1.HoLD	HOLD mode

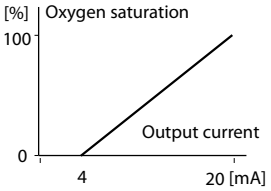
enter

5 **conf** **enter**

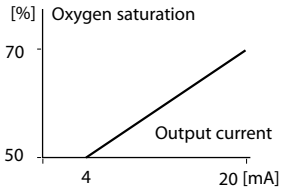
Code	Display	Action	Choices
o1.		Set output current range Select using ▸ key, proceed with **enter**.	**4-20 mA** (0 - 20 mA)
		Current start Enter lower end of scale. Select with ▸ key, edit number with ▴ key, proceed with **enter**.	**000.0 %** (mg/l, ppm)
		Current end Enter upper end of scale, depending on process variable selected (saturation or concentration) Proceed with **enter**.	**200.0 %** (mg/l, ppm)

Assignment of Measured Values: Current Start and Current End

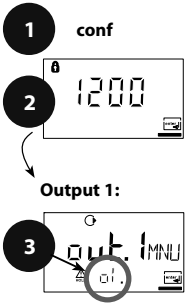
Example 1: Range 0 ... 100 %



Example 2: Range 50 ... 70%.
Advantage: Higher resolution in range of interest



Output 1
Time constant of output filter



1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 35).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

enter →

4	
o1.SnSR	Select sensor type
o1.UnIT	Select process variable
o1.rNG	Select 0-20 / 4-20 mA
o1.4mA	Enter current start
o1.20mA	Enter current end
o1.FtME	Set output filter
o1.FAIL	22 mA for error
o1.HoLD	HOLD mode

enter

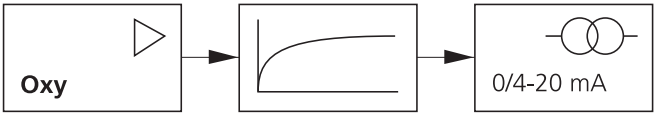
5 **conf** **enter**

Code	Display	Action	Choices
o1.		Time constant of output filter Default setting: 0 s (inactive). To specify a time constant: Select with ▸ key, edit number with ▴ key, proceed with **enter**.	**0 sec** 0 ... 120 sec

Time Constant of Output Filter (Attenuation)

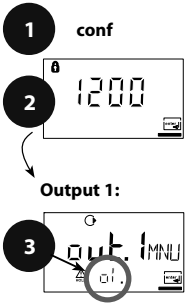
To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time constant has been reached.
The time constant can be set from 0 to 120 sec.
If the time constant is set to 0 sec, the current output follows the input.

Please note:
The filter only acts on the current output, not on the display or the limit value!



Time constant 0 ... 120 sec

Output 1
Output current during Error and HOLD



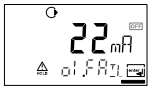
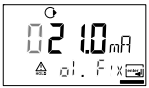
1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 37).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

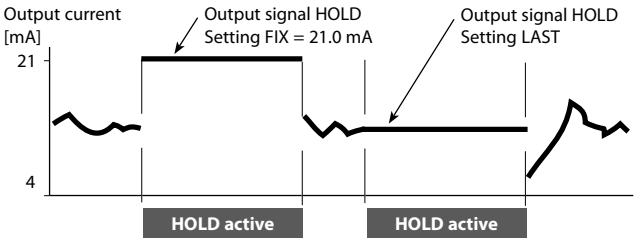
o1.SnSR	Select sensor type
o1.UnIT	Select process variable
o1.rNG	Select 0-20 / 4-20 mA
o1.4mA	Enter current start
o1.20mA	Enter current end
o1.FtME	Set output filter
o1.FAIL	22 mA for error
o1.HoLD	HOLD mode

enter

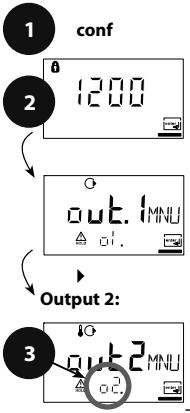
5 **conf** **enter**

Code	Display	Action	Choices
o1.		22 mA signal for error message Select using ▸ key, proceed with **enter**.	**OFF** (OFF / ON)
		Output signal during HOLD LAST: During HOLD the last measured value is maintained at the output FIX: During HOLD a value (to be entered) is maintained at the output Select using ▸ key, proceed with **enter**.	**LAST** (LAST / FIX)
	 	Only with FIX selected: Enter current which is to flow at the output during HOLD Select position using ▸ key and edit number using ▴ key. Proceed with **enter**.	**21.0 mA** (00.0 ... 21.0 mA)

Output Signal During HOLD:



Output 2
Temperature unit and probe, output current



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Output 2** menu group using arrow keys. All items of this menu group are indicated by the "o2." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 39).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

o2.UnIT	Select °C/°F
o2.rTD	Select temp probe
o2.rNG	Select 0-20 / 4-20 mA
o2. 4mA	Enter current start
o2.20mA	Enter current end
o2.FtME	Set output filter
o2.FAIL	22 mA for temp error
o2.HoLD	HOLD mode

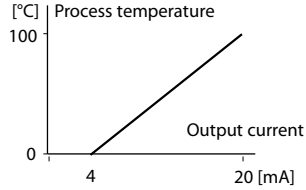
enter

5 **conf** **enter**

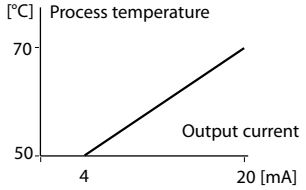
Code	Display	Action	Choices
o2.		Specify temperature unit Select using ▸ key, proceed with **enter**.	**°C** (°C / °F)
		Select temperature probe Select using ▸ key, proceed with **enter**.	**22NTC** (30NTC)
		Select output current range Select using ▸ key, proceed with **enter**.	**4 - 20 mA** (4 - 20 mA/ 0 - 20 mA)
		Current start: Enter lower end of scale. Select with ▸ key, edit number with ▲ key, proceed with **enter**.	**000.0 °C** (xxx.x °C)
		Current start: Enter upper end of scale. Select with ▸ key, edit number with ▲ key, proceed with **enter**.	**100.0 °C** (xxx.x °C)

Process Temperature: Current Start and Current End

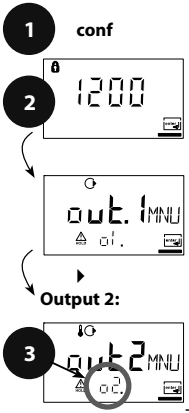
Example 1: Range 0 ... 100 °C



Example 2: Range 50 ... 70 °C
Advantage: Higher resolution in range of interest



Output 2
Time constant of output filter



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Output 2** menu group using arrow keys. All items of this menu group are indicated by the "o2." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 41).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

o2.UnIT	Select °C/°F
o2. rTD	Select temp probe
o2.rNG	Select 0-20 / 4-20 mA
o2. 4mA	Enter current start
o2.20mA	Enter current end
o2.FtME	Set output filter
o2.FAIL	22 mA for temp error
o2.HoLD	HOLD mode

enter

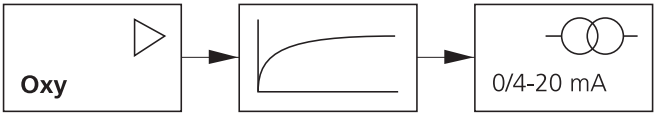
5 **conf** **enter**

Code	Display	Action	Choices
o2.		Time constant of output filter Default setting: 0 sec (inactive). To specify a time constant: Select with ▸ key, edit number with ▴ key, proceed with **enter**.	**0 sec** (0 ... 120 sec)

Time Constant of Output Filter

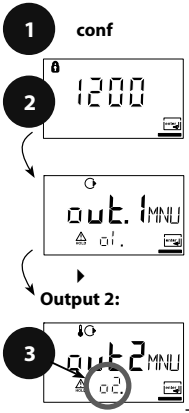
To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time constant has been reached.
The time constant can be set from 0 to 120 sec.
If the time constant is set to 0 sec, the current output follows the input.

Please note:
The filter only acts on the current output, not on the display!



Time constant 0 ... 120 sec

Output 2
Temperature error, output current during HOLD



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Output 2** menu group using arrow keys. All items of this menu group are indicated by the "o2." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 43).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

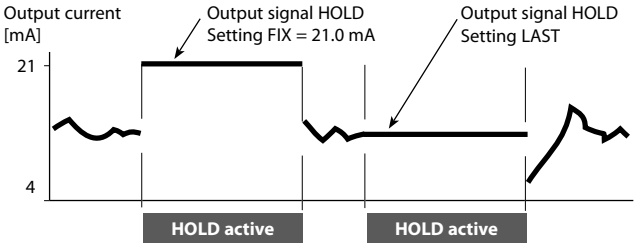
o2.UnIT	Select °C/°F
o2. rTD	Select temp probe
o2.rNG	Select 0-20 / 4-20 mA
o2. 4mA	Enter current start
o2.20mA	Enter current end
o2.FtME	Set output filter
o2.FAIL	22 mA for temp error
o2.HoLD	HOLD mode

enter

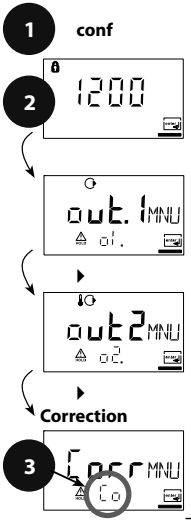
5 **conf** **enter**

Code	Display	Action	Choices
o2.		22 mA signal for error message Select using ▸ key, proceed with **enter.**	**OFF** (OFF / ON)
		Output signal during HOLD LAST: During HOLD the last measured value is maintained at the output FIX: During HOLD a value (to be entered) is maintained at the output Select using ▸ key, proceed with **enter.**	**LAST** (LAST / FIX)
	 	Only with FIX selected: Enter current which is to flow at the output during HOLD Select position using ▸ key and edit number using ▴ key. Proceed with **enter.**	**21.0 mA** (00.0 ... 21.0 mA)

Output Signal During HOLD:



Correction
Polarization voltage / Process pressure / Salinity correction



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Correction** menu group using arrow keys. All items of this menu group are indicated by the "Co." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 45).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

Co.UPOL	Polarization voltage	**enter**
Co.UnIT	Meas. unit (pressure)	
Co.PrES	Process pressure	
Co.SAL	Salinity correction	

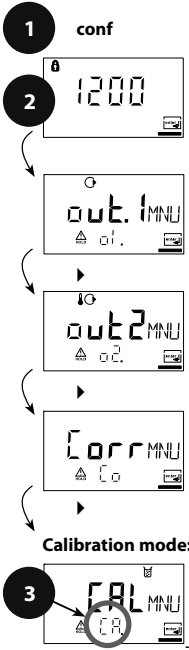
5 **conf** **enter**

Code	Display	Action	Choices
Co.		Enter polarization voltage Select using ▸ key, edit number using ▴ key, proceed with **enter**.	**0675 mV**
		Select pressure unit Select using ▸ 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 using ▸ key and edit number using ▴ key. Proceed with **enter**.	**1.013 bar**
		Enter salinity correction Select position using ▸ key and edit number using ▴ key. Proceed with **enter**.	**00.00 ppt***

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

Please note:
The polarization voltage of 675 mV (factory setting) is suitable for most sensors, e.g. for SE 703/706/707.
When using a sensor with a different polarization voltage, you must change this setting before connecting the sensor! Otherwise the sensor may be damaged!

Calibration Mode



1. Press **conf** key.
2. Enter passcode **1200**.
3. Select **Calibration mode** menu group using arrow keys. All items of this menu group are indicated by the "CA." code.
4. Press **enter** to select menu, edit with arrow keys (see Pg 47).
   Confirm (and proceed) with **enter**.
5. End: Press **conf**, then **enter**.

4 **enter**

Ca.MOD	Calibration mode
CA.tiME	Cal timer interval

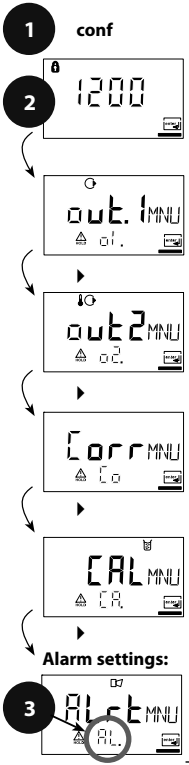
5 **conf** **enter**

Code	Display	Action	Choices
CA.		Specify calibration mode (calibration to saturation or concentration) Select with ▸ key, proceed with **enter**.	**SAt** (Conc)
		Cal timer interval The cal timer reminds you to calibrate in time. Select using ▸ , edit number using ▴ key. Proceed with **enter**.	**0000 h** (0 ... 9999 h)

Please note:
When calibrating in air-saturated water (standard practice for biotechnological processes), you should select calibration to saturation (SAT).

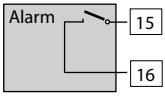
If the sensor can be removed for calibration, however, we recommend the more precise calibration in air. To do so, you have to set the calibration mode to Concentration (Conc), see also Pg 57.

Alarm Settings



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Alarm settings** menu group using arrow keys. All items of this menu group are indicated by the "AL." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 49).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

Code	Display	Action	Choices
AL.		Select Sensocheck (continuous monitoring of sensor) Select with ▸ key, proceed with **enter**.	**OFF** (ON / OFF)



Alarm Contact

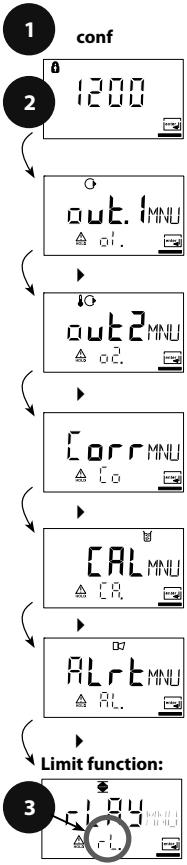
The alarm contact is closed during normal operation (N/C). It opens in the case of alarm or power outage. As a result, a failure message is provided even in the case of line breakage (fail-safe behavior).
For contact ratings, see Specifications.

Error messages can also be signaled by a 22 mA output current (see Pg 36, 42, 70).

The operating behavior of the alarm contact is shown on Pg 73.

The **alarm delay** acts on the LED, the 22 mA signal and the alarm contact.

Limit Function
Relay



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Limit function** menu group using arrow keys. All items of this menu group are indicated by the "L1." code.
4 Press **enter** to select menu, edit with arrow keys (see Pg 51).
Confirm (and proceed) with **enter**.
5 End: Press **conf**, then **enter**.

4

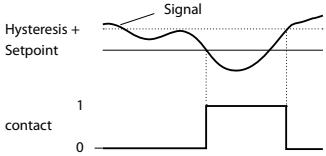
L1.FCT	Contact function
L1.tYP	Contact response
L1.LEVL	Enter setpoint
L1.HYS	Enter hysteresis
L1.dLY	Delay

enter

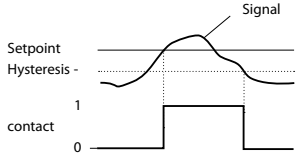
5 conf enter

Code	Display	Action	Choices
L1.		Contact function (see below for function principle) Select with ▸ key, proceed with **enter**.	**Lo** (Lo/Hi)
		Contact response N/C: normally closed contact N/O: normally open contact Select with ▸ key, proceed with **enter**.	**N/C** (N/O N/C)
		Setpoint Select with ▸ key, edit number with ▲ key, proceed with **enter**.	**000.0 %** (xxx.x %)
		Hysteresis Select with ▸ key, edit number with ▲ key, proceed with **enter**.	**001.0 %** (xxx.x %)
		Delay The contact is activated with delay (deactivated without delay) Select with ▸ key, edit number with ▲ key, proceed with **enter**.	**0010 sec** (0 ... 600 sec)

Limit Lo



Limit Hi



Parameters

Factory Settings of Parameters

Activation:
Simultaneously press **conf** + right arrow key.
Then enter passcode "4321".
The lower display line reads "Clear". To prevent accidental resetting, "NO" is set as default (blinking in the main display).
Press one of the arrow keys to select "YES" and confirm with **enter**.

Caution!
Your data (also calibration data) will be overwritten by the factory settings!

Code	Parameter	Factory setting
o1.SnSR	Sensor type	A
o1.UnIT	%, mg/l, ppm	%
o1. rNG	0/4-20 mA	4-20 mA
o1. 4mA	Current start	0000 %
o1.20mA	Current end	0200 %
o1.FtME	Filter time	0 s
o1.FAIL	22mA signal	OFF
o1.HoLD	HOLD response	Last
o1.FIX	Fix current	021.0 mA
o2.UnIT	Unit °C / °F	°C
o2.rTD	Temp probe	22NTC
o2.rNG	0/4 ...20mA	4-20 mA
o2. 4mA	Current start	000.0 °C
o2.20mA	Current end	100.0 °C
o2.FtME	Filter time	0 s
o2.FAIL	22mA signal	OFF
o2.HoLD	HOLD response	Last
o2.FIX	Fix current	021.0 mA

Code	Parameter	Factory setting
Co.UPOL	Polariz. voltage	675 mV
Co.UnIT	Pressure unit	bar
Co.PrES	Pressure	1.013 bar
Co.SAL	Salinity	00.00 ppt
Ca.MOD	Calibration mode	Sat
CA.tiME	Cal interval	0000 h
AL.SnSO	Sensocheck	OFF
L1.FCT	Contact function	Lo
L1.tYP	Contact response	N/C
L1.LEVL	Setpoint	0000 %
L1.HYS	Hysteresis	0001 %
L1.dLY	Delay	0010 sec

Please note:
Fill in your configuration data on the following pages.

Please note:
Factory settings for the calibration data are 60.0 nA (slope) and 0.000 nA (zero).

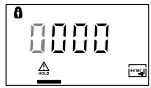
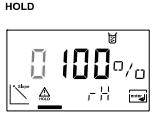
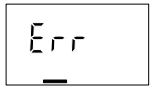
Parameters – Individual Settings

Code	Parameter	Setting
o1.SnSR	Sensor type	
o1.UnIT	%, mg/l, ppm	
o1. rNG	0/4-20 mA	
o1. 4mA	Current start	
o1.20mA	Current end	
o1.FtME	Filter time	
o1.FAIL	22mA signal	
o1.HoLD	HOLD response	
o1.FIX	Fix current	
o2.UnIT	Unit °C / °F	
o2.rTD	Temp probe	
o2.rNG	0/4 ... 20mA	
o2. 4mA	Current start	
o2.20mA	Current end	
o2.FtME	Filter time	

Code	Parameter	Setting
o2.FAIL	22mA signal	
o2.HoLD	HOLD response	
o2.FIX	Fix current	
Co.UPOL	Polarization voltage	
Co.UnIT	Pressure unit	
Co.PrES	Pressure	
Co.SAL	Salinity	
Ca.MOD	Calibration mode	
CA.tiME	Cal interval	
AL.SnSO	Sensocheck	
L1.FCT	Contact function	
L1.tYP	Contact response	
L1.LEVL	Setpoint	
L1.HYS	Hysteresis	
L1.dLY	Delay	

Calibration

Calibration adjusts the device to the sensor.

Activation	**cal**	Activate with **cal**
		Enter passcode: • Zero point 1001 • Water/Air 1100 Edit parameter with ▸ and ▴. Confirm and proceed with **enter**. (End with **cal**, then **enter**.)
HOLD During configuration the device remains in the Hold mode.	 HOLD icon	During calibration the device remains in the Hold mode for reasons of safety. The output current is frozen (at its last value or at a preset fixed value, depending on the configuration), limit and alarm contacts are inactive. Sensoface is off, "Calibration" mode indicator is on.
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	**enter** **enter**	End with **enter** (abort with **cal**). The measured value and Hold are displayed alternately, "enter" blinks. Press **enter** to end the Hold mode. The measured value is displayed. The output current remains frozen for another 20 sec (HOLD icon on, "hourglass" blinks).

Information on 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 / Calibration Medium

Process variable	Cal mode	Calibration	Default rel. humidity	Default cal pressure
Saturation (%)	SAT	Water	100 %	Process pressure
Concentration (mg/l, ppm)	Conc	Air	50 %	1.013 bar

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.

Please note:
When a 2-point calibration is required, the zero calibration should be performed prior to saturation or concentration calibration, resp.
All calibration procedures must be performed by trained personnel.

See Pg 30 for setting the process variable.

See Pg 46 for setting the calibration mode.

Calibration to Percent Saturation (SAT), in Water

Display	Action	Remark
	Press **cal** key, enter code 1100. Select with ▸ key, edit number with ▲ key, proceed with **enter**.	SAT or Conc calibration is selected during configuration. If an invalid code is entered, the device returns to measuring mode.
	Immerse sensor in cal medium Start with **enter**.	Device is in the Hold mode.
	Enter relative humidity Select using ▸, enter number using ▲. Confirm entry with **enter**.	Default for relative humidity in aqueous media: rH = 100 % (in air approx. 50 %)
	Enter calibration pressure Select using ▸, enter number using ▲. Confirm entry with **enter**.	Default for calibration 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
	Enter setpoint value for saturation Select with ▸ key, edit number with ▴ key, proceed with **enter**.	Default: last value entered
	Display of new slope and zero point (related to 25°C at 1013 mbars) End calibration with **enter**.	New calibration: Press **cal** key.
	Place sensor in process. The percent saturation is shown in the main display alternately with "Hold"; "enter" blinks. End with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Information on Saturation Calibration (SAT) in Water

- The calibration medium should be water which is in equilibrium with the ambient air (percent saturation 100%). Oxygen exchange between water and air is very slow, however.
- If the calibration medium is not in equilibrium with air and the percent saturation is known from a simultaneous measurement, it can be entered manually.
- For 2-point calibration, perform zero calibration first!

Calibration to Concentration (Conc), in Air

Display	Action	Remark
	Press **cal** key, enter code 1100. Press ▸ key to select position, enter number using ▲ key, proceed with **enter**.	SAT or Conc calibration is selected during configuration. If an invalid code is entered, the device returns to measuring mode.
	Place sensor in air Start with **enter**	Device is in the Hold mode.
	Enter relative humidity Press ▸ key to select position, enter number using ▲ key, proceed with **enter**.	Default for relative humidity in air: rH = 50 %
	Enter calibration pressure Press ▸ key to select position, enter number using ▲ key, proceed with **enter**.	Default for calibration 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, proceed with **enter**.	Default value is calculated from rel. humidity, cal pressure, and cal temperature (the unit of measurement, ppm or mg/l, is preset during configuration).
	Display of new slope and zero point (related to 25 °C at 1013 mbars) End calibration with **enter**.	New calibration: Press **cal** key.
	Place sensor in process. The new value is shown in the main display alternately with "Hold"; "enter" blinks. End with **enter**.	After end of calibration, 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.

Zero Calibration

The sensor models SE 703, SE 706, and SE 707 have a very low zero current. A zero calibration is only recommended for measurement of oxygen traces.
Therefore, you should not perform a zero calibration with Stratos Eco 2405. If you still wish to perform a zero calibration, the DO sensor should remain for at least 10 to 30 minutes in an **oxygen-free** calibration medium in order to obtain stable, non-drifting values. During zero calibration, a drift check is not performed. Zero 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
	Select calibration (press **cal** key). Enter passcode 1001. Select with ▸ key, edit number with ▴ key, proceed with **enter**.	Device is in the Hold mode. If an invalid code is entered, the device returns to measuring mode.
	Place sensor in oxygen-free medium	
	Main display: Zero current. Press **enter** to save this value or correct using arrow keys and then save with **enter**. Secondary display: Sensor current measured	
	Display of slope Display of new zero current End calibration with **enter** key, re-place sensor in process.	New calibration: Press **cal**.
	The oxygen value is shown in the main display alternately with "Hold", "enter" blinks. Stop Hold with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Product Calibration
Calibration by comparison

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

Procedure: The currently measured value is stored in the device for comparison. 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 device. 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). The following describes a product calibration with slope correction – a product calibration with zero correction is performed correspondingly.

Display	Action	Remark
	Press **cal** key, enter code 1105. Press ▸ key to select position, enter number using ▴ key, confirm with **enter.**	The type of product calibration (SAT or Conc) is selected during configuration (process variable). If an invalid code is entered, the device returns to measuring mode.
		Display (approx. 3 sec)

Display	Action	Remark
	Save currently measured value. Proceed with **enter**.	Perform reference measurement.
	Enter the comparison value. Confirm with **enter**.	Calculation of new slope
	Display new slope and zero (related to 25 °C and 1013 mbars). End calibration with **enter**.	New calibration: Press **cal**.
	The new value is shown in the main display alternately with "Hold", "enter" blinks. End with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

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

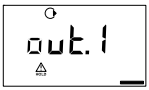
Measurement

Display	Action
	In the measuring mode the main display shows the configured process variable (%, mg/l, or ppm) and the lower display the temperature. During calibration you can return to measuring mode by pressing the **cal** key, during configuration by pressing **conf** (waiting time for signal stabilization approx. 20 sec).

Diagnostics Functions

Display	Action
	**Display of output currents** Press **enter** while in measuring mode. The current at output 1 is shown in the main display, the current at output 2 in the secondary display. After 5 sec the device returns to measuring mode.
	**Display of calibration data (Cal Info)** Press **cal** while in measuring mode and confirm code 0000. The slope is shown in the main display, the zero current in the secondary display. After 20 sec the device returns to measuring mode (immediate return at pressing **enter**).
	**Sensor monitor** (display of sensor current) Press **conf** while in measuring mode and enter code 2222. The (uncompensated) sensor current is shown in the main display, the measuring temperature in the secondary display. Press **enter** to return to measurement.
	**Display of last error message** (Error Info) Press **conf** while in measuring mode and confirm 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**).

These functions are used for testing the connected peripherals.

Display	Action
 	**Specify current at output 1** Press **conf** while in measuring mode and enter code 5555. The current indicated in the main display for output 1 can be edited. Select with ▸ key, edit number with ▲ key. Confirm entry with **enter**. The entered value will be shown in the secondary display. The device is in Hold mode. Press **conf**, then **enter** to return to measurement (Hold remains active for another 20 sec).
 	**Specify current at output 2** Press **conf** while in measuring mode and enter code 5556. The current indicated in the main display for output 2 can be edited. Select using ▸ key, edit number using ▲ key. Confirm entry with **enter**. The entered value will be shown in the secondary display. The device is in Hold mode. Press **conf**, then **enter** to return to measurement (Hold remains active for another 20 sec).

Error Messages (Error Codes)

Error	Display	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
ERR 01	Measured value blinks	**SAT range** • Sensor defective • Wrong sensor connected • Measurement range exceeded	x	x	x	
ERR 02	Measured value blinks	**Conc range** • Sensor defective • Wrong sensor connected • Measurement range exceeded	x	x	x	
ERR 98	"Conf" blinks	**System error** Configuration or calibration data defective; completely reconfigure the device using the factory settings. Then calibrate. Memory error in device program	x	x	x	x
ERR 99	"FAIL" blinks	**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	x	x	x

Error	Icon (blinks)	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
ERR 03		**Temperature probe** Open or short circuit Temperature range exceeded	x	x	x	x
ERR 11		**Current output 1** Current below 0 (3.8) mA	x	x	x	
ERR 12		**Current output 1** Current above 20.5 mA	x	x	x	
ERR 13		**Current output 1** Current span too small / too large	x	x	x	
ERR 21		**Current output 2** Current below 0 (3.8) mA	x	x		x
ERR 22		**Current output 2** Current above 20.5 mA	x	x		x
ERR 23		**Current output 2** Current span too small / too large	x	x		x
ERR 33		**Sensocheck:** Sensor: Connecting cable defective	x	x	x	
		• Zero error, Sensoface active, see Pg 74				
		• Slope error, Sensoface active, see Pg 74				
		• Response time exceeded, Sensoface active, see Pg 74				
		• Calibration interval expired, Sensoface active, see Pg 74				

Calibration Error Messages

Icon blinks:	Problem Possible causes
	**Slope out of range** Wrong calibration values specified (relative humidity, pressure, saturation, concentration)
 In addition “CAL Err” blinks.	**Calibration aborted after 12 minutes** 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

Operating status	Out 1	Out 2	Relay 1 limit value	Alarm contact	LED	Timeout
Measure	■	■	■	■	■	
Cal Info (cal) 0000	■	■	■	■	■	20 s
Error Info (conf) 0000	■	■	■	■	■	20 s
Calibration (cal) 1100	■	■				
Temp adjustment (cal) 1015	■	■				
Product calibration (cal) 1105	■	■				
Configuration (conf) 1200	■	■				20 min
Sensor monitor (conf) 2222	■	■				20 min
Current source 1 (conf) 5555	■	■				20 min
Current source 2 (conf) 5556	■	■				20 min

■ active

■ as configured (Last/Fix or Last/Off)

Sensoface

(Sensocheck 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 703, SE 706)

	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 %
😐	 30 ... 35 nA or 90 ... 110 nA	 -0.6 ... -0.3 nA or +0.3 ... +0.6 nA	 300 ... 600 s	 80 ... 100 %
☹	 < 30 nA or > 110 nA	 < -0.6 nA or > +0.6 nA	 > 600 s	 Timer expired

Notice
The worsening of a Sensoface criterion leads to the devaluation of the Sensoface indicator (Smiley becomes "sad"). To reset the Sensoface indicator, the defect must be remedied and the Stratos be calibrated.

Type B Sensors (SE 707)

	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 %
😐	 225 ... 250 nA or 500 ... 525 nA	 -1.0 ... -0.5 nA or +0.5 ... +1.0 nA	 300 ... 600 s	 80 ... ≤ 100 %
☹	 < 225 nA or > 525 nA	 < -1.0 nA or > +1.0 nA	 > 600 s	 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 blinks:

The Sensocheck message is also output as error message Err 33. The alarm contact is active, the red LED is lit, output current 1 is set to 22 mA (when configured correspondingly). Sensocheck can be switched off during configuration (then Sensoface is also disabled).
Exception: After a calibration a smiley is always displayed for confirmation.

Product Line and Accessories

Devices	Order No.
Stratos Eco 2405 Oxy	2405 Oxy
Mounting Accessories	
Pipe-mount kit	ZU 0274
Panel-mount kit	ZU 0275
Protective hood	ZU 0276
Connector for power supply instead of cable gland, Harting HAN 7D, with male insert	ZU 0271
Connector for current output instead of cable gland, Harting HAN 8U, with female insert	ZU 0272

For more information concerning our sensors and fittings product line, please refer to our "Sensors, Fittings, Accessories" catalog:
Download at http://www.knick.de or request catalog:
Phone: +49 (0)30 - 801 91 - 0
Fax: +49 (0)30 - 801 91 - 200
E-mail: knick@knick.de

Specifications

DO input

	Measuring current	–2 ... +1800 nA
	Resolution (with $V_{pol} \leq 800$ mV and $V_{ref} \leq 200$ mV)	0.05 nA
	Saturation (-10 ... 80 °C)	0... 200%
	Meas. error[1,2,3)]	0.5 % meas.val. + 0.5 %
	Concentration (-10 ... 80 °C)	0,00 ... 20.00 mg/l 0.00 ... 20.00 ppm
	Meas. error[1,2,3)]	0.5 % meas.val. + 0.05 mg/l or 0.05 ppm
	Permitted guard current	≤ 20 µA
	Polarization voltage *	0 ... 1000 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 *	• O_2 saturation (automatic) • O_2 concentration (automatic) • Product calibration • Zero calibration	
Calibration range	Zero point	± 2 nA
Sensor Type A	Slope	25 ... 130 nA (at 25 °C, 1013 mbars)
Calibration range	Zero point	± 2 nA
Sensor Type B	Slope	200 ... 550 nA (at 25 °C, 1013 mbars)
Calibration timer *	0000 ... 9999 h	
Pressure correction *	0.000 ... 9.999 bars / 999.9 kPa / 145.0 psi	

Sensor monitoring

Sensocheck	Monitoring for short circuits / open circuits (can be disabled)

Sensoface	Provides information on the sensor condition (evaluation of zero/slope, response time, calibration interval, Sensocheck)
Temperature input *	NTC 22 kΩ / NTC 30 kΩ 2-wire connection, adjustable
Measuring range	–20.0 ... +150.0 °C / –4 ... +302 °F
Adjustment range	10 K
Resolution	0.1 °C / 1 °F
Meas. error[1,2,3)]	< 0.5 K (< 1 K at > 100°C)
Output 1	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 2)
Process variable*	DO saturation/DO concentration
Overrange *	22 mA in the case of error messages
Output filter *	Low-pass, filter time constant 0 ... 120 s
Measurement error [1)]	< 0.3% current value + 0.05 mA
Start/end of scale	As desired within range
Admissible span	5 ... 200 % / 0.5 ... 20 mg/l (ppm)
Output 2	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 1)
Process variable	Temperature
Overrange *	22 mA in case of temp error messages
Output filter *	Low-pass, filter time constant 0 ... 120 s
Measurement error [1)]	< 0.3% current value + 0.05 mA
Start/end of scale *	–20 ... +150 °C / –4 ... +302 °F
Admissible span	20 ... 170 K / 36 ... 306 °F
Alarm contact	Relay contact, floating
Contact ratings	AC< 250 V / < 3 A / < 750 VA DC< 30 V / < 3 A / < 90 W
Contact response	N/C (fail-safe type)
Response delay	10 s

Limit values	Output via relay contact
Contact ratings	AC< 250 V / < 3 A / < 750 VA DC< 30 V / < 3 A / < 90 W
Contact response*	N/C or N/O
Delay *	0000 ... 9999 s
Setpoints*	Within selected range
Hysteresis*	000.0 ... 050.0 % / 00.00 ... 05.00 mg/l (ppm)
Display	LC display, 7-segment with icons
Main display	Character height 17 mm, unit symbols 10 mm
Secondary display	Character height 10 mm, unit symbols 7 mm
Sensoface	3 status indicators (friendly, neutral, sad face)
Mode indication	4 mode indicators "meas", "cal", "alarm", "config" Further icons for configuration and messages
Alarm indication	Red LED in case of alarm
Keypad	5 keys: [cal] [conf] [▸] [▴] [enter]
Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
Device self-test	Automatic memory test (RAM, FLASH, EEPROM)
Display test	Display of all segments
Last Error	Display of last error occurred
Sensor monitor	Display of direct, uncorrected sensor signal
Data retention	Parameters and calibration data > 10 years (EEPROM)
Protection against electric shock	Safe electrical isolation of all extra-low-voltage circuits against mains by double insulation to EN 61010-1
Power supply	24 (–15%) ... 230 V AC/DC (+10%); approx. 5 VA, 2.5 W AC: 45 ... 65 Hz Overvoltage category II, protection class II

Nominal operating conditions	
Ambient temperature	–20 ... +55 °C
Transport/Storage temp	–20 ... +70 °C
Relative humidity	10 ... 95% not condensing
Power supply	24 (–15%) ... 230 V AC/DC (+10%)
Frequency for AC	45 ... 65 Hz
EMC	EN 61326-1, EN 61326-2-3
Emitted interference	Class B (residential area) Class A for mains > 60 V DC
Immunity to interference	Industry
Explosion protection	
FM:	NI Class I Div 2 Group A, B, C & D, T4 Ta = 55 °C; Type 2 NI Class I Zone 2 Group IIC, T4 Ta = 55°C; Type 2
CSA	Class I Div 2 Groups A, B, C and D, T4 Ex nA IIC T4
Enclosure	Molded enclosure made of PBT (polybutyleneterephtalate)
Color	Bluish gray RAL 7031
Mounting	• Wall mounting • Pipe mounting: Ø 40 ... 60 mm □ 30 ... 45 mm • Panel mounting, cutout to DIN 43 700, sealed against panel
Dimensions	H 144 mm, W 144 mm, D 105 mm
Ingress protection:	IP 65 / NEMA 4X
Cable glands	3 knockouts for cable glands M20x1.5 2 knockouts for NPT 1/2" or rigid metallic conduit
Weight	Approx.1 kg

* User-defined

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

2) ± 1 count

3) Plus sensor error

Approvals – Canada

Warnings and Notes to Ensure Safe Operation

Warning!
Do not disconnect equipment unless power has been switched off.

Caution!
Clean only with antistatic moistened cloth.

Caution!
Substitution of components may impair suitability for hazardous locations.

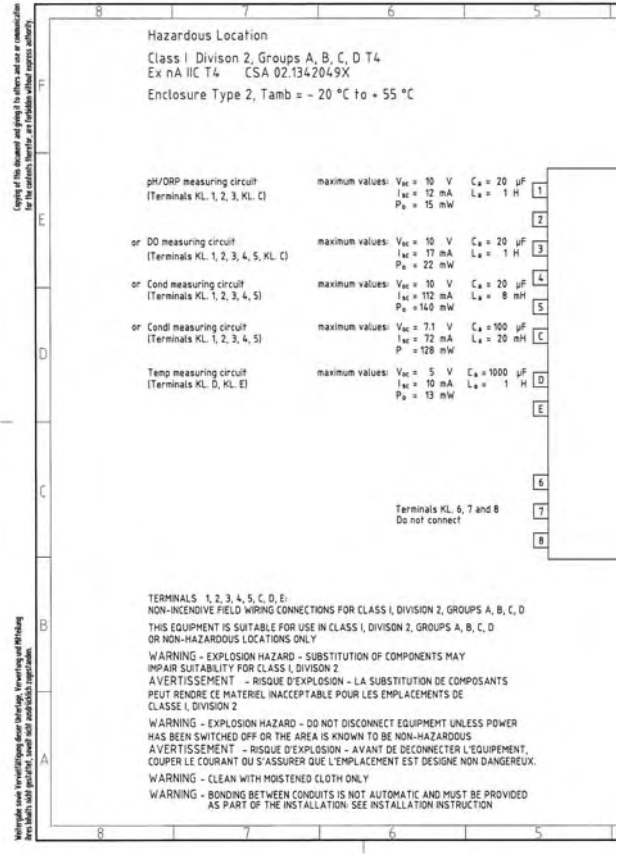
- The equipment shall be installed and protected from mechanical impact and ultraviolet (UV) sources.
- Clean only with a moistened antistatic cloth as potential electrostatic hazard may exist. Service equipment only with conductive clothing, footwear and personal grounding devices to prevent electrostatic accumulation.
- Internal grounding provisions shall be provided for field wiring. Bonding between conduit shall be provided during installation, and all exposed non-current carrying metallic parts shall be bonded and grounded.
- Installation in a ClassI, Division 2 or Class I, Zone 2 hazardous location shall be in accordance with the Canadian Electrical Code (CEC Part 1) Section 18 Division 2 wiring methods.
- The equipment shall have a switch or circuit breaker in the building installation (that is in close proximity to the equipment) that is marked as the disconnect switch.
- The enclosure Type 2 is only for indoor use.
- The mains supply voltage fluctuations should not exceed -15/+10 percent of the nominal supply voltage.
- The device shall not be used in a manner not specified by this manual.

Caution!
Use supply wires suitable for 30 °C above ambient and rated at least 250 V.

Caution!
Use signal wires suitable for at least 250V.

OBSERVE THE SPECIFICATIONS OF THE CONTROL DRAWING!

CSA Control Drawing



Stratos Transmitter 2405

Stratos Eco 2405 pH one pH/ORP input
Stratos Eco 2405 Oxy one DO input
Stratos Eco 2405 Cond one Conductivity input for 2-/4-electrode sensors
Stratos Eco 2405 CondI one Conductivity input for electrodeless conductivity sensors

20 Power supply circuit
(Terminals Kl. 19, 20)
19 20 to 253 V AC/DC, approx. 5 VA

18 Terminals KL. 17 and 18
17 Do not connect

16 Switching circuit
ALARM (Terminals KL. 15, 16)
15 maximum values:
AC: = 253 V / = 3 A / = 750 VA / resistive load
DC: = 30 V / = 3 A / = 90 W / resistive load

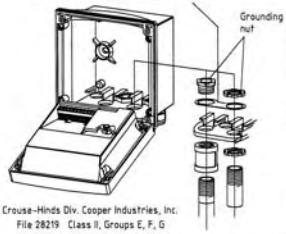
14 Terminal KL. 14
Do not connect

13 Switching circuit
REL. 1 (Terminals KL. 12, 13)
12 maximum values:
AC: = 253 V / = 3 A / = 750 VA / resistive load
DC: = 30 V / = 3 A / = 90 W / resistive load

11 Output circuits
OUT 1 and OUT 2 (Terminals KL. 9, 10 and 11, 10)
10 maximum values:
V_{oc} = 10 V C_a = 10 µF
9 I_{sc} = 22 mA L_a = 100 mH
P_o = 220 mW

Conduit mounting:

Place washer between enclosure and nut



Crouse-Hinds Div. Cooper Industries, Inc:
File 28219 Class II, Groups E, F, G
HUB BASIC SCRU-TITE: ST-1, STA-1
GROUND HUB: SSTG-1, STG-1, STAG-1
GROUND NUT: STGN-1, STAGN-1
FILE 13046 Class I, Zone 1, Ex e II; IP 66
GROUND HUB BASIC SCRU-TITE: STGK-1, SSTGK-1

Appleton
FILE 208042 Class II, Groups E, F, G
HUBG-50D, HUBL-50D

Thomas & Betts Corporation
FILE 23086 Class I, Div 2
Hub: 370AL, 370
Grounding Bushing: 3870

Division 2 Wiring Methods:
The connections of the transmitter are incendive and must be installed in accordance with the Canadian Electrical Code Part I Section 18-Hazardous Locations.

Verteiler: FUL (2x)	Zul. Abweichungen für Maße ohne Toleranzangabe ISO 2768 - m	Oberfläche	Maßstab	Blatt 1	
			Maßzeug		
	Datum	Name	Benennung	control drawing CSA Stratos Eco 2405	
	Bearb.	09.04.08 dap			
	Gepr.(KON)				
	Freigabe(FGL)	10.4.08			
	Schutzvermerk nach ISO 16016 beachten		Zeichnungsnummer	194.130-330	
Nr. Ält.	Datum	Bearbeiter FGL KON	Ungültig ab:	Ersetzt durch:	

Index

Passcodes

Calibration

Key + passcode	Menu item	Page
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cal + 1015	Temp probe adjustment	67

Configuration

Key + passcode	Menu item	Page
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conf + 1200	Configuration	26
conf + 2222	Sensor monitor (sensor current)	68
conf + 5555	Current source 1 (specify output current)	69
conf + 5556	Current source 2 (specify output current)	69
conf + ▸ + 4321	Factory setting	52