

Stattox 505 Sensor Head



Operations Manual

Stattox 505 Sensor Head Operations Manual

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1 Safety Instructions

The Statox 505 sensor head is certified as explosion-proof safety equipment for group II category 2. The intended use is the measurement of toxic gas and oxygen concentration. Due to its intrinsically safe design it is safe to install and operate this product in zone 1 and zone 2. All relevant sensor parameters will be set automatically as soon as the sensor is connected.

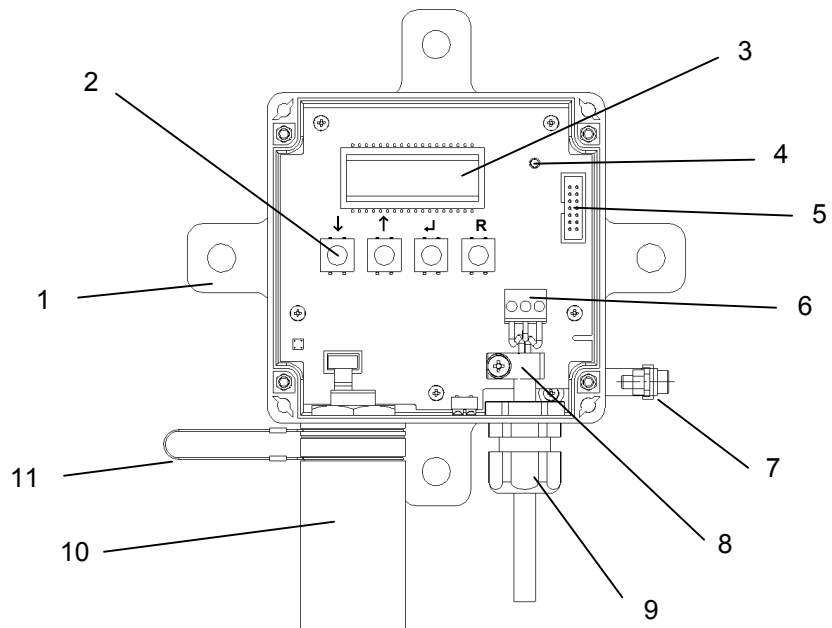
The following safety guidelines must be observed in particular:

- When installing and connecting the transmitter, the safety relevant electrical parameters and the protection class of the sensor head must comply with local standards (e.g. IEC 60079-14).
- If installed in a hazardous area, the power supply of the sensor heads must be intrinsically safe. Recommended products see connection diagrams in chapter 3.3 and in chapter 7 (accessories).
- The sensor head may only be operated within the specified environmental conditions.
- Damaged or not tightly closed housings may cause malfunction or loss of accuracy.

All of the above warnings must be observed. Incorrect installation or connection will void the explosion proof rating and thus be dangerous to life and assets.

2 Statox 505 construction

The housing cover is attached with 4 bayonet screws. To open it, just turn these screws 90° counter-clockwise. The cover is secured to the housing with a steel strap.



- 1 Mounting plate with 4 holes ϕ 10 mm
- 2 Push buttons
- 3 Display
- 4 LED
- 5 Programming interface (not for customer use)
- 6 Cable terminal X1
- 7 Ground terminal
- 8 Clamp for cable shield
- 9 cable gland M16x1,5
- 10 Sensor cover including filter support
- 11 Securing strap for sensor cover

3 Installation and connection

3.1 Warning

If the sensor head is installed in hazardous areas, the power supply must be intrinsically safe. Observe the safety - relevant specifications of sensor head, cable and barrier respectively intrinsically safe repeater.

Caution:

Do not install the sensor unless the sensor head has been connected to the power supply.

The following specifications must be observed:

$U_o \leq U_i$
$I_o \leq I_i$
$C_o \geq C_i + I \cdot C_L$
$L_o \geq L_i + I \cdot L_L$

U_o, I_o, C_o, L_o : certified repeater specifications
 U_i, I_i, C_i, L_i : sensor head specifications (→ technical data)
 C_L = cable capacity in pF/m
 L_L = cable inductivity in nH/m
 I = cable length in m

The allowable cable length is defined in most cases by the cable capacity:

$$I_{max} = C_o / C_L \quad (C_i \text{ is negligible}).$$

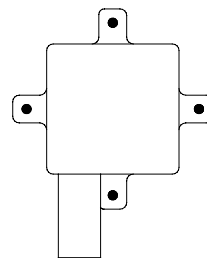
Example: Cable type LiYCY 0,75mm ² : $C_L = 110 \text{ pF/m}$ Repeater: $C_o = 63 \text{ nF}$ → $I_{max} = 573 \text{ m}$

Recommended cable type: see chapter 3.3.

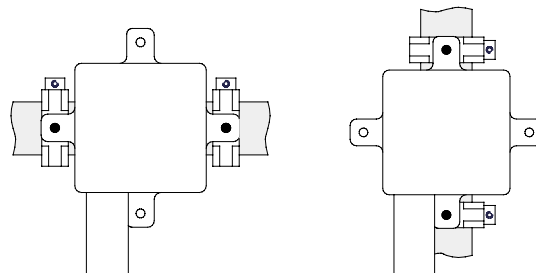
3.2 Installation

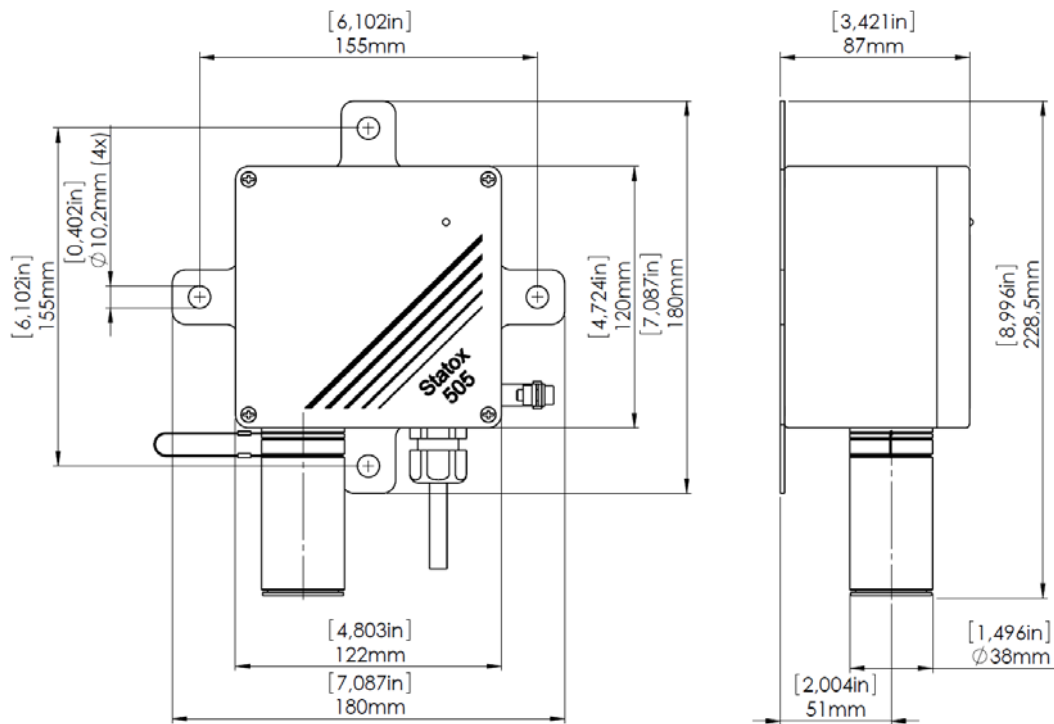
Install the sensor head sensor downwards. Use stainless steel screws or insulate screws from mounting plate to avoid corrosion. In case of potential static voltage, ground the sensor head.

The sensor head can be mounted to a wall with 2 or 4 screws without opening the housing:



Alternatively it can be mounted to a horizontal or vertical pipe. Statox 505 pipe mounting kits are listed in chapter 7 accessories.

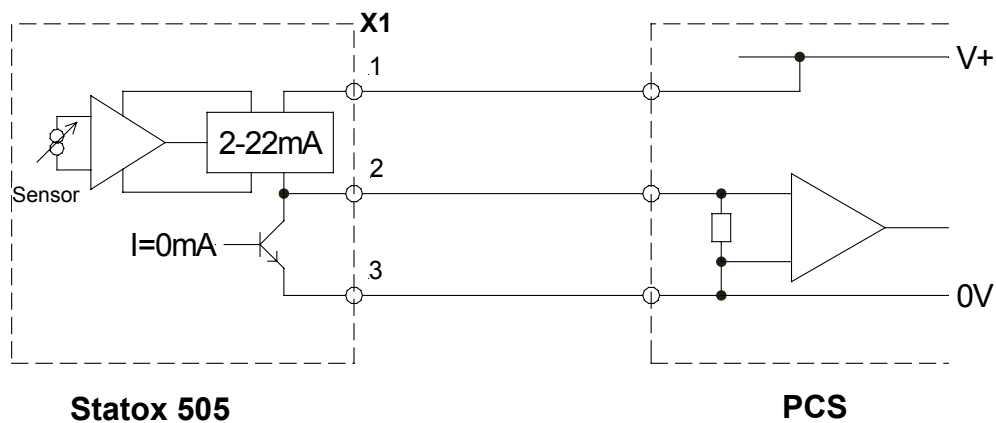




Sataox 505 drilling plan and dimensions

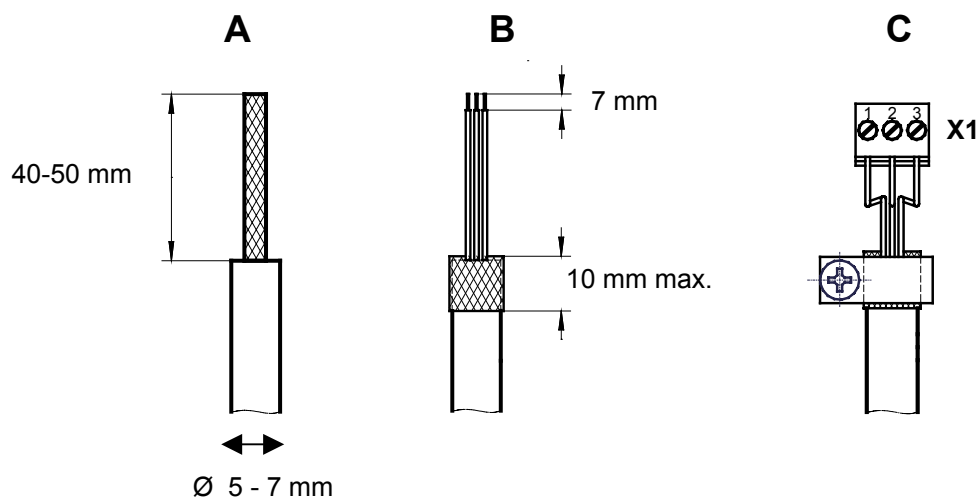
3.3 Electrical connection

- Use cable with 2 or 3 x $\geq 0,75 \text{ mm}^2$ with close - mached shield, outer diameter ca. 6 mm (e.g. type Oelflex 415 CP3 X 0,75).
- Advantage of 3 - wire operation:
In the two wire mode, the output signal for service and system failure is the same (2 mA).
In the 3 - wire mode you can differentiate between “service” (non - critical = 2 mA) and “failure” (critical = 0 mA).
- If connecting the Statox 505 sensor head to a Statox 501 control module, follow the connecting diagrams in the chapters 3.3.2 and 3.3.3. If connecting the Statox 505 sensor head directly to a PCS, observe the following connecting diagram. In case of 2-wire-mode use only terminals 1 and 2.



3.3.1 Statox 505 cable connection

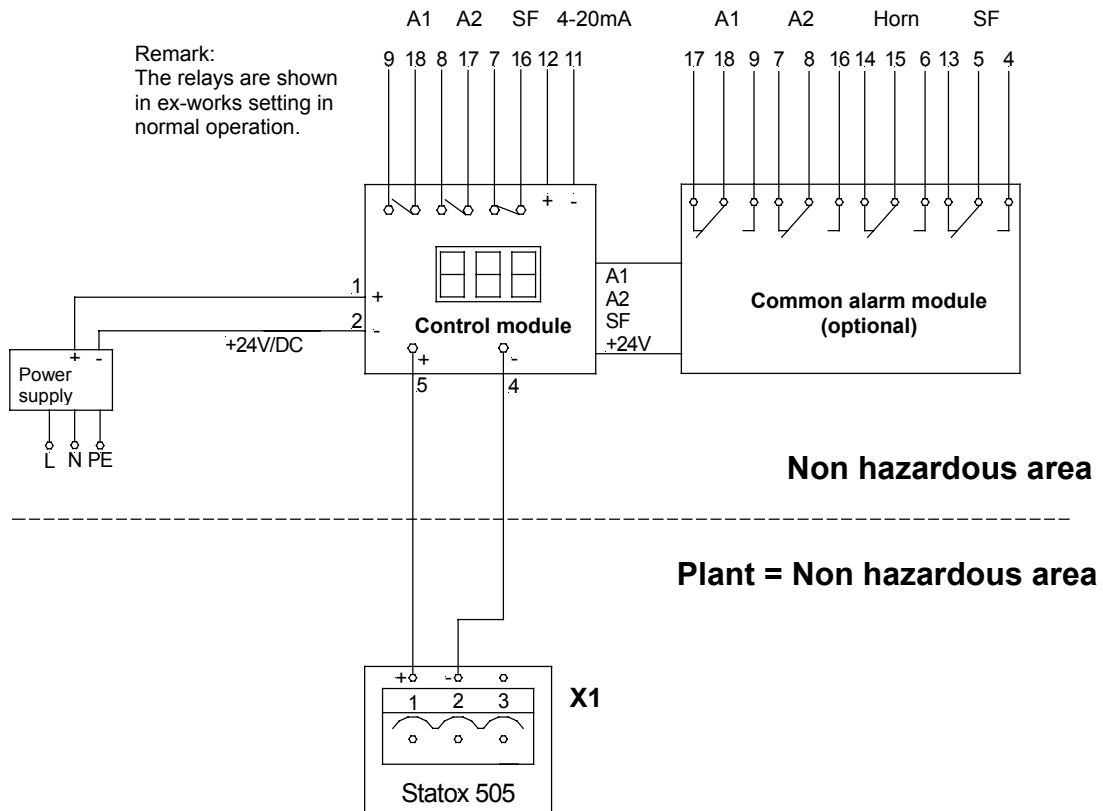
- Use cable with 2 or 3 x $\geq 0,75 \text{ mm}^2$ with close – mashed shield, outer diameter ca. 6 mm (e.g. type Oelflex 415 CP3 X 0,75).
- Do not install the sensor unless the sensor head is connected to the power supply.
- Run 20 cm (8 in) of cable through the cable gland.
- Strip the cable down to the shield. (A)
- Shorten the shield to 10 mm (0,4 in) and bend it backward. Make sure it does not touch the housing. (B)
- Connect the wires as shown in the schematics. The terminal is plugged in. Remove it for easy installation.
- Draw the cable back until the shield matches the clamp
- Fasten the cable gland.
- Secure the shield with the clamp. Good contact provides best protection from electromagnetic interference.
- Plug the terminal in.
- When the sensor head is connected to the power supply, the LED starts flashing for a short time and the display shows the software index.
- Now install the sensor (see chapter 4).



3.3.2 Connection diagram with Statox 501 Control Module in the 2-wire mode

Before connecting the sensor head, select the appropriate program. Refer to the Statox 501 operations manual and the program overview.

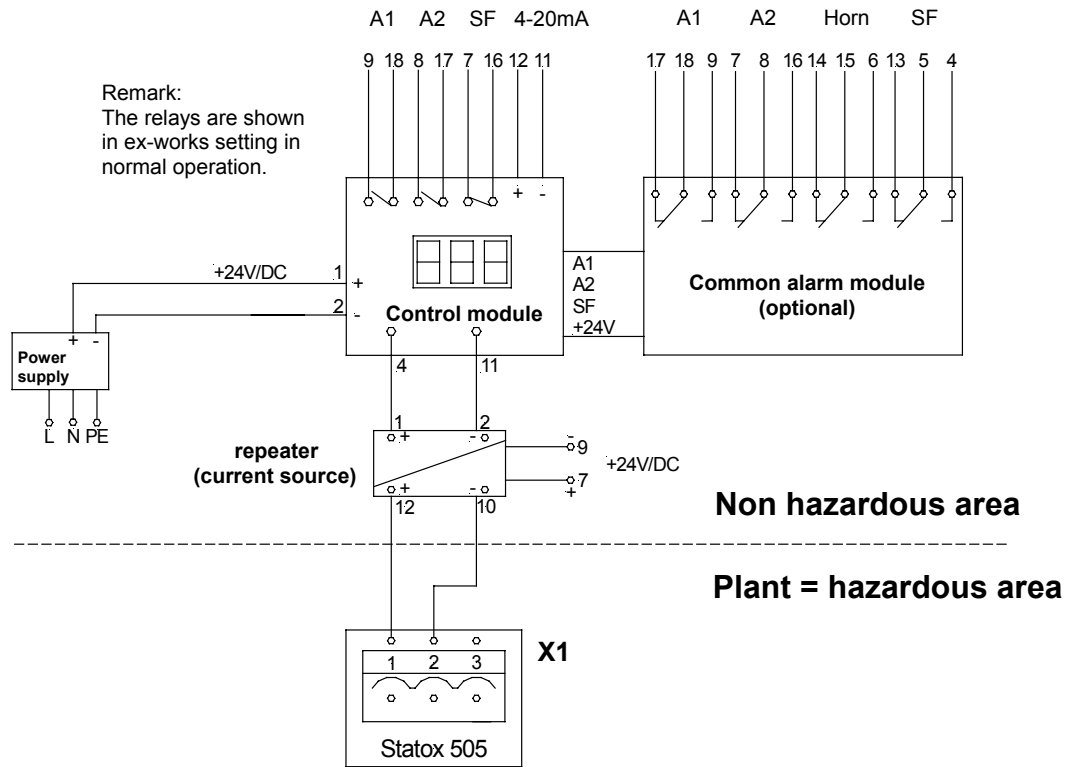
3.3.2.1 2-wire mode installation in non hazardous areas



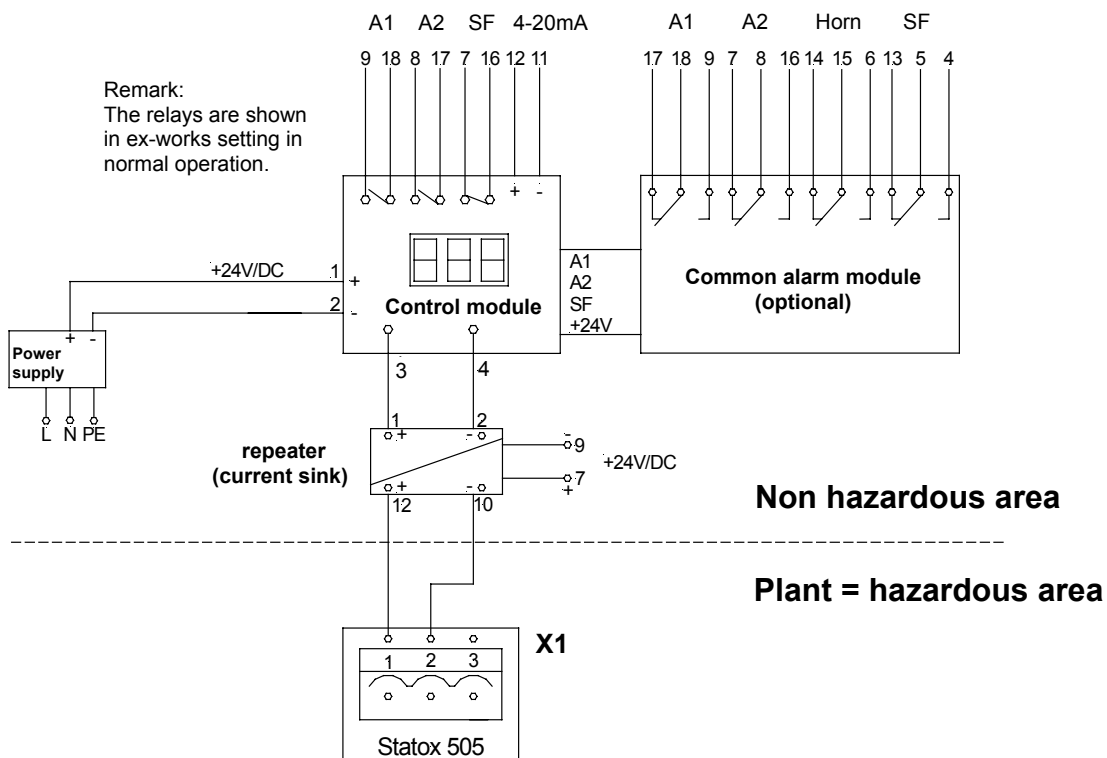
3.3.2.2 2-wire mode installation in hazardous areas

Caution: Incorrect connection of the intrinsically safe repeater might destroy it. Please take care for correct polarity and avoid short circuits.

Repeater forms a current source: the terminal numbers on the drawing below refer to repeater type 9160/13-11-11s from manufacturer R.Stahl Schaltgeräte GmbH. It requires an extra power supply and forms a **current source** at clamps 1 and 2.



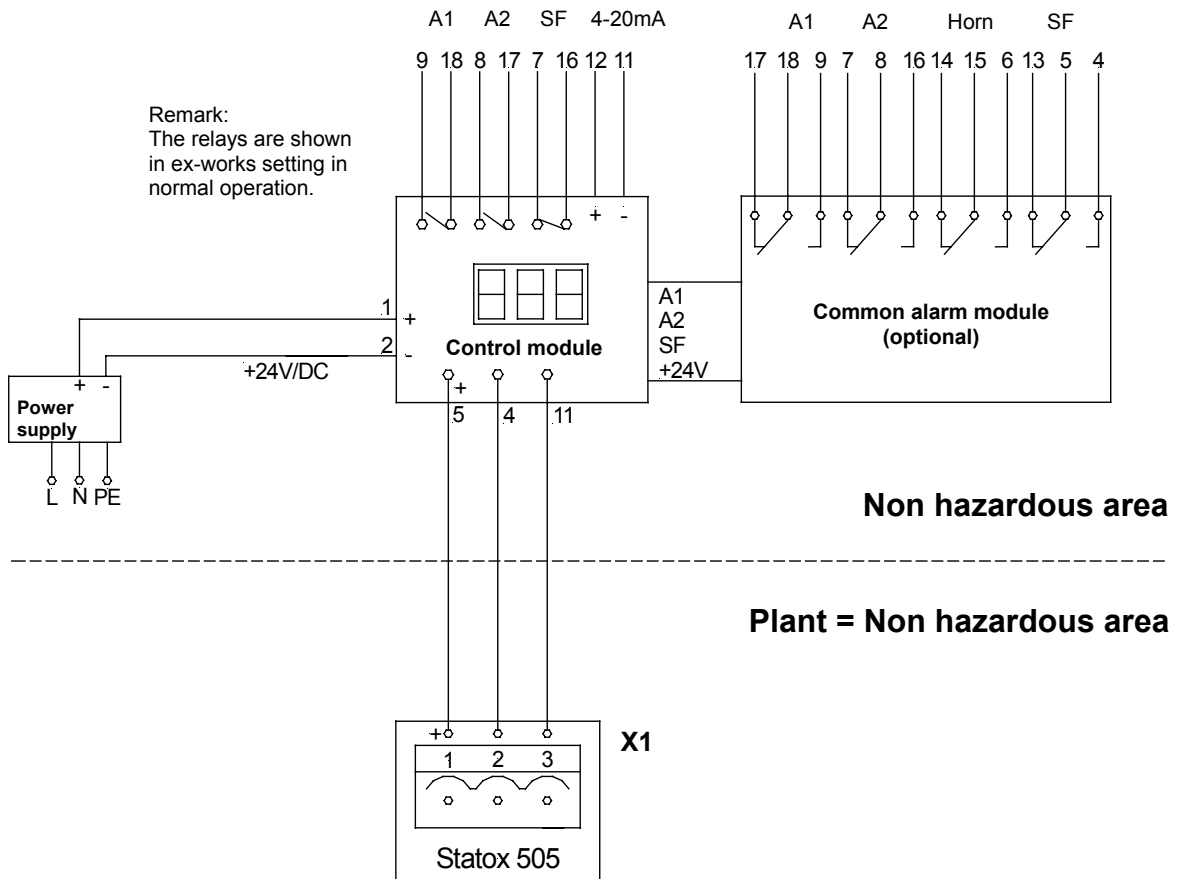
Repeater forms a current sink: the terminal numbers on the drawing below refer to repeater type 9160/13-10-11s from manufacturer R.Stahl Schaltgeräte GmbH. It requires an extra power supply and forms a **current sink** at clamps 1 and 2.



3.3.3 Connection diagram with Statox 501 Control Module in the 3-wire mode

Before connecting the sensor head select the appropriate program. Refer to the Statox 501 operations manual and the program overview.

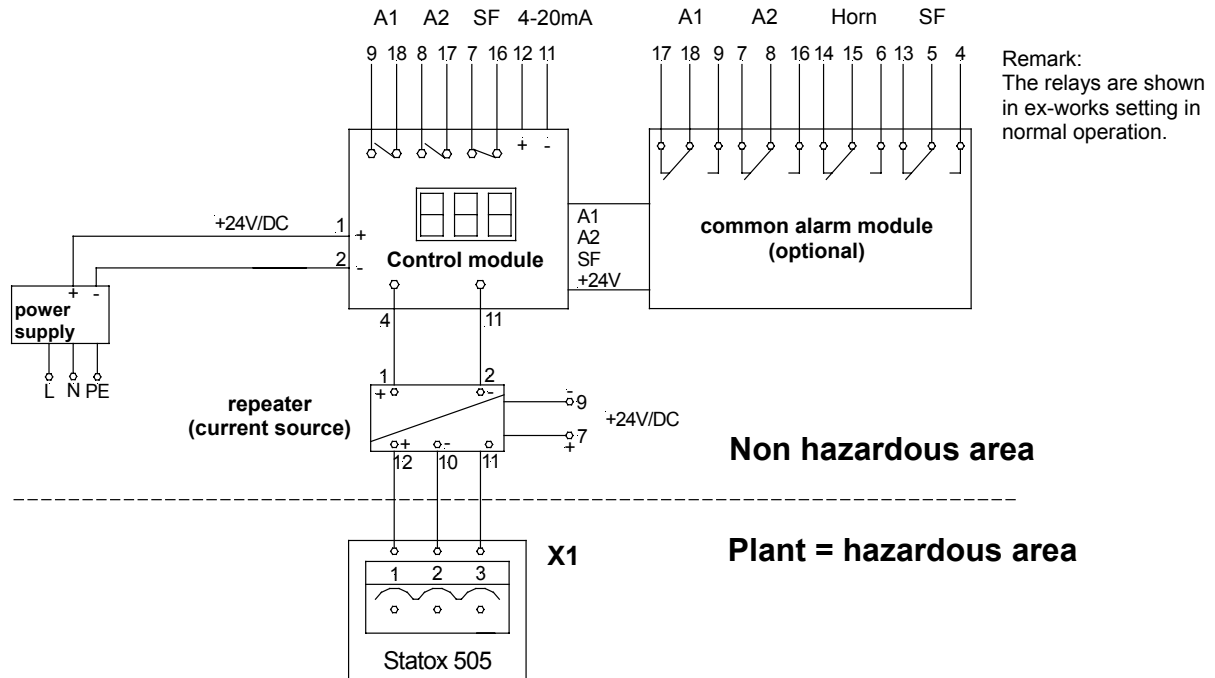
3.3.3.1 3-wire mode installation in non – hazardous areas



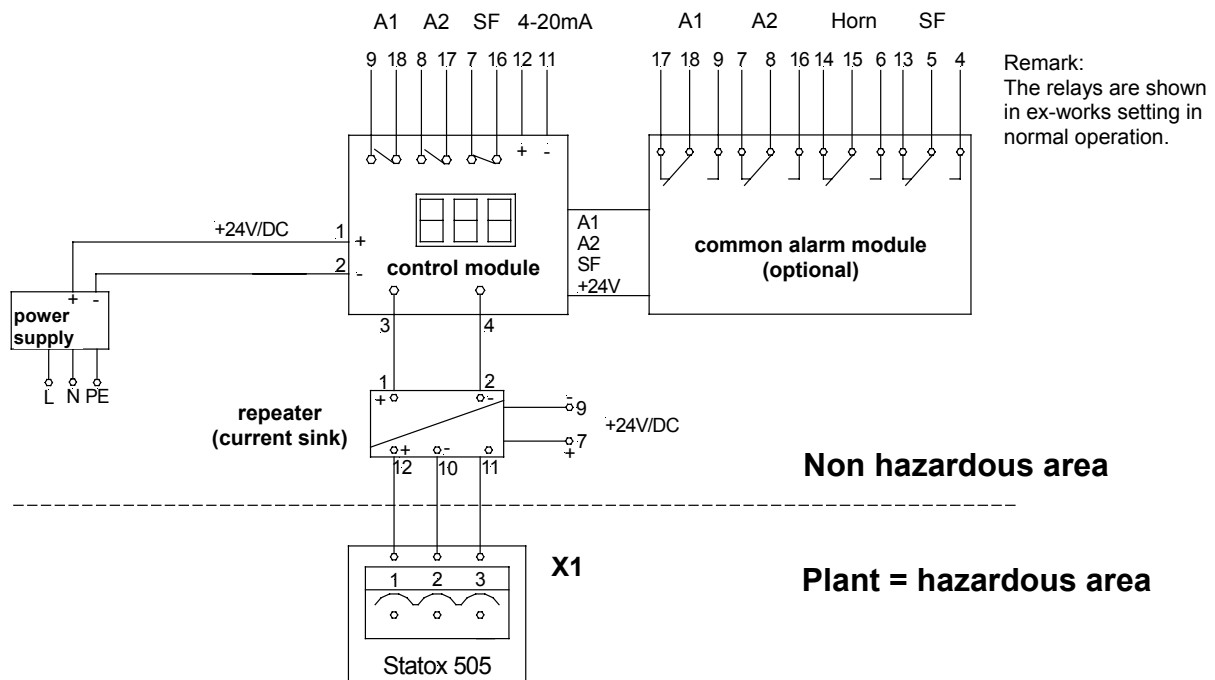
3.3.3.2 3-wire mode installation in hazardous areas

Caution: Incorrect connection of the intrinsically safe repeater might destroy it. Please take care for correct polarity and avoid short circuits.

Repeater forms a current source: the terminal numbers on the drawing below refer to repeater type 9160/13-11-11s from manufacturer R.Stahl Schaltgeräte GmbH. It requires an extra power supply and forms a **current source** at clamps 1 and 2.

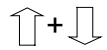


Repeater forms a current sink: the terminal numbers on the drawing below refer to repeater type 9160/13-10-11s from manufacturer R.Stahl Schaltgeräte GmbH. It requires an extra power supply and forms a **current sink** at clamps 1 and 2.



4 Start –up and service

Sensor head keyboard:



Press UP and DOWN at the same time to enter the menu.



Increase / decrease the displayed parameter.
Press and hold button for fast forward.

R

RESET: One level up in the menu.

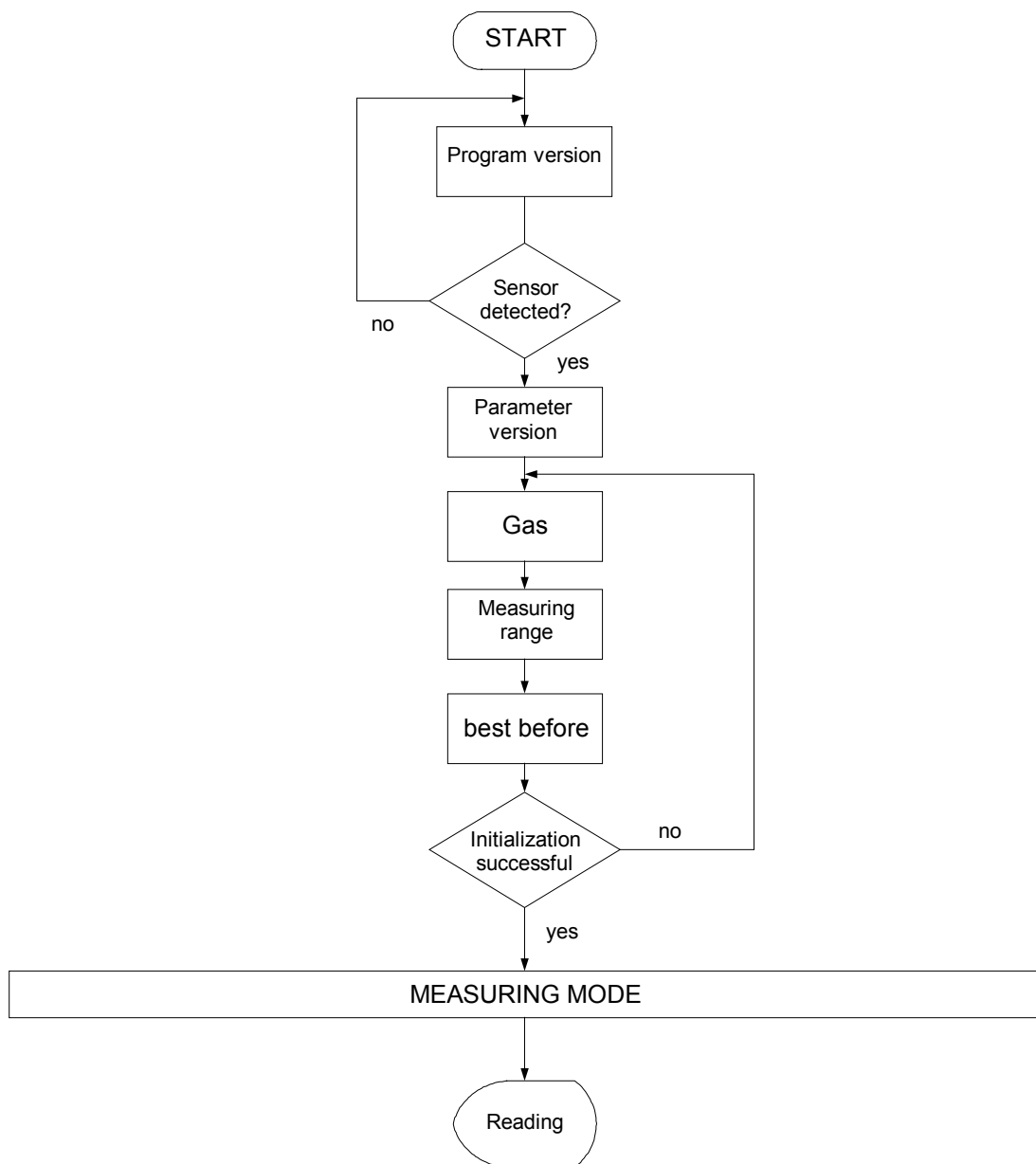


ENTER

Timeout: The sensor head returns automatically into the measuring mode if no key is pressed for more than 5 minutes.

4.1 Start - up and measuring mode

- As soon as the sensor head is connected to the power supply, it starts a self test and shows the software index.
- Now install the sensor and filter (details see chapter 5).
- Remove the yellow protection cap from the sensor cover!
- As soon as the sensor is connected, the sensor head displays the parameter set: the gas to be detected, the measuring range and the best before date of the sensor. As soon as zero has stabilized, the instrument goes into the measuring mode. The green LED starts flashing.
As long as the sensor head is not ready, the output signal is in the system fail mode, i. e. 2 mA when operated in the 2 wire mode, 0 mA when operated in the 3 wire mode.
- When the sensor head has completed the start – up sequence, you can start setting the real time clock (see chapter 4.2) and the service mode output signal (see chapter 4.3).

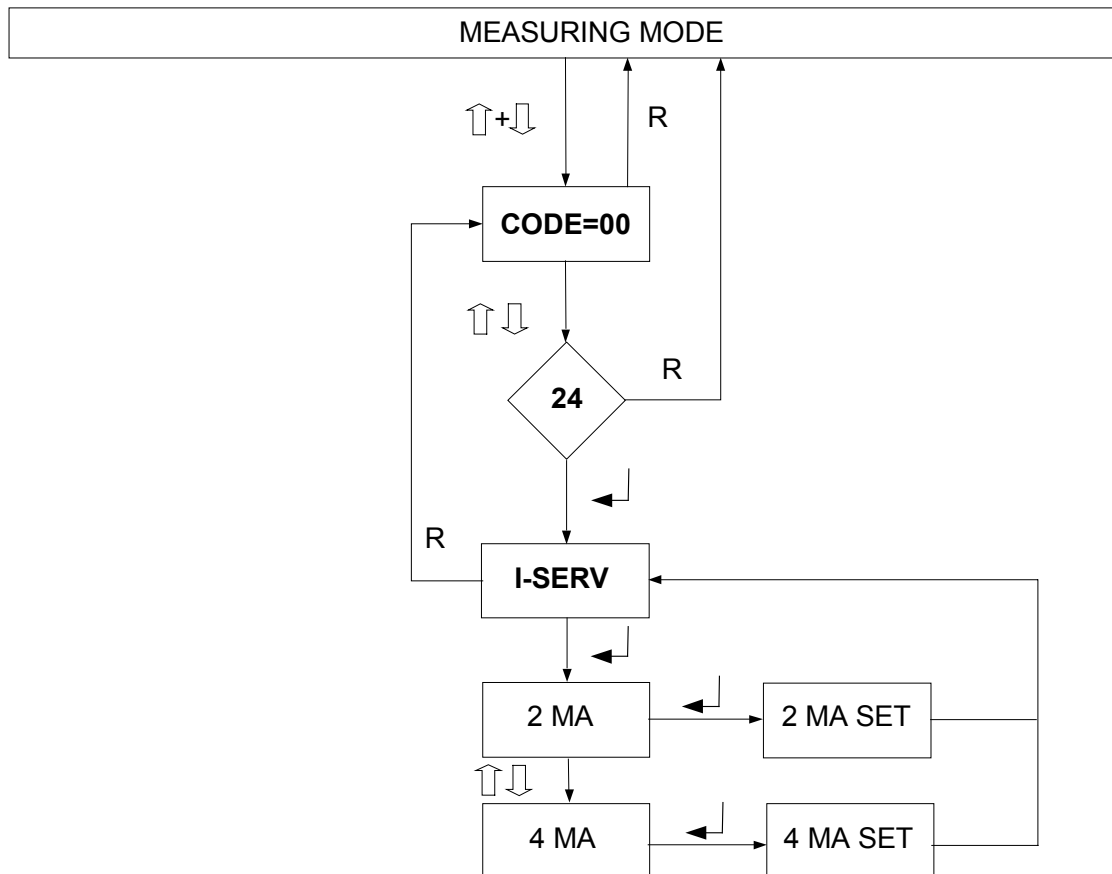


4.3 Setting the “service mode” output signal

- The following table shows the potential modes and outputs.

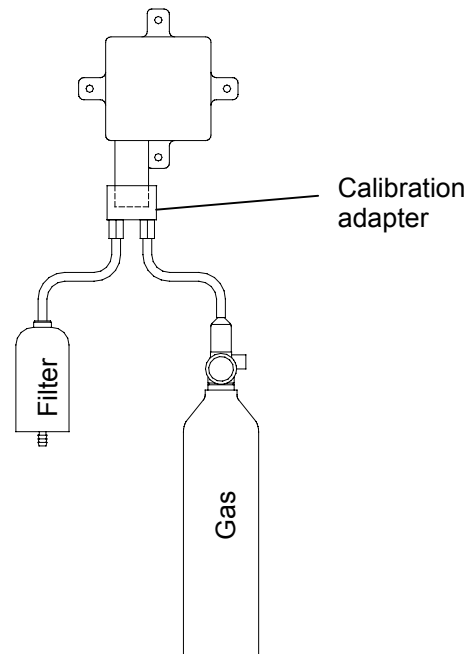
	Failure (critical failure)	Service (non critical failure)	Display on the Statox 501 control module
2-wire operation	2 mA	2 mA 4 mA	“SerU” (Service) “0”
3-wire operation	0 mA	2 mA 4 mA	“Er 2” (Error 2) “SerU” (Service) “0”

- If the sensor head is operated as a safety relevant device according to EN 50402 (Functional Safety) the output in the service mode must be 2 mA !



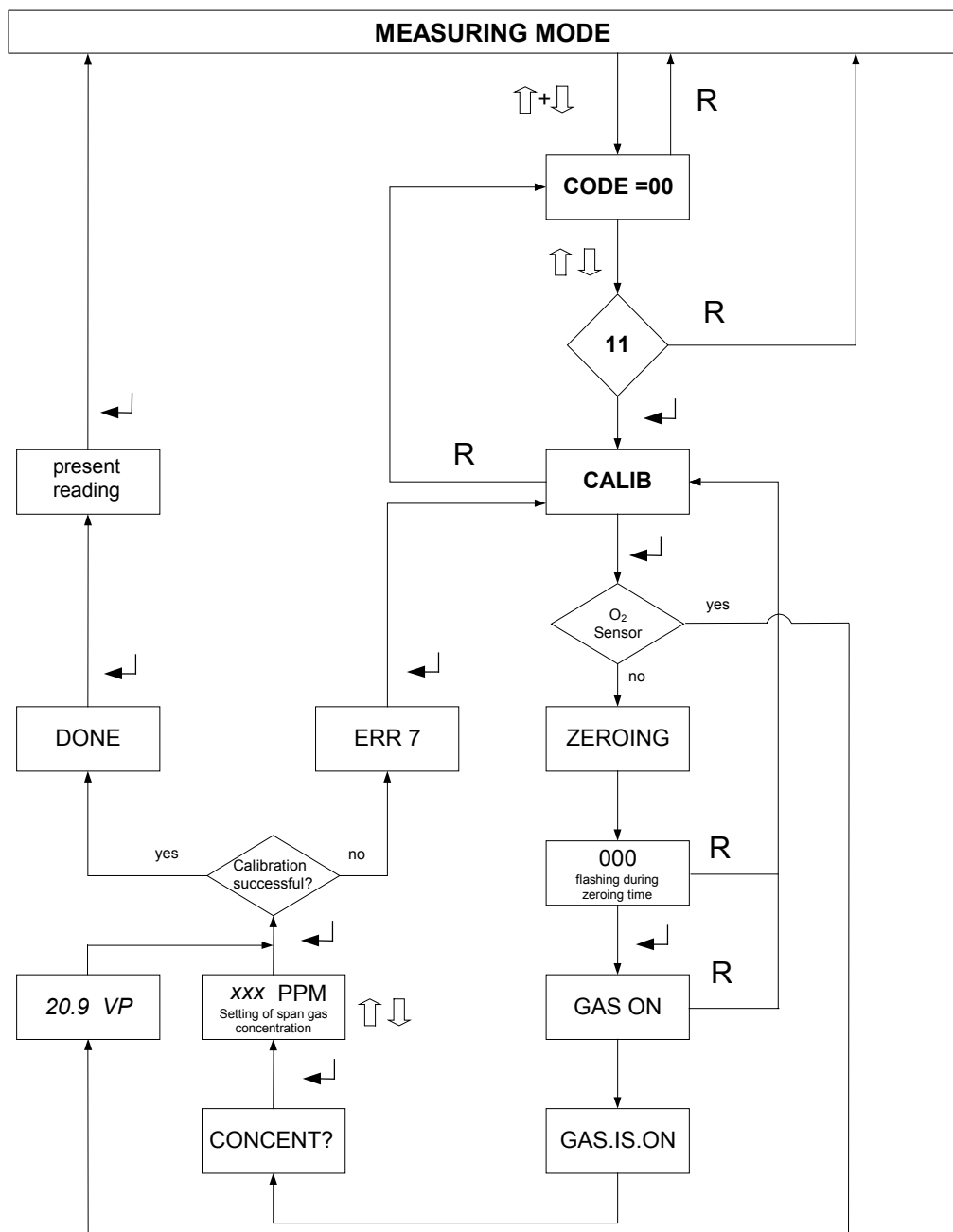
4.4 Calibrating the sensor

- Sensor head and sensor must have the same temperature!
- You need a Statox 505 calibration adapter (art.no. 570505), a gas tubing 4x1 mm (art.no. 556710) and span gas (acceptable gas concentrations see chapter 9.2). If the environment is not clean, you need synthetic air for zeroing.
- In case the calibration fails for whatever reason, the sensor head will continue to operate with the existing parameters, but the display will alternate showing the measured value and **ZERO ADJ** or **CALIB** until a calibration procedure has been completed.
- O₂-sensors do not require a zero adjustment, as their output in pure nitrogen is nearly 0 nA. The span calibration can be done with clean ambient air or synthetic air.



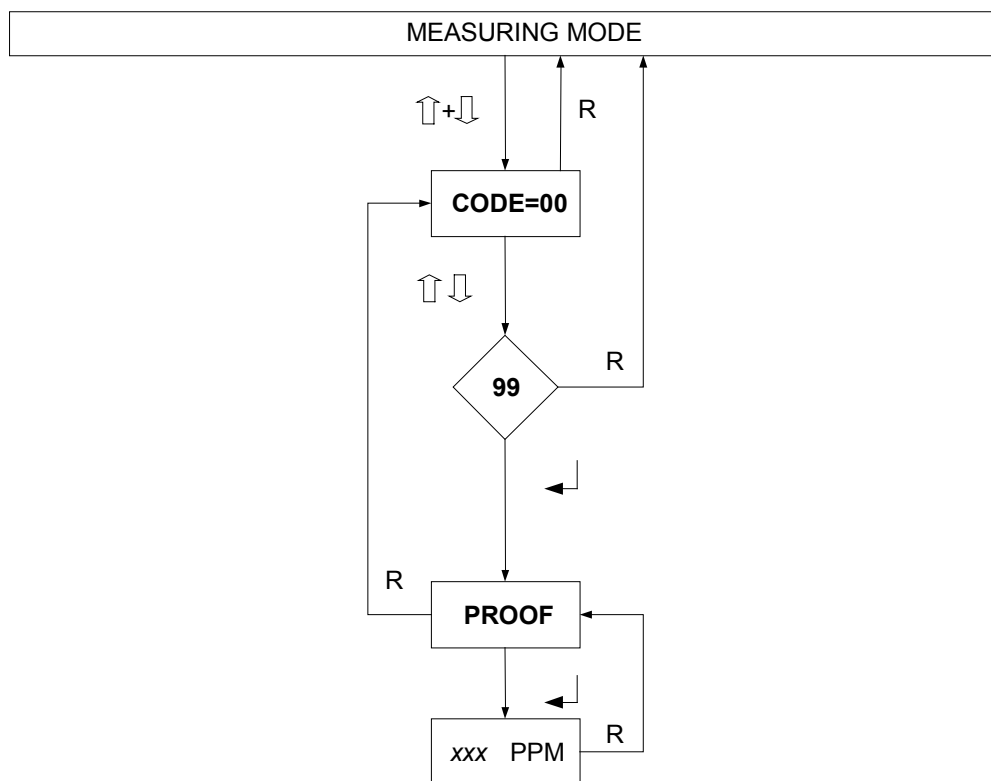
Procedure

- Affix the adapter on the sensor cover until it catches (clockwise rotation).
- Connect the calibration adapter to the span gas cylinder.
- Enter the service menu and select code 11 to enter the calibration routine. Set Zero.
- Push **ENTER** button. As soon as the display shows **GAS ON**, open the valve. The gas flow should be ca. 20 l/h (300 ml/min). If you want to avoid span gas to be released into the environment, you can connect an active carbon filter art.no. 806488 to the exhaust of the gas adapter. Make sure there is no pressure building up in the adapter!
- The display will show **GAS.IS.ON** until the reading is stable. Then it will show **CONCENT?** Now press **ENTER**. The display will now show the concentration of the recently used span gas. If you have used a gas with different concentration, adjust with the up / down buttons and confirm with **ENTER**.
- When the display shows **DONE**, press **ENTER** to display the present concentration. Now close the regulator and remove the calibration adapter (clockwise rotation).
- To return to the measuring mode, press **ENTER** again. The green LED starts flashing. If you fail to press **ENTER**, the sensor head will return to the measuring mode automatically after a timeout of 5 minutes.



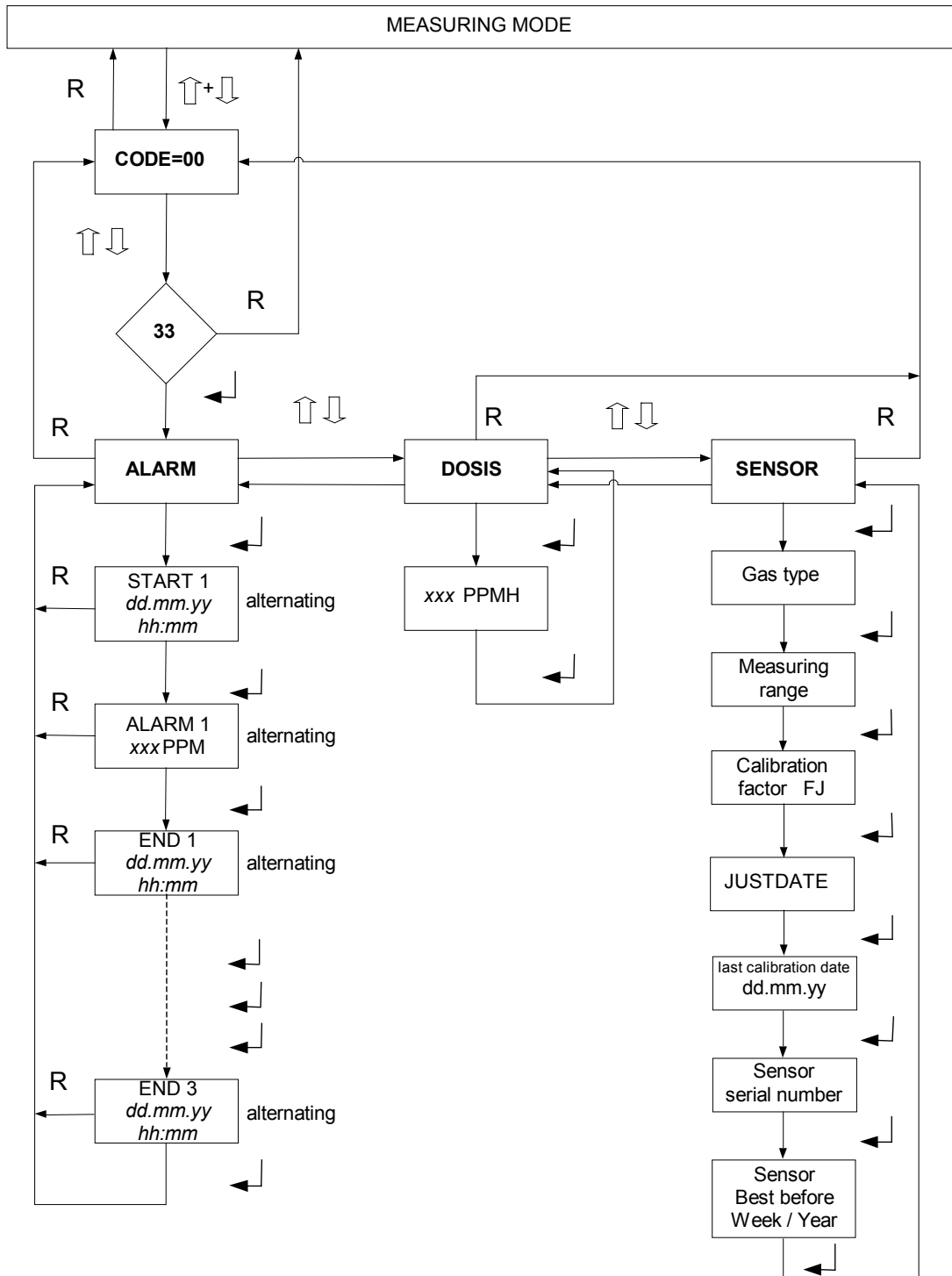
4.5 Prooftest

- A prooftest provides a verification of the transmitter performance under field conditions. It must be performed in regular intervals, if the transmitter is used as a safety relevant device. As long as the menu "Prooftest" is active, the output signal is set to 2 or 4 mA. In case the entire alarm chain must be tested, this must be done in the measuring mode.
- You need the Statox 505 calibration adapter art.no. 570505, a gas tubing 4x1 mm , art.no. 556710 and span gas with a concentration within the measuring range, preferably close to the alarm threshold.
- Affix the adapter on the sensor cover until it catches (clockwise rotation).
- Connect the gas adapter to the span gas cylinder.
- Enter the service menu and choose code 99 to enter the proof test routine.
- As soon as the display shows **PROOF**, open the valve and press **ENTER**. The gas flow should be ca. 20 l/h (300 ml/min). If you want to avoid span gas to be released into the environment, you can connect an active carbon filter art.no. 806488 to the exhaust of the gas adapter. Make sure there is no pressure building up in the adapter!
- The display will show the present concentration. Wait until the signal is stable before reading.
- Close the gas regulator and remove the calibration adapter (clockwise rotation).
- Return to the measuring mode by pushing the **RESET** button, stepping upward in the menu until you reach the measuring mode.
- If a new calibration is necessary proceed according chapter 4.4.
- Special timeout: If you do not push a button for 30 minutes, the transmitter returns automatically to the measuring mode.
- A 2- or 3-time LED flashing during the proof test signalizes a periodical hardware test.



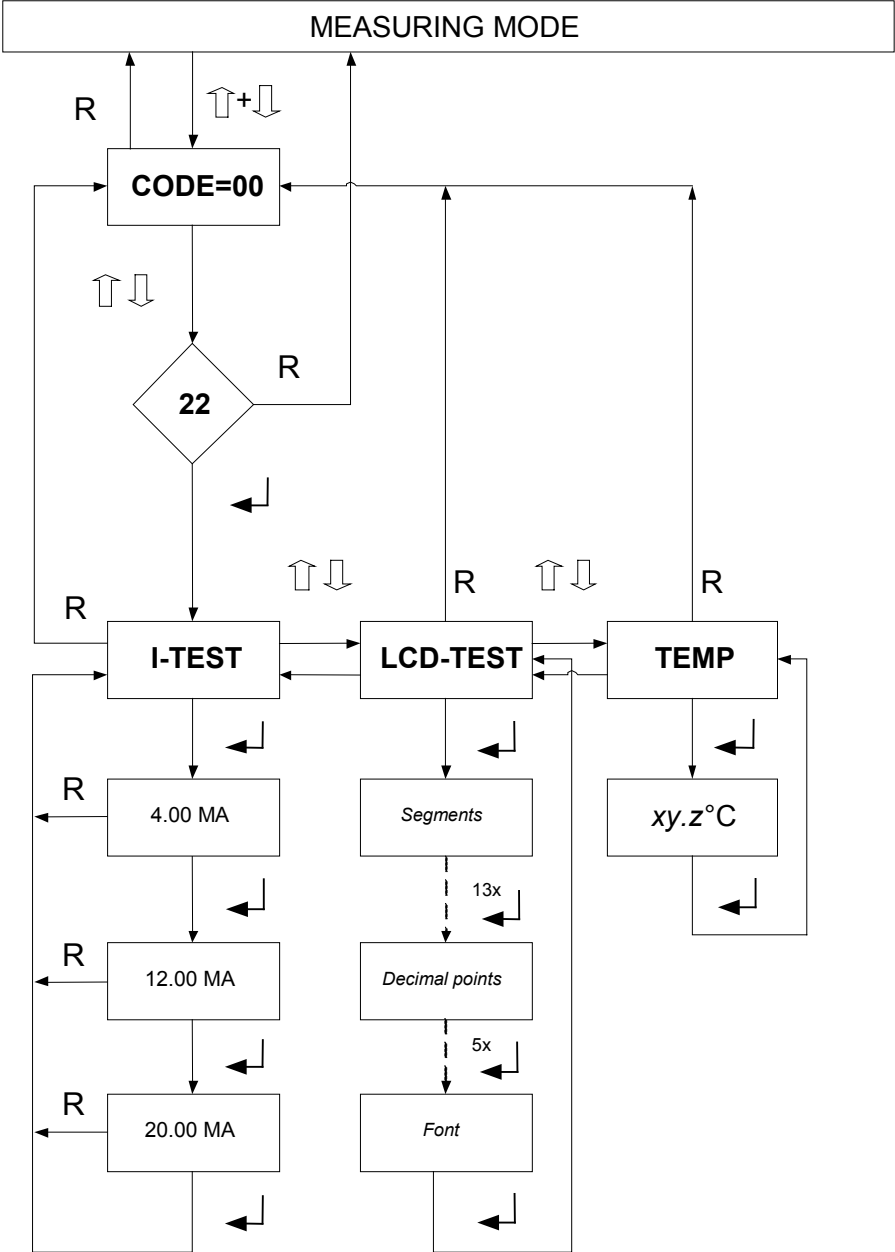
4.6 Info menu

- This menu provides information about alarm history and sensor parameters.
- As soon as the internal alarm threshold (detailed information see chapter 9.2) is exceeded, the exposure recording starts. You can access the most recent 3 alarm events (start, end and peak). The alarm events are not listed chronologically.
- The total exposure information (DOSIS) is not updated permanently. Exposure by calibration is neglected. The maximum exposure reading depends on the measuring range. It is either 9,99 or 99,9 or 999 ppm * min.
- The total exposure recording is inactive for oxygen sensors.
- The calibration factor is a parameter used by the microprocessor. It cannot be used to obtain information about the sensor signal.



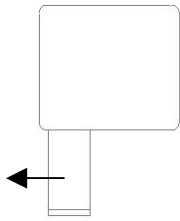
4.7 Test menu

- In order to check the signal loop, the sensor head can generate 4, 12 and 20 mA.
Caution: this might trigger an external alarm!
- The display can be tested by displaying a sequence of fonts and patterns.
- The sensor head can also display temperature.

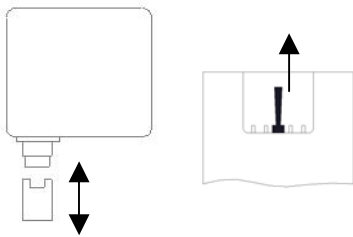


5 Sensor replacement

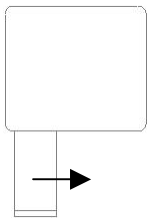
Please observe the precautions to avoid electrostatic voltage, when handling electronic devices. To avoid the sensor from being removed, while exchanging data with the sensor head, enter the service menu before you remove it.



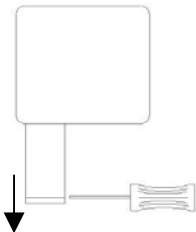
Unscrew the sensor cover counter - clockwise.
Take care not to twist the safety strap.



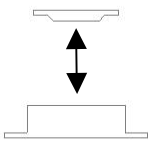
Pull the sensor downward to remove it. In case there is a shunt on the new sensor remove it prior to installation.



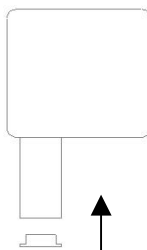
Tighten the sensor cover hand tight. Do not jam the strap.



Loosen the filter holder with a screw driver and pull it out downward.



Remove the old filter. If necessary use a screw driver at the recess of the filter. A fresh filter comes with every sensor. Insert it as shown in the picture. It must be placed close to the sensor.



Clean the filter holder, sensor cover and O-ring if necessary. Press the filter holder in place.

As soon as the sensor has stabilized, or after timeout, the sensor head returns to the measuring mode.

6 Maintenance

- Clean the Statox 505 with a humid wipe. Do not use detergents, solvents or steam jet.
- Inspect the housing for damage and pollution so that gas can securely access the sensor.
- If the sensor head is used in extremely harsh environment an extra spray shield can be installed. Calibrate the sensor with the spray shield installed. Contact Compur Monitors for technical support!
- If the Statox 505 sensor head is used as a safety relevant device in terms of functional safety standard (EN 50402, IEC 61508), a regular proof test is mandatory (see chapter 4.5).

7 Spare parts and accessories

Description	Article number
Statox 505 Calibration adapter	570505
Statox 505 Spray shield	570560
Pipe mounting kit 1" outer diameter 32-37 mm / 1,25 -1,45 in	570578
Pipe mounting kit 1,5" outer diameter 48-53 mm / 1,90 – 2,08 in	570565
Pipe mounting kit 2" outer diameter 59-63 mm / 2,32 - 2,48 in	570589
Intrinsically safe repeater 2- or 3 -wire (type 9160/13-11-11s)	803360
Intrinsically safe repeater 2- or 3 -wire (type 9160/13-10-11s)	803314
Statox 505 functional safety document	570555
Aktive carbon filter	806488
Gas tube 1m	556710
Statox 505 Filter holder	570510

Spare sensors and technical data see chapter 9.2 !

8 Status- and Error messages

8.1 Status messages

Display	Description
CODE=00	Code request
CONC=00	Enter concentration
ZEROING	Zeroing
GAS ON	Apply span gas
GAS.15.ON	Span gas has been detected
000	Flashing: zeroing in progress, steady: zero found
CALIB	Calibration menu. If alternating with measured value: calibration required
ZERO ADJ	If alternating with measured value: zeroing required
DONE	Calibration completed
PROOF	Proof test
1-SERV	Set signal output in the service mode
2 MA	Output signal = 2 mA in the service mode
2 MA SET	Confirmation of the set value
ERR	Error message, details see chapter 8.2
1-TEST	Test of the signal loop
LCD-TEST	Display test
TEMP	Temperature inside the sensor head
ALARM	Alarm history
DOSIS	Total exposure of the sensor
PPMH	Exposure in ppm*h
FF PPMH	Exposure is in excess of the display range
SENSOR	Sensor information menu
JUST DATE	Date of the most recent calibration resp. initial operation of the sensor
SN 12345	Sensor serial no.
BB KW/YY	Sensor best before ww/yy
BB-BB-BB	Real time clock date dd/mm/yy
BB.BB.BB	Real time clock date in the info menu dd/mm/yy
BB BB	Real time clock time hh/mm

8.2 Error messages

If there is no display at all, check fuse and polarity. Fuse replacement by authorised personnel only.

Error	Ranking	Reason	Correction
<i>ERR 1</i>	critical	The sensor diagnostics (heart beat) has detected a faulty sensor.	Press ENTER, if problem persists replace sensor.
<i>ERR 2</i>	critical	Faulty 4-20 mA signal output (nominal and actual value do not match).	Press ENTER, if problem persists call Compur Monitors service center.
<i>ERR 3</i>	non critical	Timeout, no plateau found during calibration (span gas flow incorrect, flow instable, sensor out of specs).	Press ENTER. The instrument returns to the measuring mode using the old parameters, but will alternately display CALIB and the measured value. Replace sensor as necessary.
<i>ERR 4</i>	critical	Zero drift warning – negative zero. Error occurs only during measuring mode.	Press ENTER. The software goes to the CALIB menu. Start a zeroing procedure. Replace sensor as necessary.
<i>ERR 5</i>	non critical	Unable to zero (during zeroing procedure).	Press ENTER. The software goes to the CALIB menu. Start a new zeroing procedure. Unless a correct zeroing has been completed, the display will alternate displaying the measured value and ZEROADJ. Replace sensor as necessary.
<i>ERR 6</i>	non critical	Timeout, no stable zero found during zeroing procedure.	Press ENTER. The instrument returns to the measuring mode using the old parameters, but will alternately display ZEROADJ and the measured value. Repeat zeroing procedure with synthetic air. Replace sensor as necessary.
<i>ERR 7</i>	non critical	While calibrating: Sensor is not sensitive enough, or span gas with wrong concentration has been used.	Press ENTER. The instrument returns to the measuring mode using the old parameters, but will alternate display CALIB and the measured value. Replace sensor as necessary.
<i>ERR 8</i>	critical	Transmitter is operating outside the temperature specifications.	Press ENTER.
<i>ERR 10</i>	critical	F-RAM Error, occurs only with mounted sensor.	Press ENTER. If problem persists, replace sensor.
<i>ERR 11</i>	critical	Hardware error - amplifier.	Press ENTER, if problem persists call Compur service center.
<i>ERR 12</i>	critical	Hardware error - potentiostat.	Press ENTER, if problem persists call Compur service center.
<i>ERR 13</i>	critical	Hardware error- power supply.	Press ENTER, if problem persists call Compur service center.
<i>ERR 15</i>	critical	Flash - error	Press ENTER, if problem persists call Compur service center.
<i>.I.</i>	critical	CPU / RAM This error creates a repeated reset. It cannot be displayed.	Call Compur service center.

Critical errors set the output signal to 2 mA in the 2 – wire mode or to 0 mA in the 3 – wire mode. Non critical errors normally occur during maintenance or calibration. They have no impact on the system status.

9 Technical data

9.1 General transmitter data

Product name:	Stattox 505 Transmitter
Type:	5375
Manufacturer:	COMPUR Monitors GmbH & Co. KG, D-81539 München
Measuring principle:	electrochemical
Operating temperature:	-30°C to +60°C / -22° F to 140° F
Storage temperature:	-30°C to +60°C / -22° F to 140° F
Humidity:	0 to 99% r.h. (non condensing)
Pressure:	900 to 1100 hPa
Accuracy at calibration point:	+/- 10%
Power supply:	12 -28 VDC, max. 22mA
Connection:	2- or 3-Wire
Output signal:	4 - 20 mA, max. load 700 Ohm
• In service mode:	2 or 4 mA adjustable
• In system fail mode:	0 mA in 3 - wire mode, 2 mA in 2 - wire mode
• Overrange:	22 mA
Display:	8-digits, 14 segments
Dimensions (HxWxD):	225 x 180 x 90 mm / 8,9 x 7,1 x 3,5 in (incl. mounting plate)
Weight:	1040 g / 36,7 ounce (incl. mounting plate)
Housing material:	ABS chromium plated / stainless steel
Protection class EN 60529:	IP 65
Operation position:	Sensor downwards
EMC:	EN 50270
ATEX:	Ex ib IIC T4 (EN 60079-0 and EN 60079-11)
Application:	II 2 G
EC type examination certificate:	BVS 09 ATEX E 104
Parameters:	U _i : max. 28 VDC
I _i :	max. 93 mA , P _i = 650 mW
Internal capacity C _i :	neglectible
Internal inductance L _i :	neglectible
Functional safety:	SIL 2
	More detailed information with regards to functional safety see Stattox 505 functional safety document art.no. 570555.

9.2 Sensor specific data

Gas type and Measuring range	Article-number	Temperature range [°C]	Humidity range [% r.h.] (non condensing)	typical response time t_{90} [s] at 20°C	Internal alarm threshold [ppm]	Span gas concentration [ppm]	min. detectable concentration [ppm]	Sensitivity drift within 6 months	Zeropoint drift / month [ppm]	Remarks
H ₂ S 20 ppm	530571	-20 to +50	20 - 95	< 5	5.0	1.9 - 18.0	0.3	< - 15 %	< 0.2	
H ₂ S 100 ppm	530501	-20 to +50	20 - 95	< 5	5	10 - 90	2	< - 15 %	< 0.2	
HCN 20 ppm	530673	-20 to +50	20 - 95	< 5	1.9	1.9 - 18.0	0.3	< - 15 %	< 0.2	Calibration only from 0°C to 50°C
HCN 100 ppm	530503	-20 to +50	20 - 95	< 5	10	10 - 90	2	< - 15 %	< 0.2	Calibration only from 0°C to 50°C
COCl ₂ 0,5 ppm	530692	-20 to +50	20 - 95	< 10	0.10	0.10 - 0.40	0.02	< - 10 %	< 0.01	
COCl ₂ 1 ppm	530702	-20 to +50	20 - 95	< 10	0.10	0.10 - 0.80	0.02	< - 10 %	< 0.01	
COCl ₂ 15 ppm	530682									projected
COCl ₂ 100ppm	530502									projected
NO ₂ 5 ppm	530504	-20 to +50	20 - 95	< 5	0.50	0.50 - 4.50	0.02	< - 15 %	< 0.01	
NO ₂ 15 ppm	530515	-20 to +50	20 - 95	< 5	5.0	3.0 - 10.0	0.2	< - 15 %	< 0.01	
CO 300 ppm	530505	-20 to +50	20 - 95	< 10	30	20 - 270	3	< - 15 %	< 3	warm-up time > 1h possible
Cl ₂ 5 ppm	530507	-20 to +50	20 - 95	< 5	0.50	0.50 - 4.50	0.03	< - 15 %	< 0.02	
O ₂ 35 Vol%	530509	-30 to +55	5 - 95	< 5	18.0 Vol%	20.9 Vol%	2 Vol%	< - 3 %	0	Calibration with ambient air
ClO ₂ 1 ppm	530523									projected
ClO ₂ 5 ppm	530723									projected
SO ₂ 5 ppm	530508									projected
HCl 50 ppm	530511									projected
NH ₃ 150 ppm	530617	-30 to +50	15 - 90	< 10	20	20 - 100	3	< - 15 %	< 1 (T=const)	warm-up time > 1h possible
H ₂ 300 ppm	530677									projected
N ₂ H ₄ 1 ppm	530506									projected
O ₃ 1 ppm	530625	-20 to +40	15 - 90	< 5	0.10	0.10 - 1.00	0.02	< - 15 %	< 0.01	warm-up time > 1h possible
HF 10 ppm	530615	-20 to +40	15 - 90	< 10	1.0	1.0 - 9.0	0.2	< - 15 %	< 0.1	span gas ≥ 5 ppm recommended
AsH ₃ 0,5 ppm	530619	-20 to +50	10 - 95	< 5	0.05	0.05 - 0.50	0.01	< - 15 %	< 0.01	warm-up time > 1h possible
PH ₃ 1 ppm	530720	-20 to +50	10 - 95	< 5	0.10	0.10 - 1.00	0.01	< - 15 %	< 0.01	warm-up time > 1h possible

10 CE-Declaration of conformity

DECLARATION OF CONFORMITY

COMPUR
Monitors

Compur Monitors GmbH & Co.KG
Weißenseestraße 101
D 81539 München

as the manufacturer hereby declares, that the transmitter

Stattox 505 Typ 5375

complies with the essential requirements of the following directives and has been tested according to European Standards:

1. Directive **2004/108/EC**
EN 50270: 2006 (type 2 device)
2. Directive **94/9/EC**
EN 60079-0: 2006
EN 60079-11: 2007

EC Type Examination Certificate: **BVS 09 ATEX E 104**
Notified Body: **0158 / DEKRA EXAM**, Bochum, Germany

Munich, 08-20-2009



B. Rist, General Manager

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