

# **Instruction Manual**

## **AMS 5200**

### **ZrO<sub>2</sub> – Oxygen Analyzer**

---

AMS Analysen-, Mess- und Systemtechnik GmbH  
Industriestrasse 9  
D-69234 Dielheim  
Tel. +49-6222-78877-0  
Fax. +49-6222-78877-20

**AMS** | Analysen-, Mess- und  
Systemtechnik

e-mail: [info@ams-dielheim.com](mailto:info@ams-dielheim.com)  
web-site: [www.ams-dielheim.com](http://www.ams-dielheim.com)

Version 1.22\_R4  
Software 1.022  
Hardware 1.05

02/2013

<b>Contents</b>	<b>page</b>
<i>1. Information for the operator</i> .....	3
<i>1.1 General Information</i> .....	3
<i>1.2 Approved Use</i> .....	4
<i>1.3 Safety Information</i> .....	5
<i>2. General Description AMS 5200</i> .....	6
<i>2.1 AMS 5200 Oxygen Analyzer</i> .....	6
<i>2.2 Technical Data</i> .....	7
<i>2.3 Terminal Assignments (wall mounting enclosure) AMS 5200</i> .....	9
<i>2.4 Terminal Assignments –electronic rack mounting- / portable housing- AMS 5200</i> .....	12
<i>2.5 Electric connection of probe / transmitter</i> .....	16
<i>2.5.1 Cable lengths and cable cross-sections</i> .....	17
<i>2.5.2 Wiring scheme transmitter <math>\leftarrow \rightarrow</math> probe</i> .....	18
<i>2.5.3 Replacement plan for replacement AMS 3220 through AMS 5200</i> .....	19
<i>2.6 Front View AMS 5200</i> .....	20
<i>2.7 Maintenance and Maintenance Intervals</i> .....	21
<i>3. Start-Up and Instrument Description</i> .....	22
<i>4. Operation of the Analyzer and Setting the User Parameters</i> .....	23
<i>4.1 Setting the Second Line of the Display</i> .....	24
<i>4.2 Submenu Diagnosis</i> .....	25
<i>4.3 Submenu Parameter</i> .....	26
<i>4.4 Submenu Alarm</i> .....	27
<i>4.4.1. Analyser Messages</i> .....	27
<i>4.4.2 Analyser malfunctions</i> .....	30
<i>4.4.3 Service request</i> .....	32
<i>4.5 Submenu Sensor Setup</i> .....	33
<i>4.6 Submenu Analogue Out</i> .....	34
<i>4.7 Submenu Calibration</i> .....	37
<i>4.7.1 How to start a calibration</i> .....	40
<i>4.7.2 Selecting the Calibration Gases</i> .....	40
<i>4.7.3 Starting the Calibration and Calibration Procedure</i> .....	41
<i>4.7.4 Aborting the Calibration</i> .....	43
<i>4.7.5 Determination of the Purge Time</i> .....	44
<i>4.7.6 Adjusting of Auto-calibration</i> .....	44
<i>4.7.7 Adjusting of blowback (backwashing)</i> .....	45
<i>4.7.8 Aligning the Analogue Output during the Calibration</i> .....	46
<i>4.7.9 Calibration Errors</i> .....	46
<i>4.8 Submenu Service</i> .....	47
<i>5. Serial Interface</i> .....	47

## 1. Information for the operator

### 1.1 General Information



Please read this Manual before the start-up of the instrument!  
The manual contains important data and information. Observing this information guarantees safe operation of the analyser and will result in reliable measuring values.

This Manual describes the standard instrument. Deviations are marked at the corresponding part of the documentation.

Of particular importance are the **information** and **warning texts** identified by the appropriate pictograms. These symbols serve the personal safety and provide useful tips on how to avoid malfunction. This Manual comprises all necessary information for the application oriented use of the instrument. Therefore only qualified and authorized personnel may work with the instrument. The personnel should be properly trained in measuring and control instrumentation for process automation.

This Manual is an integral part of the system supplied. For clarity reasons this Manual cannot cover all details of the various versions supplied. If it is intended to use the instrument in a different way as described herein, please contact AMS before starting-up the analyser.

## 1.2 Approved Use

The product supplied, has been developed, manufactured and tested according the relevant safety standards. It may be used only as approved by AMS. Proper transport, storage and installation are a must, as well as careful operation and maintenance to guarantee the safe and reliable operation of the instrument.

Only qualified and authorized personnel may install and operate this instrument. The personnel shall be familiar with the safety concept of this instrument. Severe injuries and/or substantial damage to property may occur by not observing the warning texts in this manual or attached to the analyser or when unqualified actions are carried out.

Intended use in the sense of this manual means that the instrument may only be used in applications described in this manual. Auxiliary equipment or other components used in conjunction with this instrument have to be approved by AMS.

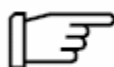
Observing the safety and operation rules described in this manual helps to avoid personal and property damages during regular operation.



### **Warning**

When opening the housing of the analyser please observe that certain parts of this device may carry dangerous voltages.

Therefore only authorized and qualified personnel may open the instrument.



### **Note**

The conformity declaration of this instrument must be renewed if modifications in this instrument have been carried out by the operator, e.g. using a different sensor type.

### 1.3 Safety Information

The following information serves for your personal safety as well as to protect the described product from damage.

Safety information and warnings to prevent danger to the life and health of users are identified by pictograms in this Manual matched to the significance of the accompanying text.



**Note** is important information on the product itself and its handling.



**Danger** means that death, severe personal injury and/or substantial damage to property **will occur** if the appropriate safety precautions are not observed.



**Warning** means that death, severe personal injury and/or substantial damage to property **can occur** if the appropriate safety precautions are not observed.



**Caution** with a warning triangle means that slight personal injury **can occur** if the appropriate safety precautions are not observed.

**Caution** without a warning triangle means that damage to property **can occur** if the appropriate safety precautions are not observed.

**Attention** without a warning triangle means that an undesirable effect or state **can occur** if the corresponding information is not observed.

## **2. General Description AMS 5200**

### **2.1 AMS 5200 Oxygen Analyzer**



The Analyzer AMS 5200 is a microprocessor controlled system for the measurement of the Oxygen content of gas mixtures in the range of 0,01 25 Vol.% Oxygen.

The sensing device is a heated, temperature-controlled ZrO<sub>2</sub>-Sensor.

The complete system consists of the sensor, the control electronics and the pneumatic unit which are installed into a rack or a wall-mounted housing.

Variations of and options for the system make it very versatile and flexible to be adapted for a series of different applications.

The AMS 5200 is also available with all components installed in a protective housing for field installation.

#### **Oxygen Probe(s)**



- Probe with 6mm ferrule pack connections
- In-Line Probe AMS 3211-500
- High Temperature Probe AMS 3211-600 / 700



#### **Installation Oxygen Probe(s)**

The positioning 'pointing downwards' as a preventive measure against the agglomeration of condensate in the calibration tube.

If the positioning is horizontal, the calibration tube should be flushed daily/weekly (depending of water vapour content) for a few seconds with dry instrument air or with calibration gas.

#### **Compact System**



- Pneumatic unit with integrated pneumatic suction pump for the sample gas and / or pressure reducer, adopted to the selected Oxygen probe and according to customer requirements.

The analyser system includes an extensive self-check feature and communicates via digital status messages and plain text messages on the display of the transmitter. Checking the instrument regularly during operation is no longer necessary.

## 2.2 Technical Data

### – Electronic Transmitter AMS 5200

Measuring Principle:	ZrO <sub>2</sub> Sensor with platinum electrode
Probe Type:	available with any AMS ZrO <sub>2</sub> probe
Power Supply:	110 ... 240 VAC, 50 ... 60 Hz or 24 VDC; max. 25W
Fuse:	2,5 A, medium inertia, size: 5x20mm
Ambient Temperature:	min/max.: - 5 / + 60 °C
Resolution:	< 0,01 Vol. %
Accuracy:	<i>(depending on calibration gas)</i>
Reproducibility:	0,1 % of measuring value
Drift / Month:	ca. 1 % of measuring value
Temperature Drift:	≤ 0,03 % of measuring value / °C ambient temperature
Response:	T 90 % ≤ 20 sec. T 98 % ≤ 60 sec.
Display:	2 x 16-digit alphanumeric LCD 1. Line: Oxygen concentration is displayed 2. Line: selectable, display of analyzer status
Analogue Outlet:	4 - 20 mA / 0 - 10V Range may be set by user 0-25 % O <sub>2</sub>
Measuring ranges:	Standard 1 measuring range Option: 4 measuring ranges with automatic switch-over
Calibration: * Option)	2-point calibration auto-calibration; triggered by 1. external, potential free contact or 2. time interval, freely selectable
PC-Interface:	RS-232
Alarms:	2 potential-free SPDT-relay contact; alarm values and characteristics may be set by the user Load: max. 60 V / 0,3 A; resistive load only
Status Signal:	1 potential-free SPDT-relay contact Load: max. 60 V / 0,3 A; resistive load only
Housing Dimensions / Protection:	for wall-mounting, IP 65 Electronic housing, IP 20 Portable housing, IP 54 for electronic rack mounting, IP 54
Zone Classification:	General application

– Technical Data ZrO2 Probes

Probe	3211-500	3211-600	3211-700	3211-000
<b>max. gas temperature</b>	500 °C	1750 °C	1100 °C	450 °C
<b>Protection</b>	IP65	IP65	IP65	IP44
<b>Response Time</b>	< 2s	< 5s	< 5s	< 2s
<b>T90-time</b>	≤ 10s	≤ 20s	≤ 20s	≤ 10s
<b>Position</b>	Any but pointing downwards	Depends on the material of the sampling tube, recommended vertically suspended	Up to 900 °C arbitrary; above 900 °C vertically suspended	Any but pointing downwards
<b>Weight (at specified length)</b>	6,5 kg (1.000 mm)	6,5 kg (1.000 mm)	7 kg (1.000 mm)	0,3 kg
<b>Dust Content</b>	beyond 5 g/m <sup>3</sup> a shield made of stainless steel is supplied to protect the sintered filter	beyond 5 g/m <sup>3</sup> a shield made of stainless steel is supplied to protect the sintered filter	up to 50 mg/m <sup>3</sup> no wet dust allowed	beyond 5 g/m <sup>3</sup> a shield made of stainless steel is supplied to protect the sintered filter
<b>Sample Flow</b>	beyond 20 m/s a shield made of stainless steel is supplied to protect the sintered filter	No limitations	Higher than 5 m/s	beyond 20m/s a shield made of stainless steel is supplied to protect the sintered filter
<b>Probe Heating Time</b>	10 min	10 min	10 min	10 min

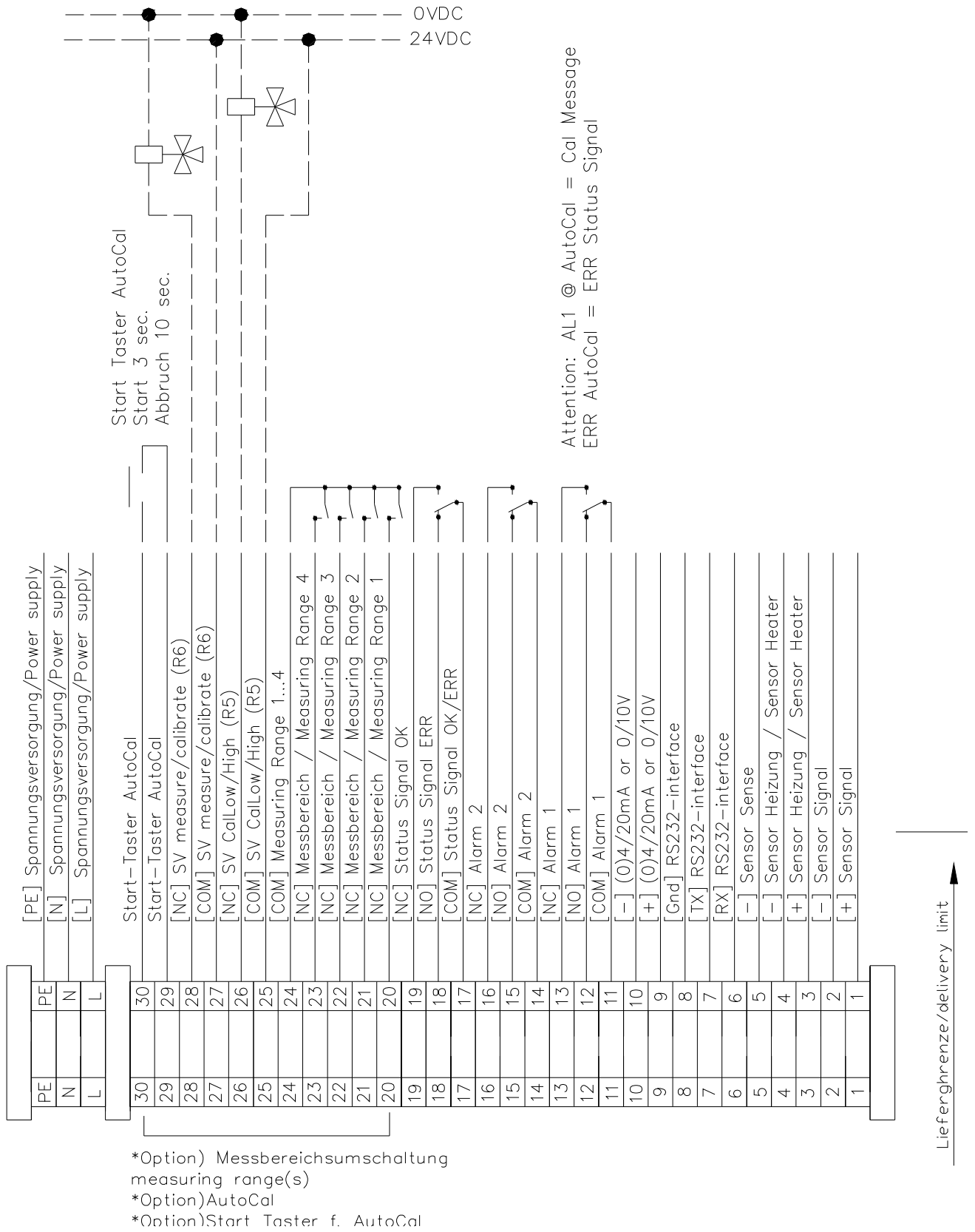
**Installation Oxygen Probe(s)**

The positioning 'pointing downwards' as a preventive measure against the agglomeration of condensate in the calibration tube.

If the positioning is horizontal, the calibration tube should be flushed daily/weekly (depending of water vapour content) for a few seconds with dry instrument air or with calibration gas.



**2.3 Terminal Assignments (wall mounting enclosure) AMS 5200**



\*Option) Messbereichsumschaltung measuring range(s)

\*Option)AutoCal

\*Option)Start Taster f. AutoCal

**Danger****3-wire connection power supply**

1 [ PE ]	110 ... 230VAC / 24 DC power supply
2 [ N ]	110 ... 230VAC / 24 DC power supply
3 [ L ]	110 ... 230VAC / 24 DC power supply

The connection to the local power supply may only be carried out by authorized personnel. Dangerous currents can result in serious injuries which can again result in the extreme in death.

Terminal    Description**1 - 5    Sensor**

1	[ + ]	Sensor Signal
2	[ - ]	Sensor Signal
3	[ + ]	Sensor Heater
4	[ - ]	Sensor Heater
5	[ - ]	Sensor Sense (voltage feedback)

**6 - 8    serial interface RS232**

6	[ RxD ]	System alarm
7	[ TxD ]	potential free SPDT-Relays, freely adjustable over the measuring range
8	[ Gnd ]	max. load: 48 V / 0,5 A; resistive load only

**9 - 10    Analogue signal**

9	[ + ]	(0) 4...20 mA ; 0...10 V
10	[ - ]	freely adjustable over the measuring range

**11 - 13    Message Al 1**

11	[ COM ]	Message Al 1
12	[ NO ]	potential free SPDT-Relays, freely adjustable
13	[ NC ]	max. load: 60V / 0,3A; resistive load only

**14 - 16    Message Al 2**

14	[ COM ]	Message Al 2
15	[ NO ]	potential free SPDT-Relays, freely adjustable
16	[ NC ]	max. load: 60V / 0,3A; resistive load only

**17 - 19    Message Analyser status**

17	[ COM ]	System Status
18	[ NO ]	potential free SPDT-Relays, freely adjustable
19	[ NC ]	max. load: 60V / 0,3A; resistive load only

---

<u>Terminal</u>	<u>Description</u>
-----------------	--------------------

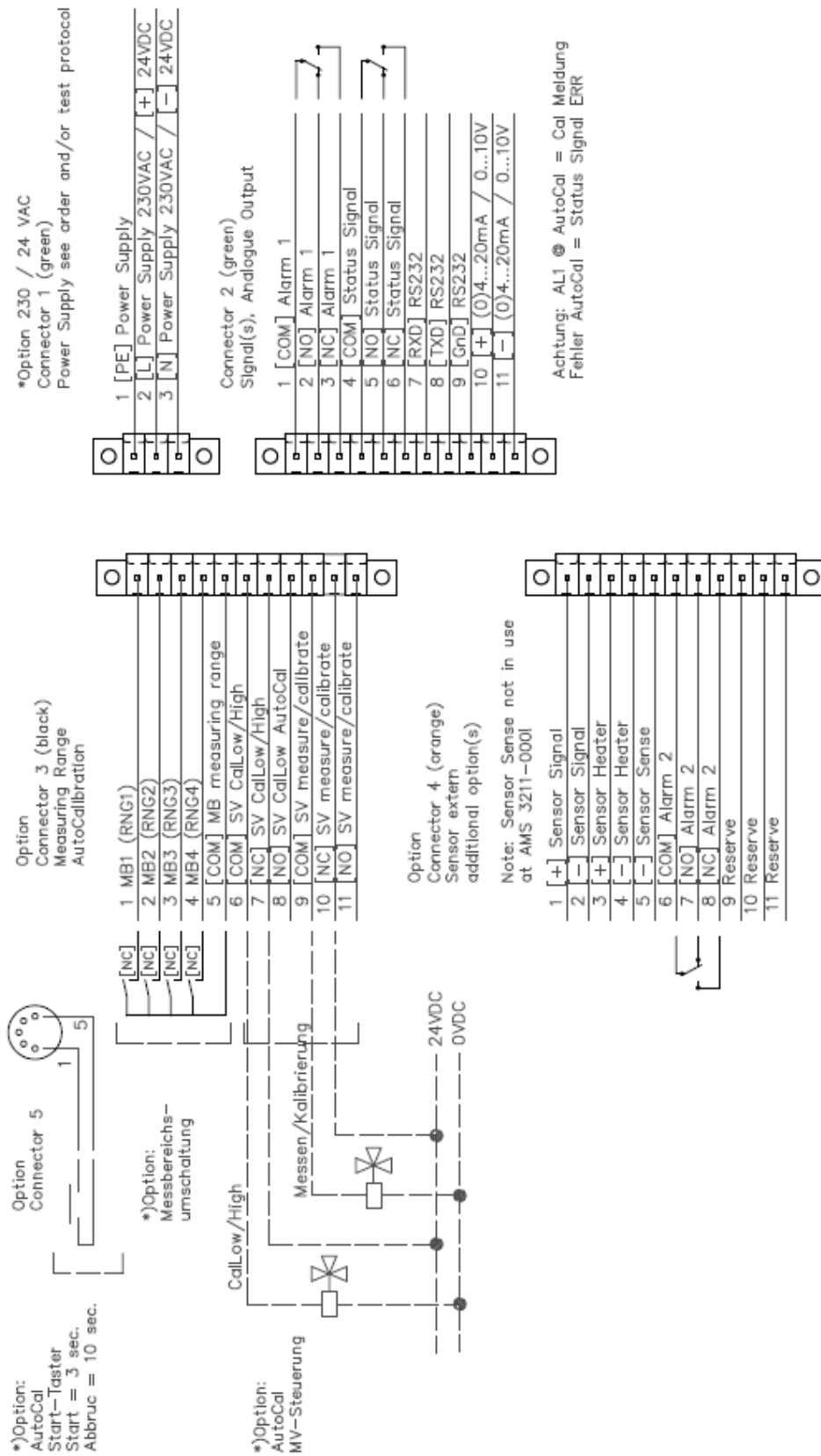
**Option****20 - 24 Automatic switch-over of the measuring ranges**

20	[ NC ]	Measuring range 1
21	[ NC ]	Measuring range 2
22	[ NC ]	Measuring range 3
23	[ NC ]	Measuring range 4
24	[ COM ]	Automatic switch-over of the measuring ranges, potential free SPDT-Relays, Max. load 60 V / 0,3A, resistive load only

**Option****25 - 30 Auto-calibration**

25	[ COM ]	[ + 24 VDC ] solenoid valve max. 9 W
26	[ NC ]	active measuring / calibration
27	[ COM ]	[ + 24 VDC ] solenoid valve max. 9 W
28	[ NC ]	active, switching between low / high gas
29		Connection for initiator key, potential free
30		Remote start / abort calibration

**2.4 Terminal Assignments –electronic rack mounting- / portable housing- AMS 5200**



**Danger****3-wire connection power supply**

1 [PE]	110 ... 230 VAC / 24 VDC power supply
2 [ + ]	110 ... 230 VAC / 24 VDC power supply
3 [ - ]	110 ... 230 VAC / 24 VDC power supply

The connection to the local power supply may only be carried out by authorized personnel. Dangerous currents can result in serious injuries which can again result in the extreme in death.

**Connector 1 11-wire connection Signals (green)**Terminal    Description**1 - 3 3-wire connection power supply**

1	[PE]	110 ... 230 VAC	[PE] 24 VDC power supply
2	[ L ]	110 ... 230 VAC	[ + ] 24 VDC power supply
3	[ N ]	110 ... 230 VAC	[ - ] 24 VDC power supply

**Connector 2 11-wire connection Signals (green)****1 - 3 Alarm 1 → NOT FAIL SAFE ←**

1	[ COM ]	Message Al 1
2	[ NO ]	potential free SPDT-Relais, freely adjustable
3	[ NC ]	max. load: 60V / 0,3A; resistive load only

**4 - 6 Analyser status → FAIL SAFE ←**

4	[ COM ]	System Status
5	[ NO ]	potential free SPDT-Relais, freely adjustable
6	[ NC ]	max. load: 60V / 0,3A; resistive load only

**7 - 9 serial interface RS232**

7	[ RxD ]
8	[ TxD ]
9	[ Gnd ]

**10 - 11 Analogausgang**

10	[ + ]	(0) 4...20 mA ; 0...10 V
11	[ - ]	freely adjustable over the measuring range

**\*Option) Connector 3                      11-wire connection Signals (black)**Terminal    Description**1 – 5    Measuring range switch-over**

1	[ NC ]	Measuring range 1 (RNG 1)
2	[ NC ]	Measuring range 2 (RNG 2)
3	[ NC ]	Measuring range 3 (RNG 3)
4	[ NC ]	Measuring range 4 (RNG 4)
5	[ COM ]	Measuring range

**6 – 11    Auto-calibration**

6	[ COM ]	solenoid valve Cal gas low / high
7	[ NC ]	24 VDC max. 9 W
8	[ NO ]	
9	[ COM ]	solenoid valve Measuring / Calibration
10	[ NC ]	24 VDC max. 9 W
11	[ NO ]	

**\*Option) Connector 4                      11-wire connection external sensor (orange)****1 – 5    External sensor                      11-wire connection probe**

1	[ + ]	Sensor signal
2	[ - ]	Sensor signal
3	[ + ]	Sensor heater
4	[ - ]	Sensor heater
5	[ - ]	Sensor sense ( not in use with probe AMS 3211-000 )

**6 - 8    Alarm2                                      → NOT FAIL SAFE ←**

6	[ COM ]	Message Al 1
7	[ NO ]	potential free SPDT-Relais, freely adjustable
8	[ NC ]	max. load: 60V / 0,3A; resistive load only

**9 – 11    Reserve**

9	Reserve
10	Reserve
11	Reserve

**\*Option) Connector 5****5-wire connection external start initiator key for Start / Abort calibration, only available with Option Auto-calibration installed**

1	Initiator key	
2		
3	Potential free	Initiating 3 sec. Start of Auto-calibration
4		Initiating 10 sec. Abort of Auto-calibration
5	Initiator key	

## 2.5 Electric connection of probe / transmitter



**Note:** Please connect the transmitter AMS 5200 to the probe (please refer to your order) as described below:  
Please observe the polarity and the minimum diameter of the wires with reference to the total length of the cable.  
See also 2.5.1

### 1) Probe 3211-000

<u>AMS 5200</u>	<u>Probe with ready-made cable pins</u>
terminal 1	[ + ] Sensor Signal [ black ]
terminal 2	[ - ] Sensor Signal [ grey ]
terminal 3	[ + ] Sensor Heater [ white ]
terminal 4	[ - ] Sensor Heater [ white ]
terminal 5	not assigned ( <i>terminals 4 + 5 are bridged internally</i> )

### 2) Probes 3211-500; 3211-600; 3211-700

<u>AMS 5200</u>	<u>Description</u>	<u>Harting plug probe 3211-...</u>
terminal 1	[ + ] Sensor Signal	terminal 1
terminal 2	[ - ] Sensor Signal	terminal 2
terminal 3	[ + ] Sensor Heater	terminal 3
terminal 4	[ - ] Sensor Heater	terminal 4 ( <i>bridged to terminal 3</i> )
terminal 5	[ - ] Sensor Sense	terminal 5
		terminal 6 ( <i>bridged to terminal 5</i> )

### 3) Probes 321x-860/150

<u>AMS 5200</u>	<u>connection box near probe</u>	<u>Harting plug probe 3211-...</u>
terminal 1	[ + ] Sensor Signal	terminal 1
terminal 2	[ - ] Sensor Signal	terminal 2
terminal 3	[ + ] Sensor Heater	terminal 3
terminal 4	[ - ] Sensor Heater	terminal 4
terminal 5	[ - ] Sensor Sense ( <i>bridged to terminal 4</i> ) (no part of delivery)	



### 2.5.1 Cable lengths and cable cross-sections



**Note:** Please use shielded conductors to connect the electronic transmitter to the measuring probe. The maximum load for the conductors is 48V/3A. For cable lengths up to 150 m a joint cable with multiple conductors can be used for signal and heating. Above 150 m cable length the conductors for signal and heating should be routed separately (please contact AMS if in doubt).

#### 1) Cable cross-sections for length up to 150 m

cable length "l"	minimum cross-section
up to 40 m	5 x 0.75 mm <sup>2</sup>
from 40 to 60m	5 x 1.0 mm <sup>2</sup>
from 60 to 90m	5 x 1.5 mm <sup>2</sup>
from 90 to 150m	5 x 2.5 mm <sup>2</sup>

The dimensions of the cross-sections for the signal and heater conductors required should be as follows:

- The sensor signal conductors (terminals no. "1" and "2" of the transmitter AMS 5200) must show a cross-section of at least 0,5 mm<sup>2</sup>, regardless of the cable length. Larger cross-sections do not affect the measurement.
- The temperature signal conductors (terminals no. "3" and "4" of the transmitter AMS 5200) have to be calculated as described below. In any case, it is important to observe that the overall resistance of the heating loop (excluding the sensor) does not exceed **3,2 Ohm!**
- The sensor sense line (terminal no. "5" of the transmitter AMS 5200) has to show a cross-section of at least 0,5 mm<sup>2</sup>, regardless of the cable length. Larger cross-sections do not affect the measurement.

How to calculate the cross-section for the heater cores (example only):

Assume a cable with 4 mm<sup>2</sup> cross-section and 4,7 Ohm / km / core resistance.

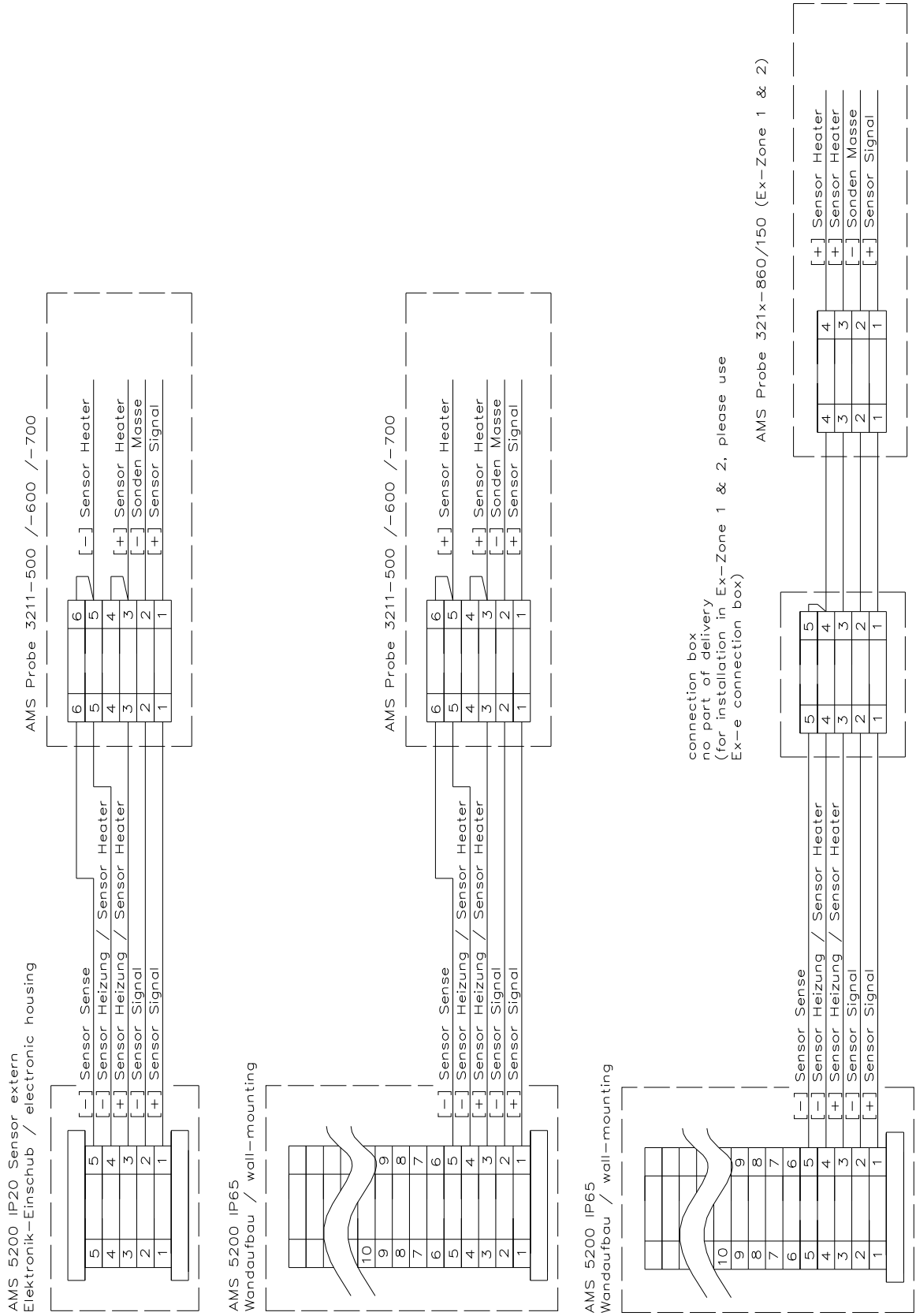
Which cable length fits?

- 4,7 Ohm / km / core results in 9,4 Ohm / km / connection  
(The connection comprises two cores)
- Prescription AMS: max. permissible resistance: 3,2 Ohm

$$\text{maximum cable length} \frac{3,2\text{Ohm}}{9,4\text{Ohm / km}} = 0,340 \text{ km} = 340 \text{ m}$$

The cable cross-section required may be split between different cores.

2.5.2 Wiring scheme transmitter ↔ probe



### 2.5.3 Terminal replacement plan for replacement AMS 3220 through AMS 5200

(Housing wall mounting IP 6x)

**AMS Probe**  
3211-500 / 600 / 700

**new analyser type**  
AMS 5200

**AMS 3220**

**Terminal**

**Terminal**

**Terminal**

- 1 (Sensor Signal +)
- 2 (Sensor Signal -)
- 3 (Heater +)
- 4 (Sense +)
- 5 (Sensor -)
- 6 (Sense -)

- 1
- 2
- 3
- 
- 4
- 5

- 5
- 6
- 1
- 2
- 3
- 4

**AMS Sonde**  
321x-860/150 Ex

**new analyser type**  
AMS 5200

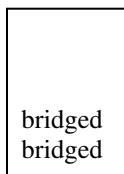
**AMS 3220**

**Terminal**

**Terminal**

**Terminal**

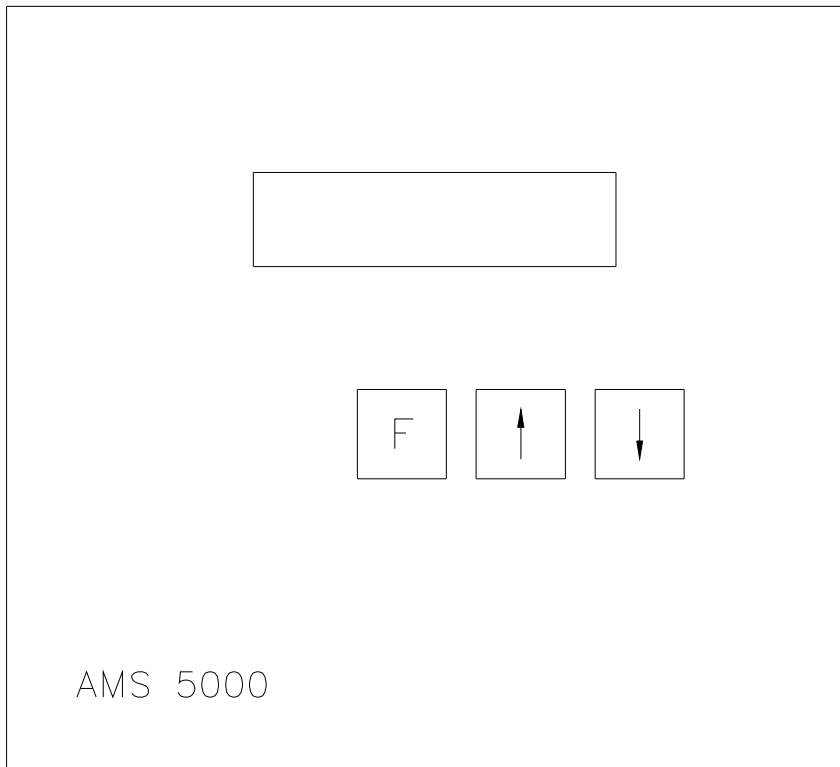
- 1 (Sensor Signal +)
- 2 (Sensor Signal -)
- 3 (Heater +)
- 4 (Heater -)



- 1
- 2
- 3
- 4
- 5

- 5
- 6
- 1 bridged
- 2 bridged to terminal 1
- 3 bridged
- 4 bridged to terminal 3

## **2.6 Front View AMS 5200**



**Fig. 1.4** Front View AMS 5200

- 1** 2 x 16-digit alphanumeric LCD-display, illuminated
- 2** Function Key "F"  
Key to select the menu, and to confirm settings
- 3** Function Key "↑"  
Input Key
- 4** Function Key "↓"  
Input Key

## **2.7 Maintenance and Maintenance Intervals**

The AMS 5200 analyser is equipped with a sophisticated self-monitoring routine and does not require intensive maintenance.

Maintenance work is restricted to the calibration, cleaning of the gas path ways and the probe from dust residues.

The life expectancy of the sensor is approximately 2 - 5 years. Applications with “clean gases” and stable ambient conditions may result in a higher life expectancy. Applications with aggressive or dirt laden gases or fluctuating ambient conditions may reduce the lifetime.

We recommend exchanging the sensor after 30 months of operation.

There is no limit to the shelf life of sensors; even 24 months of storage do not result in a measurable ageing effect.

The normal ageing of the sensor during operation is compensated by the calibration.

At the end of the sensor lifetime calibrations will result in errors, which indicates that the sensor should be replaced.

### **3. Start-Up and Instrument Description**

Pre-requisite: the system is completely installed, the probe (sensor) is connected and all gas lines are installed and connected appropriately.

Power up the analyser.

In the display, the serial number of the instrument and the software version are shown briefly; thereafter the following indication is shown:

Warm-up ### S	(Countdown 300 sec.)
------------------	----------------------

At the end of the count-down the analyzer measures the current Oxygen concentration, displayed in the first line of the display.



**Danger:**

**Before starting to operate the analyser please read the following instructions carefully.**



**Warning:**

**The AMS 5200 does not have a mains switch. A mains switch which covers also the analyser must be installed in order to switch-off the instrument in the event of danger. On site all measures have to be taken to ensure safe operation of the analyser.**

**This includes also the place where the analyser is installed**



**Warning:**

**To protect the operator a sufficient dimensioned fuse has to be installed to protect against short-circuit.**



**Danger:**

**Before start-up the housing of the analyser has to be closed.**

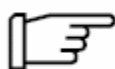


**Warning:**

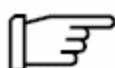
**The safety of the system is the sole responsibility of the owner / operator.**

## 4. Operation of the Analyzer and Setting the User Parameters

The analyzer is operated via three function keys. To select the menu press the F-key. In order to toggle through the menu press the function key "↑" or respectively "↓". The arrow keys also allow the adjusting of values or settings.



**Note:** After setting the desired value via the arrow keys, push the F-key. The F-key serves as „ENTER“ and confirms the new setting. If the F-key is not pressed, the former value will remain.



**Note:** The display will be lit as soon as any key has been pressed. The light switches off after 20 seconds of inactivity; however, it will be lit again as soon as any key has been pressed.

Toggle through the menu via the F-key. Choose from the menu via the F-key and/or via the arrow keys. To protect sensitive data, some submenus are protected by passwords.

**1. Password Operation-Code            111**

**2. Password Service-Code            1111**

At which point passwords have to be entered is described in the relevant submenu. The password remains valid until switching back to the measuring mode.

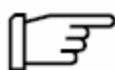
Software structure:

Measuring mode → Menu → Submenu

Measure		
Diagnosis	F-key	→ submenu refer to 3.2
Parameter	F-key	→ submenu refer to 3.3
Alarm1	F-key	→ submenu refer to 3.4
Alarm2	F-key	→ submenu refer to 3.4
Sensor Setup	F-key	→ submenu refer to 3.5
Analogue Out	F-key	→ submenu refer to 3.6
Calibration	F-key	→ submenu refer to 3.7
Service	F-key	→ submenu refer to 3.8



**Note:** To return to the measuring mode press the F-key. Via the arrow keys select the corresponding submenu from the menu. After quitting the submenu via Return and after choosing Measure the analyser returns to the measuring mode.



**Note:** If no key is being pressed for 250 sec. the analyzer will automatically switch to the measuring mode.

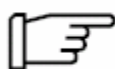
#### **4.1 Setting the Second Line of the Display**

Several values can be displayed in the second row.

The second line can be set via one of the arrow keys while the analyzer is in the measuring mode (the first row indicates the currently measured Oxygen concentration).

The following parameters can be set by the user:

Nr.	Parameter	Description
1	CU= ##,###mV	Measured sensor signal [mV]
2	HU= #####,# mV	Heater voltage of the sensor [mV]
3	HI= #,#### A	Heater current of the sensor [A]
4	HP= ##,##W	Heater power of the sensor [W]
5	HR= #####,## Ω	Heater resistance of the sensor [Ohm]
6	[ ] [ ] [ ]	[ ] Alarm 1+2 if active [ ] Error in case of instrument failure
7	FLOW	*)Option: monitoring of actual flow value
8.1	I-Out [ xx,x mA ]	Analogue signal [ mA ] at the outlet
8.2	Range y [ xx,x mA ]	Analogue signal [mA] at the outlet port, with indication of the active measuring range, *)Option)
9	Next cal xxxx h	Remaining time indicated in hours until the next automatically started calibration, *) Option
10	Bb. In ### min	Remaining time indicated in minutes until the next BlowBack, *) Option
11		Second line no indication



**Note:** If an error occurs as described in 3.4.2 the second line display changes as 6 (see above, last bracket changes into [ERROR]). After the second line has been changed, without solving the cause of the error, the message appears again in the second line after some time (~ 250 sec.)



## **4.2 Submenu Diagnosis**

Error messages are displayed in the submenu **Diagnosis**, which are the cause of the [Error] indication in the second line of the display. The error message cannot be ignored, it resets automatically after the cause is successfully solved.

How to access the submenu:

1. Press the F-key
2. Select **Diagnosis** using the arrow keys
3. Press F-key
4. Toggle through the submenu with the arrow keys

How to exit the submenu:

5. Press F-key

The analyser monitors the following alarms:

Nr.	Message	Description
1	TEMP ERROR	Sensor temperature not plausible; message occurs during the warm-up phase
2	HEATER S-CUT	Heater short cut
3	HEATER OPEN	Heat line not connected properly
4	ANALOG OUT ERR	Error analogue output, not connected
5	SENSE ERROR	Voltage response missing
6	EEPROM ERROR	General electronic error

### **4.3 Submenu Parameter**

The submenu **Parameter** includes general settings of the analyser which cannot be changed.

How to locate the submenu:

1. Press F-key
2. Select **Parameter** using the arrow keys
3. Press F-key
4. Toggle through the submenu with the arrow keys

How to view the parameters:

5. Select the parameter with the arrow keys
6. Press F-key, to show the value
7. Press F-key
8. Choose new parameter

How to quit the submenu

9. Select Return with the arrow keys
10. Press F-key
- 11.

The following parameters can be displayed:

Nr.	Message	Description
1	Return	Return to the main menu
2	Cell Offset	Sensor voltage while measuring in air
3	Cell Span	Voltage per decade Oxygen
4	Heater Res.	Heater resistance of the sensor
5	Sensor Date	Exchange date of the sensor
6	Serial No.	Serial number of the analyser
7	SW Version	Software version
8	HW Version	Hardware version
9	A1 Threshold	Alarm value Alarm 1
10	A1 Hysteresis	Hysteresis referring to the alarm value 1
11	A1 Range Beg.	Start of an alarm range at selecting and A1
12	A1 Range End	End of an alarm range at selecting and A1
13	A1 Mode	Current alarm mode
14	A2 Threshold	Alarm value Alarm 2
15	A2 Hysteresis	Hysteresis referring to the alarm value 2
16	A2 Range Beg.	Start of an alarm range at selecting and A2
17	A2 Range End	End of an alarm range at selecting and A2
18	A2 Mode	Current alarm mode
19	Extended Par.	Additional parameter, only for service purposes

## **4.4 Submenu Alarm**

### **4.4.1. Analyser Messages**

The analyser allows the display of two alarm messages. The alarm messages may be set independently from each other and/or independently from the measuring range.

#### **I.) wiring wall-mounting-enclosure IP65)**

<u>Signal</u>	<u>Terminal</u>		<b>11 - 13 (AI 1)</b>	<b>14 - 16 (AI 2)</b>
<b>AI 1</b>	<b>AI 2</b>			
<b>11</b>	<b>14</b>	[ COM ]	Analysers message	
<b>12</b>	<b>15</b>	[ NO ]	potential-free SPDT-Relay, may be set freely	
<b>13</b>	<b>16</b>	[ NC ]	max. load: 60 V / 0,3 A; resistive load only	

Pin position: **NON- FAIL SAFE**

Message inactive	<b>11 – 12 (AI 1)</b>	<b>14 – 15 (AI 2)</b>
Message active:	<b>11 – 13 (AI 1)</b>	<b>14 – 16 (AI 2)</b>

#### **II.) wiring electronic-housing / portable housing /electronic panel mounting**

<u>Signal</u>	<u>Terminal</u>		<b>1 - 3 (AI 1)</b>
<b>AI 1</b>			
<b>1</b>		[ COM ]	Analysers message
<b>2</b>		[ NO ]	potential-free SPDT-relay, may be set freely
<b>3</b>		[ NC ]	max. load: 60 V / 0,3 A; resistive load only

Pin position: **NON-FAIL SAFE**

Message inactive	<b>1 – 2 (AI 1)</b>
Message active:	<b>1 – 3 (AI 1)</b>

**Setting of Alarms:**

How to locate the corresponding submenu (Alarm 1 or Alarm 2):

1. Press F-key
2. Select **Alarm 1** or **Alarm 2** with the arrow keys

3. *Enter Password Operation Code 111 with the arrow keys*

4. Press F-key
5. Toggle through the submenu with the arrow keys

How to view and set the parameters:

6. Choose the parameter with the arrow key
7. Press F-key; the value is shown and can be changed with the arrow keys
8. Press F-key
9. Choose new parameter

How to quit the submenu:

10. Select Return with the arrow key
11. Press F-key



**Note:** The functions and the settings of message A1 are described below. Please proceed accordingly for A1 2.

The following parameters can be chosen in the submenu for each alarms:

Nr.	Message	Description	DEFAULT PARAMETER
1	Return	Return to the main menu via the F-key	
2	A1 Threshold	Set the threshold between 0...100 % via the arrow keys in [%]; after changing the limit, please confirm via the F-key	25 %
3	A1 Hysteresis	Set the threshold between 0...10 % via the arrow keys; reset the relay after the set difference [%] has been reached; after changing the limit, please confirm via the F-key	1,00 %
4	A1 Range Beg.	Set the threshold between 0...100 % via the arrow keys; set a lower alarm limit, after changing the limit, please confirm via the F-key	0,00 %
5	A1 Range End	Set the threshold between 0...100 % via the arrow keys; set a upper alarm limit, after changing the limit, please confirm via the F-key	25,00 %
6	A1 Mode	Select one of the following functioning of the message: <ul style="list-style-type: none"> <li>- High</li> <li>- Low</li> <li>- In Range</li> <li>- Out of Range</li> <li>- Calibration</li> </ul>	

Explanation # 6:

HIGH :	A1 Threshold active
LOW :	A1 Threshold active
In Range:	Message active and measuring value inside the measuring range, as set in # 4 and # 5
Out of Range:	Message active and measuring value outside the set measuring range (as set in # 4 and # 5)
Calibration:	Message set during active calibrations

#### 4.4.2 Analyser malfunctions

The analyser features a message to signal the analyser status. The message cannot be set and cannot be quitted. Only if the reason for an error message has been solved, the message will be deleted automatically.

The message is displayed in the second line of the display and via the corresponding signal outlet – Status Signal Relay.

The analyser features a status message indicating measuring values yes / no.

##### I.) wiring wall-mounting-enclosure IP65)

###### **Signal connecting port            17 - 19**

<b>17</b>	[ COM ]	Analyser message
<b>18</b>	[ NO ]	potential-free SPDT-Relay, may be set freely
<b>19</b>	[ NC ]	max. load: 60 V / 0,3 A; resistive load only

Pin position:            **FAIL SAFE**

Measuring values available    **17 – 19**  
 Error                                **17 – 18**

##### II.) wiring electronic-housing / portable housing /electronic panel mounting

###### **Signal connecting port            4 – 5 (AL I)**

<b>4</b>	[ COM ]	Analyser message
<b>5</b>	[ NO ]	potential-free SPDT-relay, may be set freely
<b>6</b>	[ NC ]	max. load: 60 V / 0,3 A; resistive load only

Pin position:            **NON-FAIL SAFE**

Measuring values available    **4 – 6**  
 Error                                **4 – 5**

**Error cause and troubleshooting:**

An error message as indicated below is automatically shown in the second line of the display as [Error]. Reasons for the error messages are displayed in the submenu Diagnosis ( # 3.2 ). Errors can be solved as described below.

<b>Error Cause</b>	<b>Displayed as....</b>	<b>Troubleshooting</b>
Power failure		switch on the analyser
Temperature Error	TEMP ERROR	warming phase
Heater Short-Cut	HEATER S-CUT	check for short circuit
Missing heater line	HEATER OPEN	check connection
Missing voltage feedback	SENSE ERROR	for connecting refer to #1.3.1
Calibration failure	CAL ERROR	repeat calibration
General hardware error	EEPROM ERROR	please contact AMS GmbH
Last valid calibration has been performed more than 10000 hours earlier	Service request	perform new calibration



**Note:** Changing the second line of the display when an error message has been displayed, without solving the error itself, the message [Error] reappears after some time.

The analogue output port can be integrated into the monitoring of errors. Please contact AMS about the instructions to do so.

<b>Error Cause</b>	<b>Displayed as....</b>	<b>Troubleshooting</b>
Analogue output open	ANALOGUE OUT ERR.	Connect analogue outlet

### 4.4.3 Service request

As recommend by the association NAMUR the analyser features a service request message. The service request message is displayed only when the last calibration has been performed more than 10000 h earlier. When the service request message is displayed, it is highly recommended to perform a new calibration as soon as possible to avoid false measurements.



**Warning:**

**To ignore the request for calibration can result in false measurements. The responsibility is solely with the system owner / operator.**

The message is displayed as follows:

Error Cause	Displayed as....	Troubleshooting
Last valid calibration has been performed more than 10000 hours earlier	Service request, shown in 2. line, also indicated as Status signal ( # 4.4.2 )	perform new calibration



**Note:** None of the analyser functions are affected by the Service request indication. It is highly recommended to perform a new calibration at the earliest.



**Note:** The Service request can be ignored once. To ignore the request go to submenu Diagnosis and confirm the request by pressing the < F > key. After another 150 h without new calibration the message appears again, and cannot be ignored this time. It will continue to show in the second line of the display.



**Note:** AMS offers calibration services for all AMS instruments.



#### **4.5 Submenu Sensor Setup**

If a sensor has been replaced the corresponding sensor data have to be set in the analyzer. After the new data have been stored the system uses the calibration data of the new sensor. The sensor data are available from AMS.

How to locate the submenu:

1. Press F-key
2. Select **Sensor Setup** with the arrow keys

3. Enter Password Service Code 1111 with the arrow keys

4. Press F-key
5. Toggle through the submenu with the arrow keys

How to view and set the parameters:

6. Select the Parameter with the arrow keys
7. Press F-key, the value is shown and can be changed via the arrow keys
8. Press F-key
9. Choose the new Parameter

How to quit the submenu:

10. Select Return with the arrow keys
11. Press F-key

The following parameters can be displayed / changed:

Nr.	Message	Description
1	Return	Return to the main menu with the F-key
2	Cell Offset	Sensor voltage [mV], can be set with the arrow keys, confirm with the F-key!
3	Cell Span	Sensor sensitivity; can be set with the arrow keys, confirm with the F-key!
4	Heater Res.	Heater resistance [mOhm]; can be set with the arrow keys, confirm with the F-key!
5	Sensor Date	Sensor date; can be set with the arrow keys [YYMMDD] confirm with the F-key!
6	Autos. Heater	Auto set-up heater resistance @ 12,5 V heater voltage

## **4.6 Submenu Analogue Out**

The analyser features an analogue output port.

The output port has been set according to the test protocol.

This submenu allows setting of the measuring range according to your requirements.

How to locate the submenu:

1. Press F-key
2. Select **Analogue Out** with the arrow keys

*3. Enter Password Operation Code 111 via the arrow keys*

4. Press F-key
5. Toggle through the submenu with the arrow keys

How to view and set the parameter:

6. Select the parameter with the arrow keys
7. Press F-key, the value is displayed and can be changed with the arrow keys
8. Press F-key
9. Choose new parameter

How to exit the submenu:

10. Select Return with the arrow keys
11. Press F-key



**Note:** After selecting Adjust Output, the analogue output „freezes” to the last measuring value (shown in the first line). Both values (analyser / recorder) can be compared. Data can be changed with the arrow keys.

The following parameters can be displayed / changed:

Nr.	Message	Description	DEFAULTPARAMETER
1	Return	Return to the main menu with the F-key	
2	Adjust Output	Adjust the analogue port to the receiver, Adjust to the displayed measuring value by using the arrow keys, confirm with F-key	
3	Last Range	Selection for the differentiation of the analogue port to max. 4 measuring ranges  <i>Note: Automatic switch-over to 4 measuring ranges is an option which has to be ordered seperately</i>	00000 without automatic switch-over  00004 with automatic switch-over
4	Extended Parameter	Depending on the selection of the active measuring ranges, the following parameter are displayed	

**Tab. 4.1-1 Without Option: Automatic switch-over between measuring ranges**

Last Range		00000	
5	Analog Min	Lower boundary at which 4 mA are sent, Input data in [%]  Changes with the arrow keys, confirm with the F-key	0,00 Vol %
6	Analog Max	Upper boundary at which 20 mA are sent, Input data in [%]  Changes with the arrow keys, confirm with the F-key	25,00 Vol %

**Tab. 4.1-2 With Option: Automatic switch-over**

	Last Range	00001...4	maximal 4 Measuring Ranges
5	Hysteresis	Value [%] at which the next lower measuring rang is selected, with reference to the measuring range limit	2,5 %
6	Range 1	Upper boundary at which 20 mA are displayed (lower boundary is always 0 Vol. % O <sub>2</sub> )	1,00 Vol. %
7	Range 2	Upper boundary at which 20 mA are displayed (lower boundary is always 0 Vol. % O <sub>2</sub> )	2,00 Vol. %
8	Range 3	Upper boundary at which 20 mA are displayed (lower boundary is always 0 Vol. % O <sub>2</sub> )	5,00 Vol. %
9	Range 4	Upper boundary at which 20 mA are displayed (lower boundary is always 0 Vol. % O <sub>2</sub> )	25,00 Vol. %



**Note:** The actual measuring range can be displayed in the second line. Additionally the value at the analogue port will be shown in brackets.



**Note:** The analogue signal port can always be divided into 4 measuring ranges with the automatic range switch-over installed. The range always starts at 0,00 Vol. %. Within limits the end of the range can be adjusted freely.



**Note:** If the analogue output port shall be divided the range recognition has to be activated. Otherwise a analogue receiver would not be able to tell the signals apart.

## **4.7 Submenu Calibration**



**Note:** It is highly recommended to calibrate the analyser in regular intervals to compensate for the natural ageing of the sensors. We recommend a time interval of 6 – 8 weeks at the beginning. The time interval may be changed once the long term stability of the sensor is established.



**Note:** A calibration has to be started and executed manually. The monitoring of stability and plausibility is performed automatically.

How to locate the submenu:

1. Press F-key
2. Select **Calibration** with the arrow keys
3. Press F-key
4. Toggle through the submenu with the arrow keys
- 5.


How to view and set the parameter:

6. Select the parameter with the arrow keys
7. Press F-key, the value is displayed and can be changed with the arrow keys
8. Press F-key
9. Choose new parameter

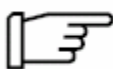
How to quit the submenu:

10. Select Return with the arrow keys
11. Press F-key

The following parameters can be displayed / changed:

Nr.	Message	Description	DEFAULT PARAMETER
1	Return	Return to the main menu with the F-key	
2	LO Gas Conc.	Oxygen concentration of the Cal gas of the lower calibration point; set in [%]; after changing the value with the arrow keys, confirm the new value with the F-key!	2,00 Vol%
3	HI Gas Conc.	Oxygen concentration of the cal gas of the upper calibration point; set in [%]; after changing the value with the arrow keys, confirm the new value with the F-key!	20,95 Vol%
4	LO Gas Calib.	Starting the calibration of the lower calibration point	
5	HI Gas Calib.	Starting the calibration of the upper calibration point	
6	Extended Par.	Additional parameters for the calibration; to activate the extended parameters, please enter the Password Operation Code 111	
6.1	Purge Time	Setting the purge time [s]; min. purge time: 30 sec.; after changing the value with the arrow keys, confirm the new value with the F-key!	180 s
6.2	Analog Out	active / frozen; setting the analogue outlet during the calibration; active = the analogue outlet displays the cal gas concentration during the calibration frozen = analogue outlet is frozen, i.e. the power output freezes to the last measuring value before the calibration	frozen
6.3	Service Calib.  The analyzer ignores all settings during this procedure.	Only to do when:  changing the sensor  error cause (deviation error)  After accessing the menu "Service Calib." the analyzer switches back to the calibration routine and can be calibrated. The menu changes only to inactive if the display shows a O2 value, a parameter setting or by pressing the F-key the analyser is set to measure.	

6.4	Auto-calibration mode.	<p>OFF Auto-calibration is switched-off</p> <p>LOW Auto-calibration starts the calibration of the lower calibration value.</p> <p>HIGH Auto-calibration starts the calibration of the upper calibration value.</p> <p>Low-High Auto-calibration starts the calibration of the lower and the upper calibration value.</p> <p>High-Low Auto-calibration starts the calibration of the upper and the lower calibration value.</p>	<p>OFF</p> <p>Only available with Option Auto-calibration.</p>
6.5	Auto-calibration time	Setting of the time interval between two automatically started calibrations	<p>00000 h</p> <p>Only available with Option Auto-calibration.</p>
6.6	Blowback Int.	Setting of the time interval between two automatically started backwashing (blow back)	<p>0000 min (5 min on delivery)</p>
6.7	Blowback Time	Length of the blowback	<p>0000 sec (15 sec on delivery)</p>



**Note:** If auto-calibration is installed it is always deactivated on delivery.



**Note:** The solenoid valves which are used to switch from process gas to calibration gas are not included. However the valves may be ordered separately from AMS.



**Note:** If blowback is installed it is Blowback activated on delivery.

#### **4.7.1 How to start a calibration**

1. by using the keyboard of the analyser
2. automatically started and monitored (only if option Auto-calibration has been ordered)
3. by external actuator with the analyser by setting the Auto-calibration mode to the OFF-position (only if option Auto-calibration has been ordered)

#### **4.7.2 Selecting the Calibration Gases**

The Oxygen analyzer has to be calibrated with two different calibration gases. Depending on the application, the calibration gases have to be determined as follows:

##### **A.) Measuring the Oxygen Concentration in Process Gas Samples**

To determine the Oxygen concentrations in a custom-set range the calibration gases have to cover the upper and the lower set point of the Oxygen concentration range.

**Example:** Measuring a process gas with an oxygen concentration of about 1 ... 10 Vol-% in N<sub>2</sub>, a calibration gas with the following oxygen concentrations are recommended:

For the lower set point: 2 Vol-% O<sub>2</sub> in N<sub>2</sub>, as the lower calibration point.

For the upper set point: 20,95 Vol-% O<sub>2</sub> in N<sub>2</sub>, as the upper calibration point.

##### **B.) Continuous Measurement of Oxygen Concentration for Control- and Alarm purposes**

Usually in this kind of applications the Oxygen concentration is relatively constant just varying in a narrow concentration range around the correct value. Correspondingly, for process control one calibration gas should show the correct Oxygen concentration value and for alarm purposes the lower or upper alarm value.

The Oxygen concentration of the second calibration gas should be aligned to the range of deviation from the correct Oxygen value. It may contain more or less Oxygen compared to the process gas.



**4.7.3 Starting the Calibration and Calibration Procedure**

1. Type in the calibration gas concentration according to the actual calibration gas concentrations of the certificate of the cal. Gas tank.
2. Check and / or set the calibration gas concentrations for the lower calibration point.

LO Gas Conc.	Select <i>Calibration</i> in the submenu; after changing the previous value with the arrow keys, confirm the new value with the F-key!	Type in Vol% Oxygen, the difference between both calibration points will be monitored by the analyzer
--------------	--	---

3. Check and / or set the calibration gas concentrations for the upper calibration point.

HI Gas Conc.	Select <i>Calibration</i> in the submenu; after changing the previous value with the arrow keys, confirm the new value with the F-key!	Type in Vol% Oxygen, the difference between both calibration points will be monitored by the analyzer
--------------	--	---

4. Starting the calibration of the lower calibration point:

LO Gas Calib.	Select the low gas calibration from the menu and confirm with the F-key → the calibration is started	
---------------	--	--

5. Calibration Process

LO-G x,xx Vol% < F > z,zz Vol%	Press the F-key to start the calibration	x,xx current Cal Gas concentration z,zz current measuring value
-----------------------------------	--	--

6. Purge Time

CAL z,zz Vol % PURGING ### s		z,zz current measuring value ### residual time
---------------------------------	--	---

*Each calibration is preceded by a purge time during which the sensor settles on the calibration gas concentration. Measuring value deviations should not occur after the purge time. If there are still deviations, the calibration has to be aborted and the purge time has to be prolonged. (Please refer to # 3.7.4 of the instruction)*

7. Logging of measuring data

CAL z,zz Vol % Sampling ### s		z,zz current measuring value ### residual time
----------------------------------	--	---

*The analyzer is calibrated during the Sampling Phase. The sensor signal has to be totally stable. Any deviation causes an calibration error. After a successful calibration the following message is displayed:*

CAL successful Press F to cont.	Successful calibration; press the F-key
------------------------------------	---

### 8. Re-applying Sample Gas

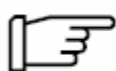
PR-G z,zz Vol % Press F to cont.	Switch back to measuring gas; press the F-key	z,zz current measuring value
-------------------------------------	---	------------------------------

*The current sample gas concentration will be displayed. Before confirming the sample gas concentration the sensor should have been adjusted to the current sample gas concentration.*

*After pressing the F-key, the following message will be displayed:*

PR-G z,zz Vol % Purging ### s	Measurement adjusts to sample gas	z,zz current measuring value
----------------------------------	-----------------------------------	------------------------------

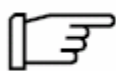
*After the final purging the analyzer automatically switches back to the measuring mode. The analogue signal is being updated.*



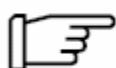
**Note:** We recommend to “freeze” the analogue signal during the calibration in order not to interfere with the plant operation.



**Note:** The calibration of the upper calibration point proceeds accordingly. However the messages are preceded by the term HI-G.



**Note:** If auto calibration is installed in the analyser the calibration proceeds according to the selection of the calibration points. In this case some of the following messages, as shown on the next page are not available.



**Note:** Calibration errors can be displayed notwithstanding manual or Auto-calibration in the submenu diagnosis. Calibration errors can also be displayed using the Status-Signal Relay.

### 4.7.4 Aborting the Calibration

The calibration can be aborted at any time. If the calibration is aborted before the sampling time has elapsed no parameters will be changed. The previous calibration remains valid. To abort please proceed as follows:

1. To abort a calibration, press the F-key during the calibration and the following message will be displayed:

Sure? # s Press F to abort	Press the F-key, calibration will be aborted	# [5 s] remaining time for confirming the abortion
-------------------------------	--	--

*Confirm with the F-key, the following message will be displayed:*

PR-G z,zz Vol% Press F to cont.	Switch back to sample gas and confirm via the F-key	z,zz current measuring value
------------------------------------	---	------------------------------

*Confirm with the F-key, the following message will be displayed:*

PR-G z,zz Vol% Purging ### s		z,zz current measuring range ### residual time
---------------------------------	--	---

2. During the final purging, press the F-key. The following message will be displayed:

Sure? # s Press F to abort	Press the F-key, calibration will be aborted	# [5 s] remaining time for confirming the abortion
-------------------------------	--	--

*The analyzer returns to the submenu Calibration. Either re-start the calibration or quit the submenu.*



**Note:** If the calibration has been started automatically, it can always be aborted on the analyser. Also holding the start actuator for more than 10 sec. aborts the calibration.

### **4.7.5 Determination of the Purge Time**

Each calibration sequence starts and ends with purging the analyzer. The duration of the sampling period depends on the purging of the lines and the behavior of the sensor. After the purge time the sensor (respectively the analyzer) has to be stabilized. If a measuring value deviation occur during the sampling phase the calibration will be aborted.

To determine the purge time to your system, please proceed as follows:

1. Press the F-key and select the submenu Calibration
2. Select Extended Par. via the arrow keys and choose the following sub item:

Purge Time	Press the F-key and set the purge time with the arrow keys; confirm with the F-key	
------------	--	--

### **4.7.6 Adjusting of Auto-calibration**

Auto-calibration is available as option. It includes the possibility to pre-select the type of calibration and the time interval by using the counter in the time range of max. 9999 h between two calibrations. AMS recommends setting the time range at 600 – 1000 h.

To set the time please proceed as follows:

1. Press the F-key and select the submenu Calibration
2. Select Extended Par. via the arrow keys and choose the following sub item:

Auto-calibration mode	Press the F-key and set the desired calibration. OFF indicates that Auto-calibration is deactivated.	
Auto-calibration time interval	Press the F-key and set the time interval between 2 calibrations. 0000 h indicates, that auto-calibration is not active. In this setting the auto-calibration can be started at any time with a external actuator.	The counter shows the remaining time until the next auto-calibration in the second line of the display.

**4.7.7 Adjusting of blowback (backwashing)**

Blowback is available as option. It includes the possibility to pre-select Interval and Length of the blowback. The time interval using the counter in the time range of max. 999 min. and length of blowback using the counter in the time range of max. 9999 sec.

AMS settings on delivery are: Blowback Interval is 5 min, Blowback Time is 15 sec.

To set the time please proceed as follows:

- 1.Press the F-key and select the submenu Calibration
- 2.Select Extended Par. via the arrow keys and choose the following sub item:

Blowback Interval	Press the F-key and set the time interval between 2 actions. Zero indicates that blowback is deactivated.	5 min on delivery
Blowback Time	length of time	15 sec. on delivery



*Note:* During the blowback the analogue output is frozen.  
-For Activation use the #4.7.8-



*Note:* time duration of the running [T] backblowing

$$[T] = \text{Blow Back Time} + \text{Purge (see \#4.7.5)} < \text{blowback Int.}$$



*Attention:* blowback interval < [ T ] no measuring values are available



*Note:* The display will shown -in the second line- following messages, when the blowback is active:

Oxygen ##,## Vol%	##,## Vol% actual value
Bb. Blowing ### s	### s remaining time for blowback

Oxygen ##,## Vol%	##,## Vol% actual value
Bb. Purging ### s	### s remaining time for activate the analogue output, when frozen

**1.) wiring the message for blowback**

**Signal connecting port 21 – 23**

- |    |         |                  |  |
|----|---------|------------------|--|
| 21 | [ COM ] | Analyser message |  |
| 22 | [ NO ]  | Bb is inactive   | potential-free SPDT-relay, may be set freely |
| 23 | [ NC ]  | Bb is active     | max. load: 60 V / 0,3 A; resistive load only |

Pin position: **NON-FAIL SAFE**

### **4.7.8 Aligning the Analogue Output during the Calibration**

We recommend to “freeze” the analogue output during the calibration. This ensures a safe system operation. If “frozen“ is selected in the corresponding submenu the analogue output will store its last valid measuring value until the calibration is finished or aborted.

To align the analogue outlet to your system, please proceed as follows:

1. Press the F-key and select the submenu Calibration
2. Select Extended Par. with the arrow keys and choose the following sub item:

Analog Out	Press F-key and choose between frozen / active; confirm with the F-key
------------	--

### **4.7.9 Calibration Errors**

After the Sampling Phase of the calibration the following message may be displayed:

Deviation Error Press F to cont.	
-------------------------------------	--

This message indicates that

1. the plausibility of the calibration is not met (calibration gases interchanged)
2. the distance to the calibration point is too high

Trouble shooting:

- apply correct calibration gases
- check the sensor parameters, especially after sensor exchange
- contact AMS

Signal Instable Press F to cont.	
-------------------------------------	--

This message indicates that

1. the measuring value deviations are too high

Troubleshooting:

- extend the purge time
- remove the probe from the furnace and calibrate the probe in ambient conditions.



**Note:** Calibration errors are shown in the second line of the display as [Error]. The reason for the message can be found in the submenu. It is also possible to display the calibration error via the Status Signal Relays.

#### **4.8 Submenu Service**

Modify parameters only after contacting AMS. Sensitive areas of the electronic unit may be changed and a new parameterization may occur accidentally!

#### **5. Serial Interface**

The Oxygen Analyzer AMS 5200 features a serial interface Type RS 232. This interface serves as a connection to a computer from which data from the analyzer may be collected by a data handling software or via simple keyboard commands.

In order to connect the electronic transmitter and the remote computer via a serial interface RS 232, please follow the instructions below:

1. Connect the serial interface of the AMS 5200 via a non-modem cable to the COM interface of the computer.
2. Start the terminal program on the remote computer and take care of the assignments as follows:

COM-Port:	(COM serial interface of remote computer)
Baud-Rate:	19200 bps
Start-Bits:	1
Data Bits:	8
Stop Bits:	1
Parity:	None

If required you can receive the accurate structure of the commands. Via these commands you will be able to retrieve measuring values or you can set/trigger parameters.

A corresponding software-tool is also available. With this program a computer with Windows XP may read all necessary parameters which are visualized.