G3631

Ambient Oxygen Analyzer Manual

Green Instruments

Figure 1-1: G3631 Oxygen Analyzer Program Menu Structure

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1 Introduction

1.1 About this Manual

This manual contains data and instructions for the installation, operation, and maintenance of the G3631 Ambient Oxygen Analyzer.

The instructions have been made in general terms and do not take into consideration a specific installation. The instructions & figures have been made in general terms and do not take into consideration specific installations. The figures used in the manual are only for general illustration purposes. As such, the instruction manual is designed only for the G3631 Ambient Oxygen Analyzer.

The instructions for the installation, operation, and maintenance of the complete analyzing system including sampling board designed for the G36 Oxygen Analyzer by Green Instruments A/S are provided in a separate manual.

The manual does not describe all possible situations but only the most common and known situations and cannot replace the necessary education of the personnel. Should situations not described in the manual occur, which cannot be solved in accordance with normal known practice and good workmanship, the operator should contact Green Instruments A/S for instructions.

Attention

Before operation, read all instructions and warnings within this manual and associated documentation. Improper use may cause personal injury and/or damage of equipment and may void the warranty. Green Instruments A/S disclaims any responsibility for damage and/or injury caused by improper installation, use or maintenance of the equipment

Green Instruments A/S reserves the right to minor alterations and improvements owing to developments without being obliged to enter the corresponding changes in this manual.

Green Instruments A/S reserves the copyright of the manual. Without prior written permission of Green Instruments A/S, the manual may not be copied and given to unauthorized people.

1.2 Inquiries and Feedback

All claims and inquiries for spares shall be addressed to Green Instruments A/S or our distributors. In all correspondence or when ordering spare parts, please carefully state the equipment type and serial number, which you can find on the label on the equipment.

Green Instruments A/S appreciates all feedback and suggestions for improvement. If you have any questions or find any errors in the manual, you are welcome to contact us at the following address:

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1.3 About the System

The G3631 Ambient Oxygen Analyzer measures the content of oxygen with concentrations up to 21.0%. The system is designed to measure the content of oxygen in the ambient air.

The G3631 Ambient Oxygen Analyzer uses a zirconia sensor. Zirconium dioxide sensors have long been established as industry standards, but the G3631 uses a new type of zirconia sensor, which can be used in a wide range of applications.

Download all product certificates at https://greeninstruments.com/

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2 Specifications

G3631 Ambient Oxygen Analyzer	
Analyzer Type	G36p Oxygen Analyzer – panel mounted
Approvals	DNV/GL, BV, LR & MED
Sensor Type	Zirconia sensor type SEN9
Measurement Range	0…21 % O_2
Ambient Temperature	0…55 °C
Ambient Humidity	20...90% R.H.
Ambient Pressure	Constant at barometric pressure at sea level
Power Supply	24 VDC
Power Consumption	40 VA per analyzer
Digital Display	Touch screen 71 x 39 mm
Output Signals	Active 4…20 mA – range selectable – default 0…25 %
Load Output (max.)	600 ohm / 24 VDC
Relays	4 relays, volt free, 24 V AC/DC, 5A
Alarm Functions	Low O_2 level - freely configurable High O_2 level – freely configurable High – High O_2 level – freely configurable - connected to a buzzer System failure alarm
Repeatability	+/– 0.1 % of the full scale
Linearity/Accuracy	+/– 0.5 % of the full scale
Drift (one month)	+/– 0.1 % of the full scale
Dimensions	240 × 240 × 105 mm (H×W×D)
Weight	4.0 kg without packaging
Specifications are subject to changes without notice.	

3 Safety Aspects

Attention

Follow the operating instructions.

Make sure that all power and signal cables are connected before operating the system.

The sensor is hot and can cause severe burning of personnel if not handled with care.

The system must be installed in a safe, non-hazardous area, and it is not suitable for use with flammable sample gases.

The installation and operation of the G3631 Ambient Oxygen Analyzer and associated equipment must be carried out by skilled, trained, and certified personnel. Green Instruments A/S does not take any responsibility for the operation of the system and associated equipment whatsoever.

Successful and safe operation of this equipment is dependent upon proper handling, installation, operation, and maintenance.

Hazardous voltage!

Always disconnect the power before installing or servicing the analyzer. Ignoring this warning can result in severe personal injury or material damage. Read the manual carefully to ensure that all power and signal leads are connected correctly.
Make sure that the analyzer is connected to the correct voltage (see rating marked on the analyzer label).

Circuit breaker!

The installation must include a way to switch off the electrical power by a clearly marked switch or circuit breaker external to the analyzer. The external switch or circuit breaker shall be placed in close proximity to the analyzer and within easy reach of the operator.

Overload protection!

For compliance with the IEC 61010-1 (2003) safety requirements, the installation must include a means of overcurrent protection to provide protection against excessive energy being drawn from the power supply system in case of a fault in the analyzer.

Installation and fault finding!

Electrical installation and fault finding on the analyzer should only be undertaken by a suitably trained and qualified engineer.

EMC!

For compliance with the EMC product standard IEC 60533 (1999), the connection cables for the main supply, relays, interface, and analog output signals should be shielded or provided with equivalent protection.

Special precautions must be taken in connection to "long" signals or control lines of more than 30 meter.

Sensor!

The sensor must not be exposed to strong mechanical shocks. Mechanical shocks may cause the sensor element to crack without visible damage.

The sensor must be connected to the analyzer before the analyzer is powered up (risk of damage).

As soon as the analyzer is under voltage, the connection to the sensor must not be interrupted. Therefore, please disconnect the power when you need to connect or disconnect the sensor.

Connections!

The power supply and all electrical connections are accessed at the back of the analyzer.

Poisonous gases!

Sensor type SEN9 is not suitable for installation in an area with a high concentration of methane (CH_4).

Recycling!

Please do not dispose the G_{3631} Ambient Oxygen Analyzer with regular refuse. Disposal should be in accordance with the requirements of the current statutory regulations.

Symbol identification

⚠	Caution, risk of danger
⚡	Caution, risk of electrical shock
♨	Caution, hot surface
⏚	Protective earth
CE	The CE mark proves the compliance of the instrument with the requirements of the relevant EU directives

4 Control at Delivery

When you receive the G3631 Ambient Oxygen Analyzer, control that the received scope of supply is in accordance with the packing list and not damaged.

Any discrepancy should be reported to the supplier immediately. If any of the received parts are damaged, the shipping company should be informed, and new parts should be made available before completing the installation.

5 Installation

Read this chapter in its entirety before installing the analyzer.

5.1 Where to Install the System

> **Attention**
>
> Mounting and operation of the G3631 Ambient Oxygen Analyzer and associated equipment must be carried out by skilled and certified personnel.
>
> Green Instruments A/S does not take any responsibility of the operation of the system and associated equipment whatsoever.
>
> The equipment must only be applied as specified by Green Instruments. If the equipment is used in a manner not specified by Green Instruments, the protection provided by the equipment may be impaired.

Satisfactory operation, faultless functions, and minimal maintenance of the G3631 are achieved by paying attention to the following:

- The equipment shall be installed in a clean area away from dust, oil mist, and moisture. It shall be installed at viewing level so that it is easy to access in connection to operation and service.

- The equipment shall be placed and installed in a location where the ambient conditions (humidity, temperature, and pressure) are as specified in chapter 2 at any time.

5.2 Electrical Connection

> **Note**
>
> The electrical connections are dependent on the actual system configuration.
>
> For the default configuration and connection of each analyzer, please see the Testing & Configuration Sheet attached to each analyzer.

The electrical connections are dependent on the actual system configuration. The terminals are all located on the back of the analyzer. For details, please see Figure 5-1. Only those functions to be used shall be connected.

5.2.1 Power Supply

The power supply terminal is located at the bottom right corner and is marked supply rating (24 VDC). For details please see Figure 5-1.

Before connecting the power supply, please make sure that the power supply rating of the analyzer corresponds with the power supply available.
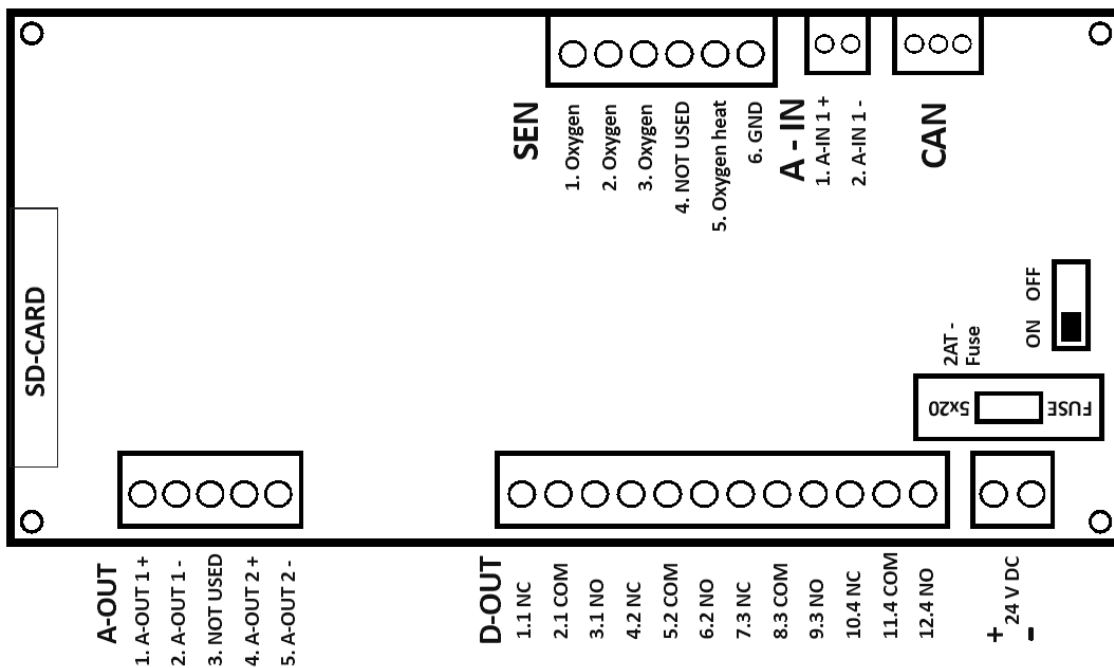
Figure 5-1: The G36p Connection Terminals

5.2.2 Sensor Connections – SEN

The analyzer is arranged with the sensor connection terminal SEN.

Terminal 1 (Black)   = Sensor electrode (oxygen)
Terminal 2 (Yellow)   = Sensor electrode (oxygen)
Terminal 3 (Red)   = Sensor electrode (oxygen)
Terminal 4   = No connection
Terminal 5 (Gray)   = Sensor heating (oxygen)
Terminal 6 (White)   = Ground

5.2.3 Relay Outputs – D-OUT

The analyzer is arranged with four relay outputs connected to D-OUT with 12 terminals.

The default relay functions, and connections of the G3631 Ambient Oxygen Analyzer are as follows:

Relay No.	Relay Function	Terminal Connections	
Relay 1	Low/High O2 level alarm	Terminals 1.1-2.1-3.1 (NC-COM-NO)	Inverted – Normally energized
Relay 2	High High level alarm (Buzzer)	Terminals 4.2-5.2-6.2 (NC-COM-NO)	Inverted – Normally energized
Relay 3	System failure (sensor +loop)+Flow alarm if any	Terminals 7.3-8.3-9.3 (NC-COM-NO)	Inverted – Normally energized
Relay 4	Auto Calibration	Terminals 10.4-11.4-12.4 (NC-COM-NO)	Normally de-energized

Alarms

The system failure alarm includes a sensor alarm and alarm for open loop of the analog outputs.

For setting of values for the O_2 alarm levels see section 7.2.

Normally energized

Normally energized means that the relay is energized in the alarm free condition during operation. The relay will be de-energized when there is an alarm or when the supply voltage disappears from the analyzer. Thus, the normally energized relays will give a fault signal in the event of failure of power to the analyzer.

Normally de-energized

Normally de-energized means that the relay is de-energized in the normal operating condition.

5.2.4 Input Connections – A-IN

The input connections A–IN are placed next to the sensor connections SEN. The terminal is arranged with two poles for one analog input 4…20 mA (Analog Input 1).

5.2.5 Analog Output Connections – A-OUT

There are two active 4…20 mA output signals* for load up to 600 ohm. The configuration is as follows:

- Terminals 1 & 2: Analog Output 1 for the remote indication of oxygen level
- Terminal 3: No connection
- Terminal 4 & 5: Analog Output 2 (optional)
* Active output signal means signal voltage from the G3631 Ambient Oxygen Analyzer.

For setting of analog outputs please see section 7.4.

5.2.6 SD Card

The SD card is used for storage of the historical trend of O_2 and the alarm logbook. The SD card can also be used to load a new software version to the analyzer.

Data log

The internal memory of the analyzer measures and saves six values every minute. However, the internal memory can only store one hour of logging, which is equal to 360 log values. If there is no SD card installed the new log values will supersede the old log values. This means there will be no historical trend curve and alarm logs as well.

However, if you place an SD card in the analyzer, the internal memory will be saved on the SD card every minute. If the analyzer alarm and logbook functions are on, the alarms will also be logged on the SD card.

There are two log files in the SD card, a log file for O_2 value **g1x.log** and a log file for alarms **g1x.alm**.

If you want to read the log files directly from the SD card using a Windows-operated computer you have to use Notepad. **Do not open** the log files in WordPad. WordPad will damage the format of the log files, and the analyzer will be unable to log any more data on the SD card.

The best way to read the log files is to copy them to the local disk of your computer and then open them from your computer. This way you can use any program that can open a txt-file including Notepad, Wordpad, MS Word, and MS Excel.

The data in the log file – **g1x.log** includes 5 columns, i.e.:

YYYY-MM-DD	HH:MM:SS	Datalog of A–OUT 1 (O_2 *100)	Datalog of A–OUT 2 (O_2 *100)	Unix time
2009-11-12	13:01:54	2089	2089	1258027314

The SD card shall be replaced after four years due to the limited capacity.

Software and default configuration uploading

The folder **bin** at the SD card includes two files: **G1.bin** and **g1parm.bin**. **G1.bin** is the software file and **g1parm.bin** is the default configuration file.

If Green Instruments delivers a new software version with two files named **G1.bin** and **g1parm.bin** the following steps will guide you through the installation:

- Replace the old files at the SD card with the new files **G1.bin** and **g1parm.bin** that you have received.

- Set the SD card back in the analyzer. Then, restart the analyzer. Now the analyzer will automatically check the SD card to see if there is a new software version. If yes, the new software will automatically be loaded to the internal memory of the analyzer.

- After uploading the new software version, reload our default settings by choosing Load default settings in *Tools setting\Service (password level 2)\Load default settings*.

- After uploading the new software version, you must reset the analyzer following the instructions in chapter 7.

5.2.7   Other Connections

The CAN connection is not in use by default.

6 Menu Structure

Please see Figure 1-1 for the Program Menu Structure

Attention

The instructions & figures have been made in general terms and do not take into consideration specific installations. The figures used in the manual are only for general illustration purposes.

6.1 Main Menu

The analyzer is designed with a touch screen. The Main Menu displays the current oxygen value in percent. To the right four function keys are displayed. The function keys are connected to four different functional menus: **Graph, Information, Calibration and Tools.**
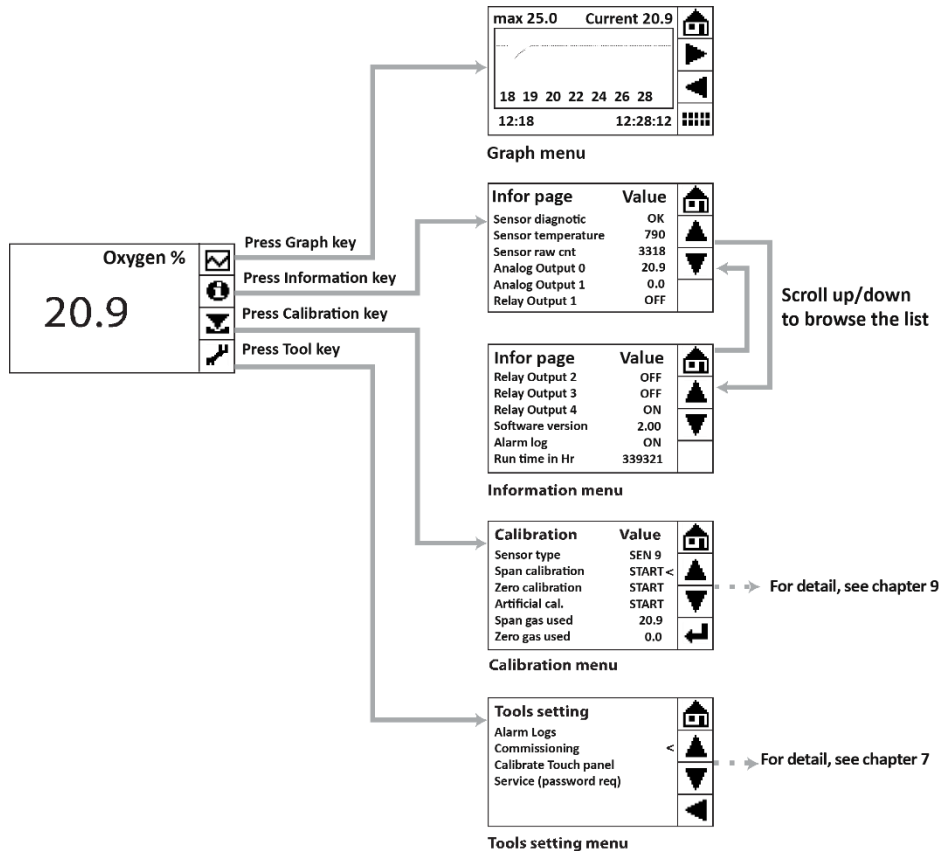
Figure 6-1: The G3631 Main Menu and Four Functional Menus

If the alarm function is on and an alarm is triggered, the alarm message will be displayed at the bottom left corner of the screen. The alarm will disappear automatically when the reading of the O_2 value is no longer the alarm zone (O_2 level alarms) or the problem with the sensor/output loop is fixed (system failure alarm).

6.2 Graph Menu

Pressing ☑ changes the display into a graphical mode in which a trend curve of the log values (Y-axis) is shown on a time scale (X-axis).

The actual oxygen value in percent is displayed in the upper right corner of the graph screen as Current.

The trend curve displays the log values from the SD card. The trend screen has 108 dots in the timeline. Therefore, the trend curve will show 1 log value per dot if the X timing is set at 18 minutes (6 log values/minute x 18 minutes = 108 values). If the X timing is less than 18 minutes, the trend curve will be shown as a dotted line.

If the X timing is 36 minutes, two values will be printed at the same X-position. Similarly, if the X-timing is 180 minutes, 10 values will be printed at the same X-position with all different Y values.

Pressing ⊞ gives access to the History time menu, where you can choose to see the trend curve in a specific historical period and change the setting for the trend curve.

History time & Graph settings

Change the values in Date and Time to see the trend curve in a specific historical period. For example, the time is now 12:28 and you want to see the trend curve at 11:00.

- First, select **Time** and enter the historical point of time.

- Then, select **Locate history point**, and the screen will show to the trend curve at that specific time.

It will take time for the analyzer to browse an old history point. The longer time you want to go back, the longer time the analyzer will require to recall the history. When the analyzer is recalling history, the touch screen will freeze and will not immediately react to touching.

If you want to browse a history point that dates back more than a week, it will be best to read the history data directly from the log file at the SD card. For details of how to read the log file, please refer to section 5.2.6.

X-timing shows the time range of the trending graph, which can be set as required. However, the time range should not be over 1440 minutes (24 hours). The time range is displayed on the lower part of the graph screen with the starting point in the bottom left corner and the ending point in the bottom right corner.
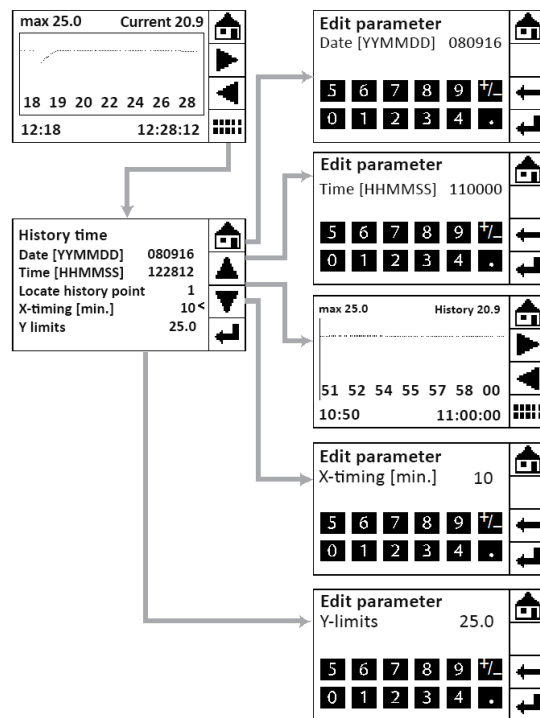

Figure 6-2: History and Settings

Y-limits shows the maximum measurement range displayed in the trend curve. Default setting is 25%. Y-limits are displayed in the top left corner of the graph screen as Max.

6.3 Information Menu

By pressing 🛈 the following information will appear:

Sensor diagnostic	Shows the status of the sensor: OK indicates the sensor is working HGerr, VMerr, UNerr, IAerr, IPerr, and HDerr indicate sensor failure or connection failure of a sensor cable.
Sensor temperature	Shows the current temperature of the sensor. After starting the analyzer, it will take about five minutes for the sensor to reach its normal operating temperature. The operating temperature of SEN9 is approx. 785°C. If the sensor temperature is much lower than the normal operating temperature, the display of oxygen will be incorrect. This can be caused a bad connection between the sensor and the sensor connection terminal SEN, a defect sensor, or too high sample/gas flow through the sensor.
Raw sensor cnt	Shows the raw adc count signal from the sensor.
Analog output 0	Shows the current O_2 in percent from Analog output 1 (Ao00).
Analog output 1	Not in use as per default (Ao01).
Relay outputs 1-4	Shows the status of relay outputs 1-4: ON or OFF.
Software version	Shows the software version of the analyzer. For installation of new software version, see section 5.2.6.
Alarm log	Shows the status of alarm logbook: ON or OFF. When the status is OFF, no alarm will be logged. The alarm logbook view in the Service Menu is also OFF.
Run time in Hr	Shows the analyzer's running time in hours - power ON only.

To browse the list in the information menu, please go up and down the list by using the scrolling keys ▲▼.

6.4 Calibration Menu

Pressing ▼ which will give you access to the calibration function. In the calibration menu, you can:

- See the sensor type selected for the analyzer (SEN9)

- Access artificial calibration START functions for the analyzer

- Set values for the test gases: zero and span (Not relevant for the end user)

Use the scrolling keys ▲▼ to browse the list and press ↵ to select the action to be taken, e.g. selecting Artificial cal. will start the artificial calibration.

For further information, please see chapter 9 about calibration.

6.5 Tools Menu

Pressing ⌐ gives access to the Alarm logs and the operating system of the analyzer including Commissioning, Calibrate touch panel, and Service.

Use the scrolling keys ▲▼ to browse the list and press ↵ to select the action to be taken.

Alarm logs show all log alarms if the Alarm Logbook in *Tool settings\Commissioning\Alarm Logbook* and Analyzer Alarm in *Tool settings\Service (password level 1)\Alarm setting\Analyzer Alarm* are ON.

An O_2 level alarm is logged only after the alarm delay runs out (default at 10 seconds for all three alarm levels). The alarm delay for O_2 limit can be changed in the Alarm setup menu. For more details, see section 7.2.

The failure alarms (sensor or analog output loop alarms) have no alarm delay and are logged immediately. Data log is saved on the SD card every minute.

The alarm logbook might have the following displays:

O2 Low	O_2 low level alarm
O2 High	O_2 high level alarm
O2 High High	O_2 high high level alarm
HGerr/VMerr/UNerr/IAerr/IPerr/HDerr	Sensor failure
Ao0 Loop	Open loop of analog output 1 (Ao00)
Ao1 Loop	Open loop of analog output 2 (Ao01)
Startup	The analyzer is restarted

6.5.1 Commissioning

Commissioning gives access to the settings of the basic display including Date and Time, Auto returns, and Alarm logbook. For details of these parameter settings, please see section 7.1.

6.5.2 Calibrate Touch Panel

The touch panel requires calibration every time the user reloads the factory settings.

To calibrate select the **Calibrate** touch panel and follow the instructions on the screen, i.e. hitting the cross hairs when they appear on the screen.

- If the touch panel is calibrated correctly, i.e. you have hit the cross hairs on the screen; the message Saved – hit the touch panel will appear. Complete the calibration by touching the panel one more time.

- If the touch panel is calibrated incorrectly, i.e. you have not hit all the cross hairs, the display will show the message **Error** try again – hit the touch panel. In this case, you must calibrate the touch panel again.

Please note, that it can be useful to calibrate the touch panel using a small pointed object such as a pencil. However, the pointed object cannot be too sharp, and you must be careful not to push it too hard in order not to avoid damaging the touch screen.

6.5.3   Service (requires an access password)

- Password level 1 is **9490**. This gives you access to the analyzer configuration including Alarm setup and Analog input/out setup. For details of these settings, please see sections 7.2, 7.3, and 7.4.

- Password level 2 gives access to two other functions: **Load factory settings and Load default settings.** For password level 2, see the Testing & Configuration Sheet delivered with each analyzer.

Please see Figure 1-1 for the program menu structure overview.

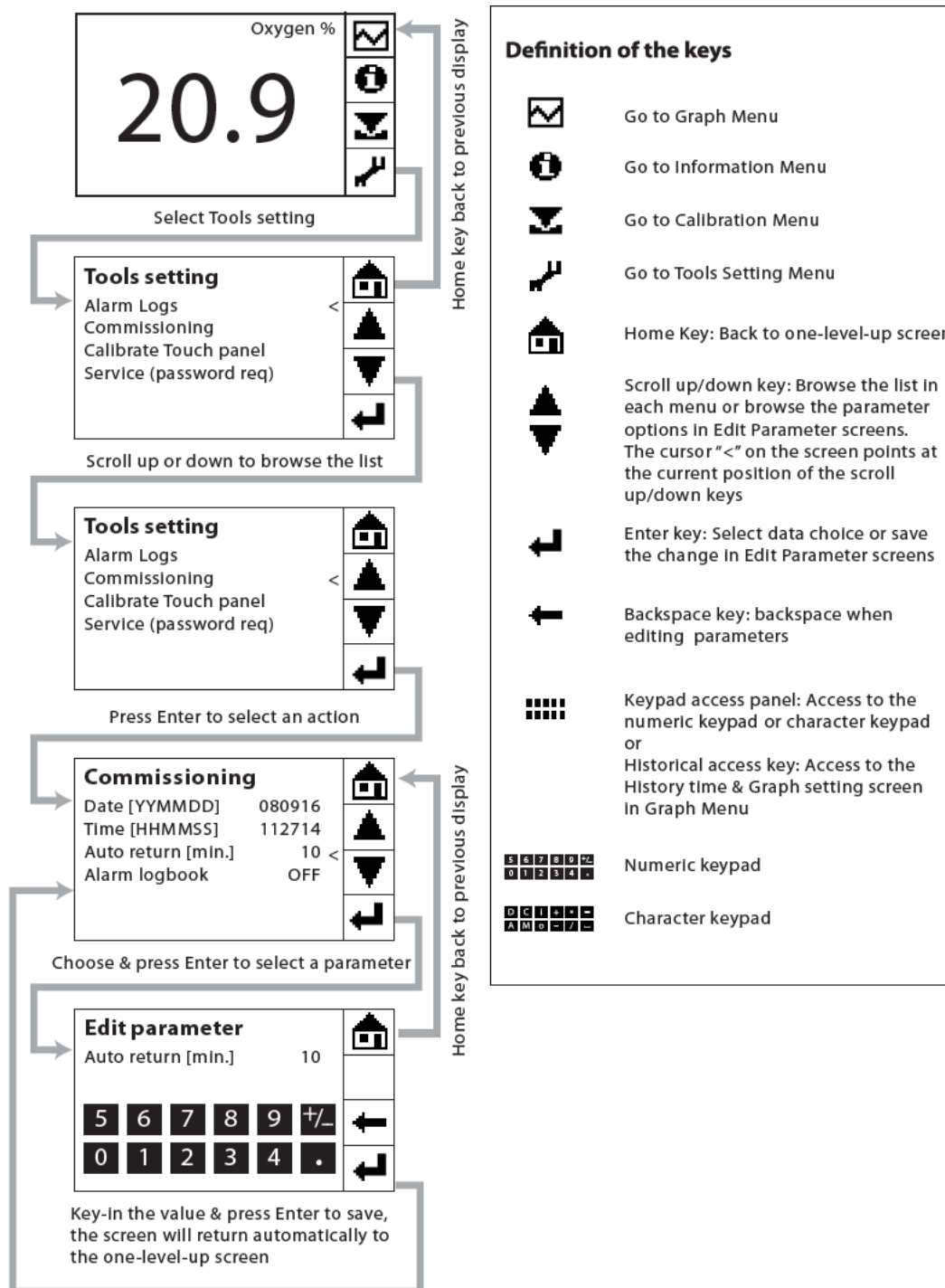| Note |
| --- |
| The Testing & Configuration Sheet is an important document. It includes the factory settings as well as the password for level 2 functions. Please keep this Testing & Configuration Sheet in your files. |

6.6 Navigating the Menu Structure

Figure 6-3: Navigating the Menu Structure

7 Configuration

Before starting the analyzer for the first time after completing the installation, control that all electrical connections are installed according to the instruction.

After switching the power on, the analyzer readings shall be stable before starting calibration. It normally takes about five minutes to warm up. During the heating up of the sensor, the **Main Menu** will display the oxygen content of 0.0. After several minutes, when the sensor has reached its operation temperature, the **Main Menu** starts displaying the actual oxygen content.

7.1 Setting of Basic Display Parameters

The route for setting the basic display parameters is *Tools menu\Commissioning*.

Date & Time: The logbook and trend graph use calendar and clock as reference.

The date and time are per default set to follow the Coordinated Universal Time (UTC).

The current time is displayed in the Graph Menu. Date and Time can be set upon your requirement. However, it is recommended not to change date and time too often as it will be difficult to keep track on the historical data.
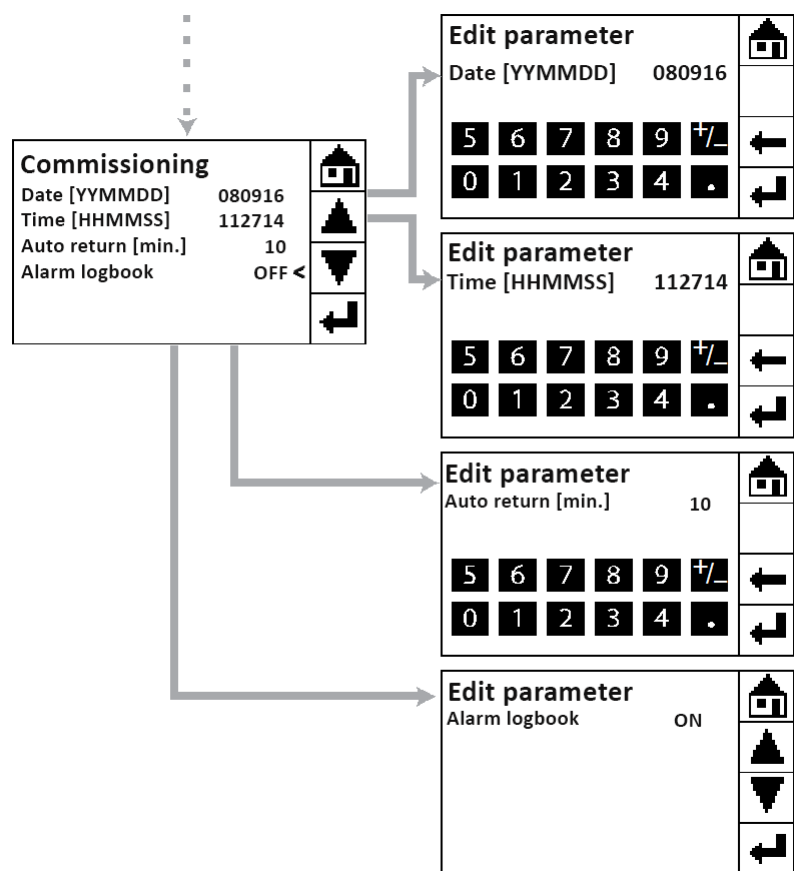

Figure 7-1: Basis Display Setting

Auto return [min.]: Sets the timeout period. If there is no action taken during that period, the system automatically reverts to the Main Menu

from anywhere in the functional menus (except for the Graph Menu). Default setting for auto return is 10 minutes. Minimum setting is 1 minute.

Alarm logbook: ON/OFF mode is set here. When the Alarm logbook is ON, the alarm logbook starts to record all the alarms. The last 12 alarms are shown in *Tools menu\Alarm Logs*. If the Alarm logbook is OFF, no alarms are saved.

7.2 Setting of Alarm Limits

The route for setting the alarm limits is *Tools menu\Service (Password level 1: 9490)\Alarm setup*.

The G3631 has three oxygen alarm levels:

Low Alarm level sets the low O_2 level alarm – default set at 0 %

High Alarm level sets the high O_2 level alarm – default setup at 22 %.

H&L Al. delay 1/10s sets the alarm delay for both Low and High O_2 level alarms. Default setup is 100 (equal to 10 seconds).

High-High Alarm lv sets the high O_2 level alarm – default set at 25 %

HH Al. delay 1/10s sets the delay for High-High O_2 alarm. Default set is 100 (equal to 10 seconds).
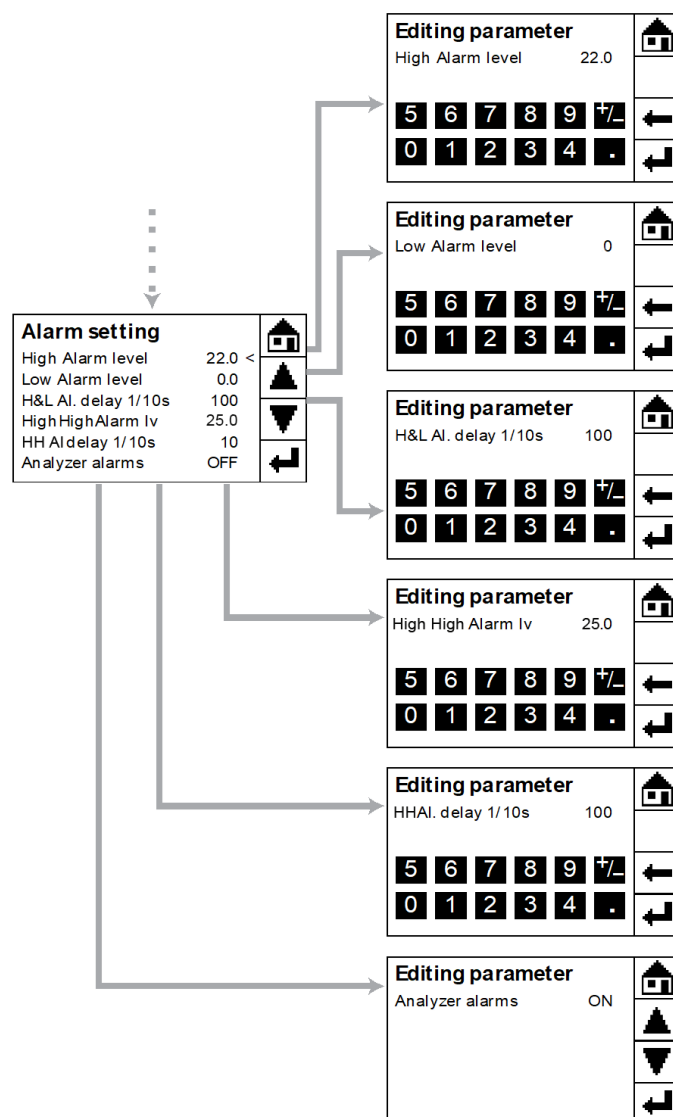

Figure 7-2: Settings of Alarm Limits

Analyzer alarms is used to switch alarm function of the analyzer ON/OFF. When the Analyzer alarms is ON and one of the alarms is triggered, the Main Menu will display the alarm message (e.g. Alarm: Low O_2) in the bottom left corner of the screen.

7.3 Setting of the Analog Input

The route for setting the analog input is *Tools menu\Service (Password level 1: 9490)\Analog in/out settings\Analog input 1*.

The parameters in the analog input settings shall not be edited as the analog input is not in use by default.

7.4 Setting of Analog Outputs

7.4.1 Analog Output 1

The route for setting Analog output 1 is *Tools menu\Service (Password level 1: 9490)\Analog in/out settings\Analog output 1*.

Analog output 1 (Ao00) is connected to terminal A-OUT connection 1 & 2 with default setup to indicate the actual oxygen value in percent.

Freeze output: The freezing of the output signal after back-flushing or calibration is set up at 20 seconds by default.

Analog Output Scale: The analog output signal can be scaled by editing the minimum and maximum values (DispMin/DispMax).

The scale is freely configurable, but usually only the maximum setting is changed. The range of the output signal must correspond to the requirements and settings of the external instrumentation or system.
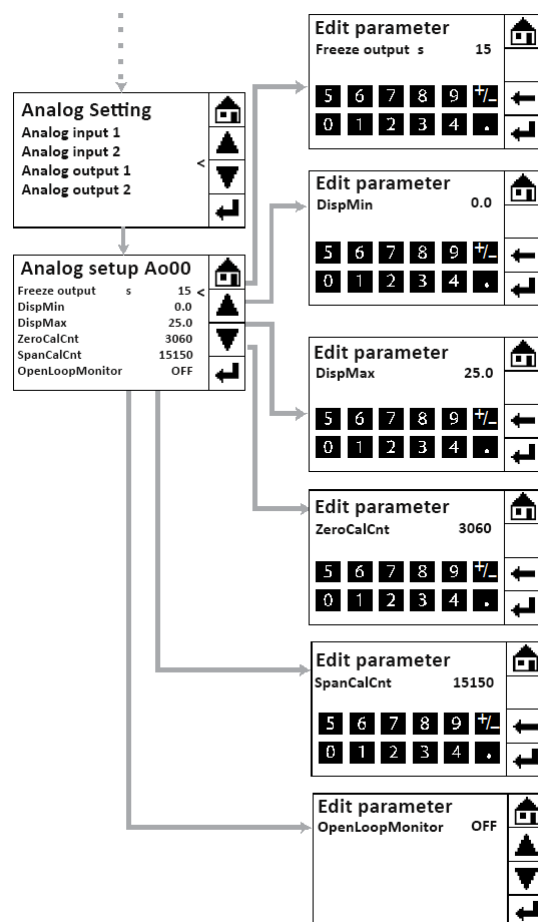

Figure 7-3: Settings of Analog Outputs

The default setting is 0…25 % oxygen (0% = 4 mA and 25 % = 20 mA). This is appropriate where the external instrumentation is operating with an input scale of 4…20 mA and display of 0…25 % oxygen.

If however, the external instrumentation is working with an input in a different range – for example 0…10 % O_2, i.e. 0% = 4 mA and 10 % = 20 mA – then the maximum value in **DispMax** has to be changed – in this example to 10.0.

Calibration of Analog Output Signal

This procedure is usually only relevant after reloading new factory/default settings. The calibration of the analog signal is carried out in one of the following ways:

Option 1: Input of tested values

- Select **ZeroCalCnt** and key in the value according to the **ZeroCalCnt** value in the Testing & Calibration Sheet attached to each specific analyzer. Press ↵ to save. The screen will automatically return to the **Analog setup Ao00** screen.

- Select **SpanCalCnt** and key in the value according to the value in the **SpanCalCnt** value in the Testing & Calibration Sheet attached to each specific analyzer. Press ↵ to save.

Option 2: Manual calibration

Only if the analog signal does not function properly with the input of the tested values – Calibration Option 1, the analog signal shall be calibrated manually. For manual calibration of analog signal 1 (Ao00), zero test gas and instrument air shall be used.

Connect a current meter with a range 4…20 mA between terminal A-OUT connection 1 & 2.

For zero calibration:

- Select **DispMin**. Enter the oxygen value of the zero-test gas and save

- Introduce zero test gas to the sensor

- Select **ZeroCalCnt**. Then adjust and save the value to correspond with 4 mA output.

- Select **DispMin**. Change the value back to the minimum value of the scale required by the external instrumentation (usually 0% O_2 – in rare cases other values).

For span calibration:

- Select **DispMax**. Enter 20.9 (oxygen % in the instrument air), and save

- Introduce the instrument air to the sensor

- Select **SpanCalCnt**. Then adjust and save the value to correspondent with 20mA output.

- Select **DispMax**. Change the value back to the maximum value of the scale required by the external instrumentation (usually 25% O_2 – in some cases 10% O_2 – in rare cases other values).

Open Loop Monitor

The function can be switched ON/OFF. The default setting is OFF. If the function is ON, there will be an alarm displayed Alarm: Loop in the Main Menu if the loop between A-OUT connection 1 & 2 is open.

7.4.2 Analog Output 2

The route for setting Analog output 2 is *Tools menu\Service (Password level 1: 9490)\Analog in/out settings\Analog output 2*.

Analog output 2 (Ao01) is connected to terminal A-OUT connection 4 & 5. Analog output 2 is per default arranged to display the oxygen value just as Analog output 1. The adjustment of settings and calibration is done as described in section 7.4.1.

If ordered Analog output 2 can be set to display Analog input 1 (Ai01). Most settings are done equivalently to the description in section 7.4.1 with the exception of the manual calibration of the output signal. If Analog output 2 is connected to Analog output 1 then follow these instructions for a manual calibration of the output signal.

- Connect a current meter to terminal A-OUT connection 4 & 5 for measuring the analog output 2.

For zero calibration:

- Simulate a 4 mA current to Analog input 1.

- Select **ZeroCalCnt**. Then adjust and save the value that corresponds to 4 mA showed on the current meter connected to the analog output 2

For span calibration:

- Simulate a 20 mA current to Analog input 1.

- Select **SpanCalCnt**. Then adjust and save the value that corresponds to 20 mA showed on the current meter connected to the analog output 2.

7.5 Loading Default Settings & Factory Settings

The route for these two functions is *Tools setting\Services (password level 2 – see configuration sheet for password)*.

Load Default Settings

This function makes is possible to return to the standard settings. After loading the default settings, the analyzer will restart automatically loading the default settings from the SD card to the analyzer. After reload default settings, please reset the analyzer using the Testing & Configuration Sheet attached to each analyzer or following the instruction in chapter 5.

In case the g1parm.bin at the SD card has been deleted accidentally, please contact Green Instruments for resending the standard setting file.

Load Factory Settings

Loading factory settings should only be used under the instructions from Green Instruments. After loading factory setting, you must calibrate the touch panel following the instructions in section 6.5, and then reset the analyzer following the instructions in chapter 7.

8 Commissioning

After completing the configuration, please verify the installation and setup of the system with the following steps:

- Check that the setup of analog output signals is correct.

- Check that the setup of alarm levels is correct.

The analyzer has been calibrated at the factory. However, the analyzer can always be re-calibrated using the ambient air (O_2 content of 20.9 %) following the instructions in chapter 9.

9 Calibration

After completing the installation and before putting the system into operation, the analyzer shall be calibrated.

After switching the power on, the analyzer readings shall be stable in about five minutes of warm-up time. Although the analyzer has been calibrated from the factory, the analyzer can be re-calibrated artificially if the ambient air is atmospheric air at sea level (Oxygen concentration of 20.9 %)

- Before calibrating the analyzer artificially, make sure that the ambient air is atmospheric air at sea level.

- Enter the **Calibration Menu**, enter password, and select **Artificial Calibration**. The artificial calibration will now start calibrating first Span using the instrument air as the reference; then Zero using the reference Zero point generated by the analyzer.

- The calibration is completed when the analyzer returns to normal reading (i.e. 20.9 % displayed on the main menu.).

> ### Note
>
> To calibrate the signal from the sensor shall be stable for at least 10 seconds. Therefore, during calibration there must not be variations in the pressure of the ambient air.
>
> In order to have an accurate result, the pressure of the ambient air should be the same as the pressure of the ambient air under monitoring.

10 Routine Maintenance

10.1   Calibration

An important routine maintenance task is calibration of the analyzer. It is recommended that the analyzer is calibrated after each startup of the G_{3631} Oxygen Analyzer. If in operation continuously, experience has shown that one calibration per 3 mounts is sufficient. See chapter 9.

10.2   Analyzer

The system is tested from the factory. The system does not require any special maintenance. The LCD shall be kept clean in order to give a clear view and allow proper operation of the touch screen. The touch screen shall be cleaned using a soft damp cloth or soft tissue. Dirt and oil on the surface of the analyzer(s) need to be removed carefully using neutral detergent and a clean rag.

11 Troubleshooting

Troubleshooting should always be carried out by skilled personnel.

WARNING
The G3631 Oxygen Analyzer is connected to hazardous electric voltages, which can cause personal injury or mechanical damage if not handled correctly and in accordance with normal safety regulations

Trouble	Possible Cause →Action
No display at all	→Check the circuit breaker
	→Check the power supply – make sure that the power supply is the correct voltage
	→Check the ON/OFF switch at the back of the analyzer – make sure it is ON
	→Check the fuse on the back of the analyzer
No display despite power supply and fuse is found OK	The analyzer is defect → reboot, repair, or exchange the analyzer
Display only indication 0.0	No signal from sensor → check the connection both at the analyzer and sensor. Then wait several minutes and re-plug the sensor or restart the analyzer.
	Check the sensor temperature in 🛈 Information Menu, see section 0. If the sensor temperature could not reach its operating temperature before it starts working, the sensor's diagnostic status will show OK, but the display only indicates 0.0 → check if the sample flow is too high. Try taking the sensor out of the sensor house and let it hang in the ambient air to see if the sensor temperature can reach its operating condition.

Trouble	Possible Cause →Action
Incorrect indication of oxygen level	→Try to recalibrate the analyzer
	→ If normal calibration is not working, try artificial calibration see chapter 9.
	→Check the sensor's diagnostic status and temperature in Information Menu, see section 0. Check the sensor connection or replace the sensor if it is defect
Incorrect remote display and recording	There might be a mismatch in the output range of the analyzer and the input range of the remote system
	→Check and correct output signal settings, see section 7.4
No trend curve	Y-limits is set too low → reset Y-limits, see section 7.1
Graph Menu may be frozen	X-timing is set too high → restart the analyzer, reset X-timing, see section 7.1
Touch panel errors	→Calibrate the touch panel, see section 6.5.2
No data log	→Check if the SD card is in position
No historical trend curve	→If yes, check the SD card's lock mode. The lock button should always be in the unlock position.
	→Replace the SD card if it is defect
Unable to reload default settings	→ If the screen shows Error!! No SD card, please check the SD card inside the analyzer. Replace the SD card if it is defect. Contact Green Instruments for a new SD card with the default setting file
	→ If the screen shows Error!! No parm file, please Contact Green Instruments to resend the default setting file. Copy the g1parm.bin to the SD card:\bin, then try to reload default settings one more time.

12 Spare Parts

When ordering parts, please quote the serial number of the analyzer, which you can find on the label on the back of the analyzer.

Part No.	Part Description	the specific appearance of the spare parts is subject change without notice; the function however will not change
01251	Fuse 2 AT (pkg of 10)	
01257	SEN9 Oxygen sensor w. 0.75 m cable	
02987	This Instruction manual	
01471	2 GB SD card with Green Instruments' software and standard settings files Please inform the serial number of the analyzer when you order an SD card.	
01787	Audio Alarm Buzzer w.Ackn. RED	
02074	Buzzer	
	Other optional equipment – e.g. pressure transmitter, remote digital display, signal amplifier for logarithmic output, flow alarm, visualization, recording and data logging, monitoring of gas temperature, pressure, and load – can be supplied.	

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