Technical Manual

iAN-Analyzer Series

Environmental Analyser

INDEX

1 INTRODUCTION

The purpose of this document is to provide installation, operation and maintenance instructions for the environmental analyzer iAN Analyzer Series delivered by Drass. The present manual does not replace the requirements and the guidelines of the applicable and present laws and rules, which have to be considered mandatory and additional to the manual.

2 WARRANTY

Each Monitor display and Remote sensor board unit is calibrated and tested before delivery.

The user shall avoid opening the monitor or the sensor boards since they do not contain any customer serviceable parts. On the outer edges of the package tamper-proof seals are applied; if removed, this will void the warranty. During operation, when the iAN display warns that the sensor board must be replaced or in the event that performance is not as expected, the parts shall be replaced with spare unit, and faulty/expired parts shall be returned to Drass for maintenance. The cells of sensors are not designed to be user replaceable. Please consult Drass if any other parts of an iAN module require replacement.

Although designed to be water-resistant, the iAN oxygen sensor boards should not be immersed in liquid or left outside unprotected.

Each part of the iAN analyzer has 12 months of warranty. Warranty covers defects in workmanship and materials and does not extend to defects caused by the effects of normal wear and tear, erosion, corrosion, fire, explosion, misuse, use in any context or application for which the equipment is not designed or recommended, or unauthorized modification.

Following a valid warranty claim in accordance with the above rules, the equipment, upon return to Drass, will be repaired or replaced without cost or charge. Following Drass discretion, we may elect to instead provide to you whichever is the lesser, the cost of replacement or a refund of net purchase price paid as per invoice on initial purchase. Drass shall have no liability for losses, damages, costs or delays whatsoever or for any incidental or consequential losses or damages. All express or implied warranties as to satisfactory or merchantable quality, fitness for a particular or general purpose or otherwise are excluded and no such warranties are made or provided, save as set out in this clause.

In order to effectively notify a warranty claim, the claim with all relevant information and documentation (refer to chapter 16 *Fault Reporting to Drass*) should be sent in writing using one of the following modes of communication:

Postal service:	Drass Group U.T. Via Teresa Mattei 4 57121 Livorno ITALY
E-mail:	drass.info@drass.tech
Telephone:	+39 - 0586421221

Drass reserve the right to request from the customer the proof of dispatch of the notification of warranty claim by any of the above alternative means. The equipment should not be sent to Drass

without prior written authority. All shipping and insurance costs of returned equipment are to be borne by customer and at customer's risk. All returned items must be properly and sufficiently packed.

3 SAFETY WARNINGS

3.1 General

- All operations on the iAN analyzers must be performed by specialized personnel only.
- This equipment works under voltage: connect the electrical connections appropriately and always check that voltage of components is suitable. Never dismount parts or open the equipment under voltage; switch off power supply prior to all maintenance checks.
- Replace items only with Manufacturer original spare parts as per chapter 14 *Part List.*
- Drass cannot be held responsible for potential problems arising from improper use or unauthorized modification made by the user or maintainer.
- Each component of this equipment is designed to work at atmospheric environmental pressure.
- To prevent damage to the iAN analyzers and its electronic components and to prevent accidental electric shock, the iAN analyzers MUST NOT be operated with any casing removed.
- Never remove safely sealing installed on the monitor and on the remote sensor board.

3.2 Remote Sensor Board

- The oxygen remote sensor boards hold an electrochemical sensor, containing caustic electrolyte. In case of damaging and/or leaking, take care to avoid any contact with body or clothing. If there is liquid around the sensor, wear eye and hand protection. Before installing the replacement sensor, check the new sensor for leakage. If the sensor leaks, do not use it.
- In the event of an accidental contact with the internal electrolyte, use the following first aid procedures:
    - In case of contact with the skin or eyes, immediately flush with plenty of water for at least 15 minutes and remove all contaminated clothing. Get medical attention immediately.
    - If ingested, give large amounts of water and DO NOT INDUCE VOMITING. Obtain medical attention immediately.
    - If inhaled, remove to fresh air and obtain medical attention immediately.
- Sensor boards are safely sealed in order to preserve the warranty, therefore never remove the seals. To prevent leakage, the unit must not be exposed to temperatures outside the specified range, or be exposed to organic vapors, which may cause physical damage to the board.

- The unit must not be stored in areas containing organic solvents or in flammable liquid stores. The oxygen sensors are packed inside protective sealings for storage. Removing the protective sealing the sensors begin the process of deterioration.
- When replacing the remote sensor boards, dispose it according to local regulations, see chapter 15 *Disposal*.

3.3 Pressurized Gas

- Do not exceed the specified maximum pressures. Failure to do so may result in damage to the equipment and to personnel.
- Users of this equipment MUST be familiar with the handling of pressurized gas.
- Take particular care when handling toxic or flammable gases (e.g. to calibrate HC sensor). In such cases ensure to operate in a well-ventilated area and manage to properly vent the exhaust gas.

3.4 Oxygen Systems

- Present document is not aimed to define a safe working method for oxygen systems. It is developed assuming that all personnel working with oxygen are skilled and competent to do so.

4 CONTENT CHECKLIST

The complete analyzer system (O_2D, O_2P, CO_2, CO or He) is packaged in suitable Drass boxes (Figure 1 and Figure 2). Each supplied box contains the following items:

First box

1 One monitor with fixing screws and electrical flying connectors.

2 One USB pen containing the Technical Manual.

3 One stylus touch screen pen.

4 One test and calibration certificate.

5 One Declaration of Conformity certificate.

Second box

6 One remote sensor board with electrical flying connector.

Note: connection cables are not supplied.

Figure 1 : Control Panel Front View

Figure 2 : Control Panel Front View

There are the following accessories (optional):

iAN - PANEL MOUNTING KIT PN: E411002-550-K

Panel version is suitable for direct mounting into an instrument panel. It is composed of two metal brackets with suitable threaded holes, used to fix the monitor to the panel.

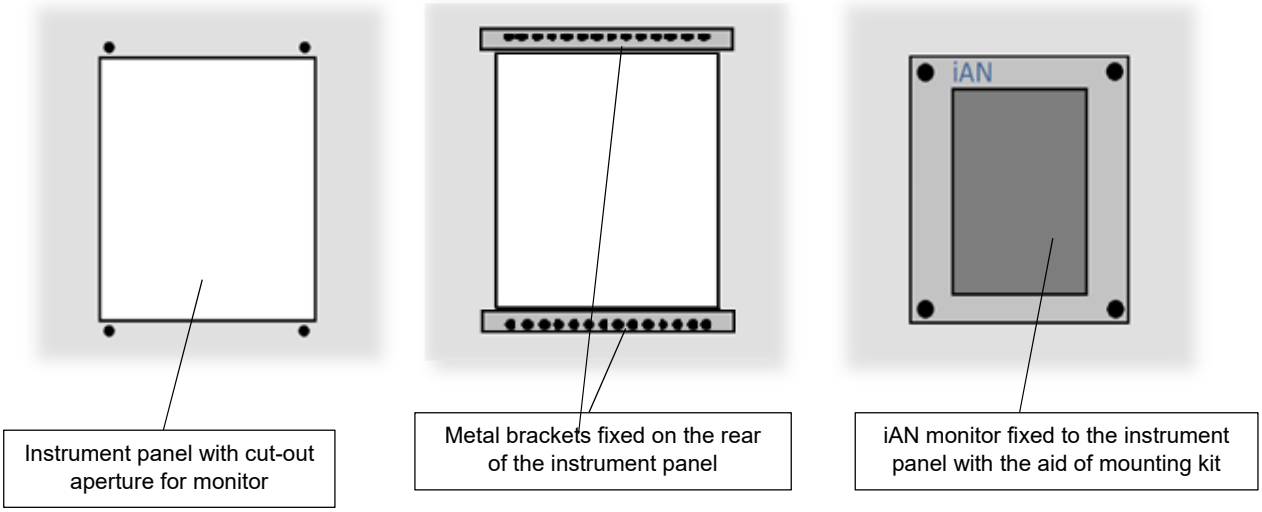


Figure 3 : iAN Panel Mounting Kit

iAN - RACK PANEL MOUNTING KIT PN: E411003-550-K

This rack panel is designed to be mounted onto standard 19” mounting rails (height: 3U). It can house up to four iAN monitors with respective sensor boards. The rack ensures the EMC requirements only if the top cover is not removed. For further details refer to chapter 9 *Installation*.

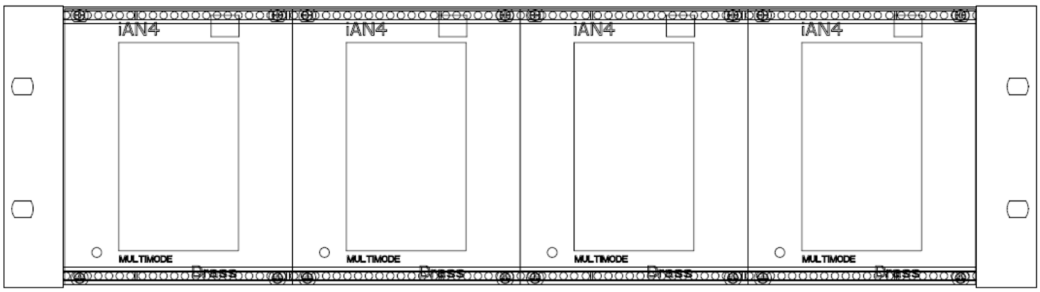


Figure 4 : iAN Rack Panel Mounting Kit

5 ACRONYMS AND ABBREVIATIONS

CO_2	Carbon Dioxide
O_2	Oxygen
CO	Carbon Monoxide
HC	Hydro-Carbons
VOC	Volatile Organic Compounds
T	Temperature
RH	Relative Humidity
D	Depth
EC	European Community
IACS	International Association of Classification Societies
PC	Personal Computer
PLC	Programmable Logic Controller
RAM	Random Access Memory
CSV	Comma Separated Values
PPM	Parts Per Million
PPB	Parts Per Billion
PP	Partial Pressure
MSW	Meters of Sea Water (based on a conversion factor of 1 bar = 9.94 MSW)
LEL	Lower Explosive Limit
FW	FirmWare

Table 1 : List of Acronymns

6 QUICK START

This section is intended as a first approach with the iAN-Analyzer, and to find the appropriate part of the manual as required. Check below in the table through the typical queries in order to find appropriate guidance. If this is not possible, please contact Drass for further assistance.

No	Query	Guidance
1	Can I have some brief introduction to the device?	Chapter 7
2	How can I store the device?	Chapter 8
3	How can I install the device?	Chapter 9
4	What should I check before powering on the system for the first time?	Paragraphs 9.3 e 9.9
5	How can I calibrate the system?	Chapter 11
6	How can I set alarm and warning thresholds?	Paragraph 10.3.2
7	How can I replace the spare parts?	Chapter 9
8	Is it possible to upgrade firmware?	Paragraph 10.3.2
9	The device shows an error or is working unexpectedly: what can I do?	Chapter 13
10	How can I dispose the old / expired / failed parts?	Chapter 15

Table 2 : Quick Start Checklist

7 GENERAL DESCRIPTION

7.1 System overview

Each iAN analyzer is composed of a touchscreen monitor and a relevant remote sensor board to be connected using a four-core shielded cable (suggested 2xSTP). The sensor board can be installed several hundreds of meters far from the monitor (if required), since it relies on strong RS-485 communication. Ferrites are suggested on cable when it is installed out of metallic rails.

Remote Sensor Board has inbuilt gas concentration, temperature, barometric pressure and gas flow sensors.

In addition, it is possible to connect the iAN monitor to a remote pressure sensor measuring the pressure of the relevant hyperbaric compartment. This allows an easier management when the analyzer is used to monitor relevant gas level in the hyperbaric compartment.

7.2 iAN O_2D

The display shows the oxygen concentration in %. The analyzer can read oxygen concentration up to 99.99% value, measured by sensor with digital output.

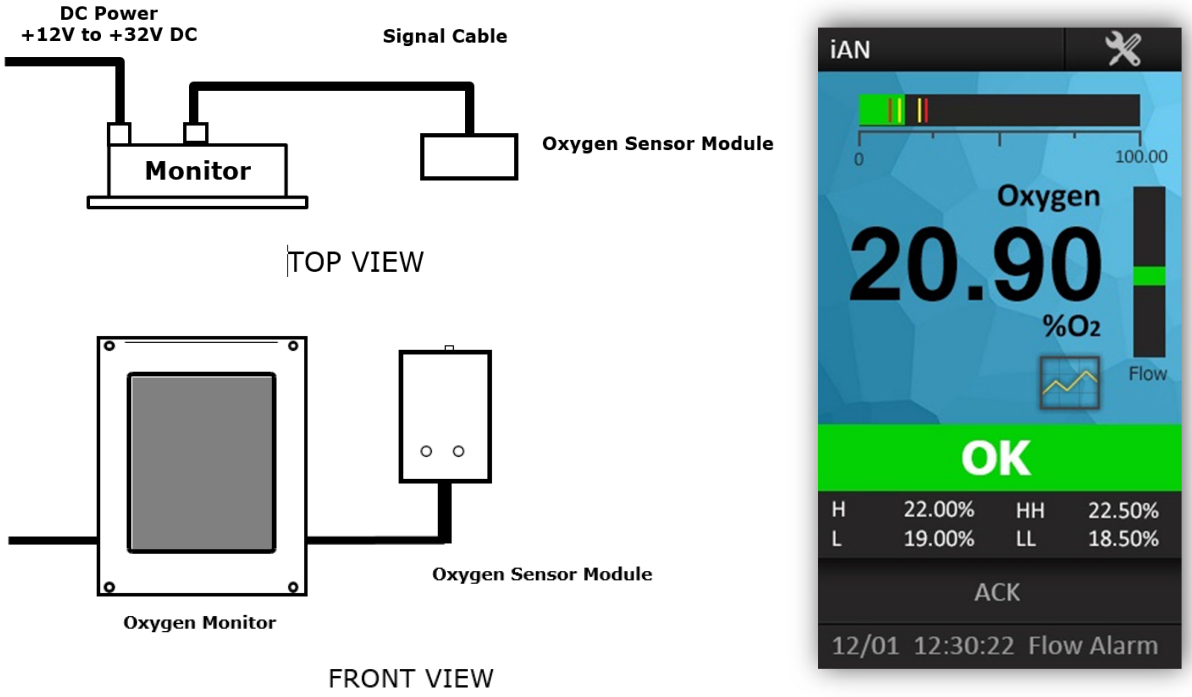


Figure 6 : iAN D Oxygen System and Display Touch Screen

7.3 iAN O_2P

The display shows the oxygen concentration in %. The analyzer can read oxygen concentration up to 99.99% value, measured by paramagnetic sensor.

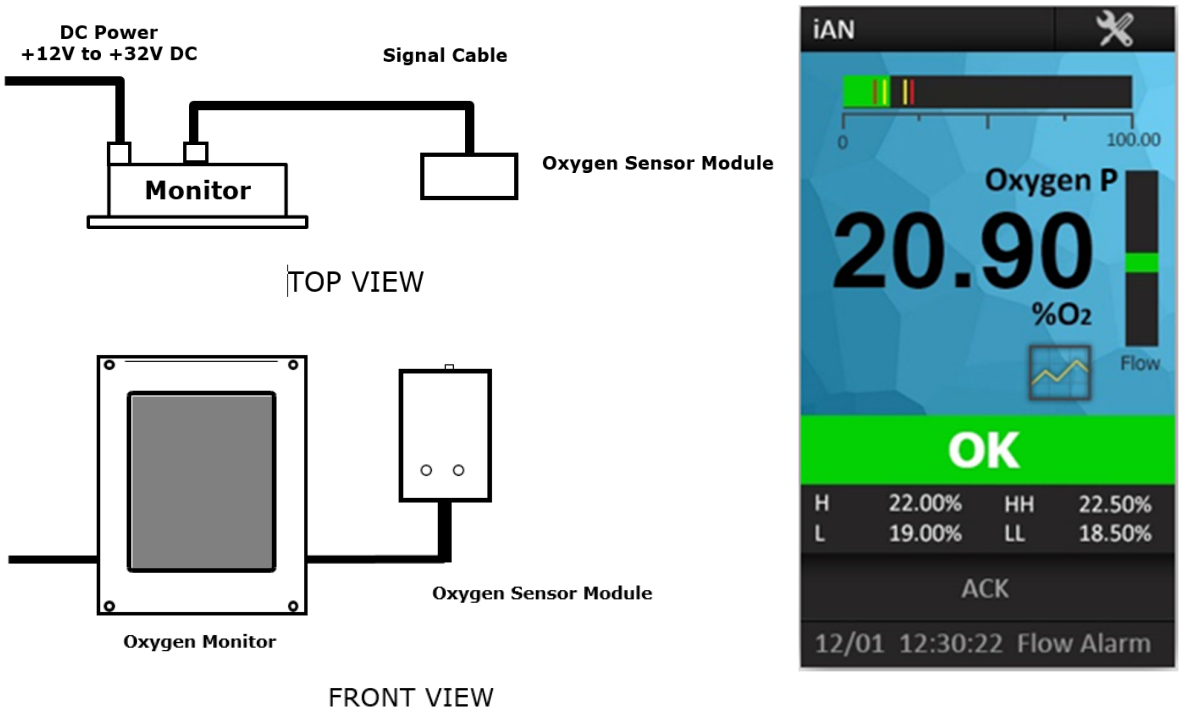


Figure 7 : iAN P Oxygen System and Display Touch Screen

7.4 iAN CO_2

The display shows the carbon dioxide concentration in ppm (part per million). The analyzer can read carbon dioxide concentration up to 3000 ppm.

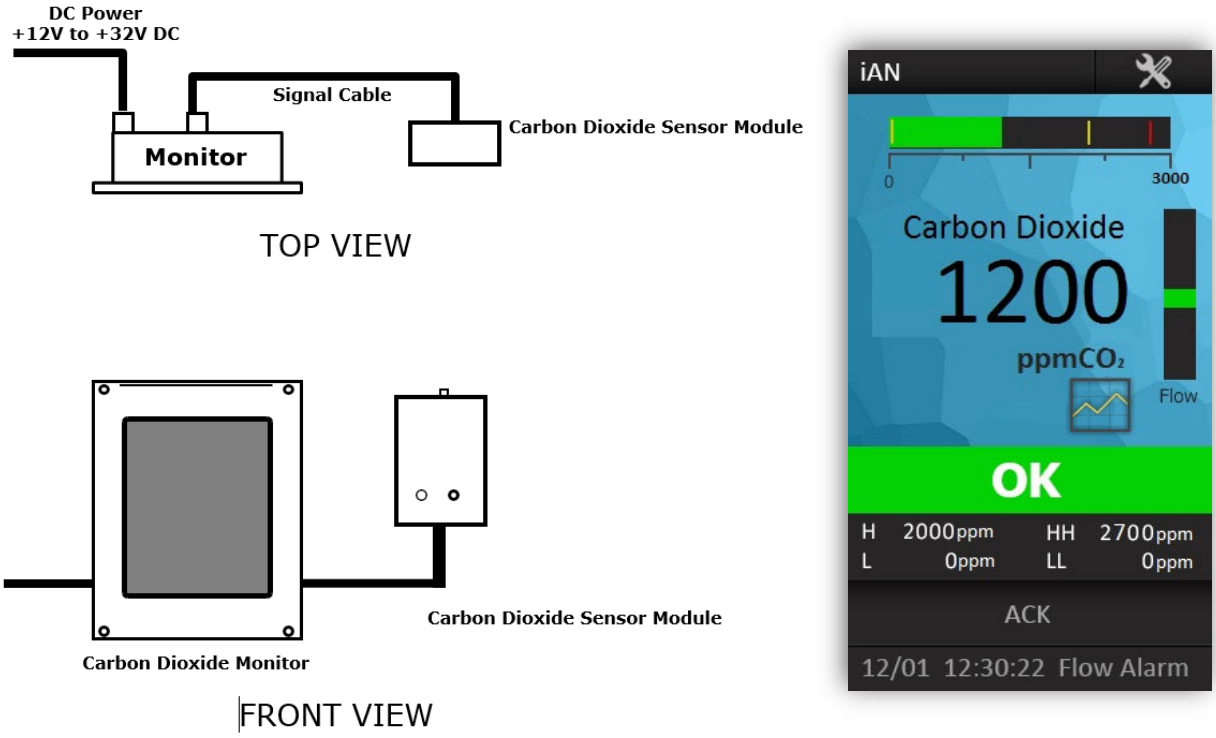


Figure 8 : iAN Carbon Dioxide System and Display Touch Screen

7.5 iAN CO

The display shows the carbon monoxide concentration in ppm (part per million). The analyzer can read carbon monoxide concentration up to 10.0 ppm.

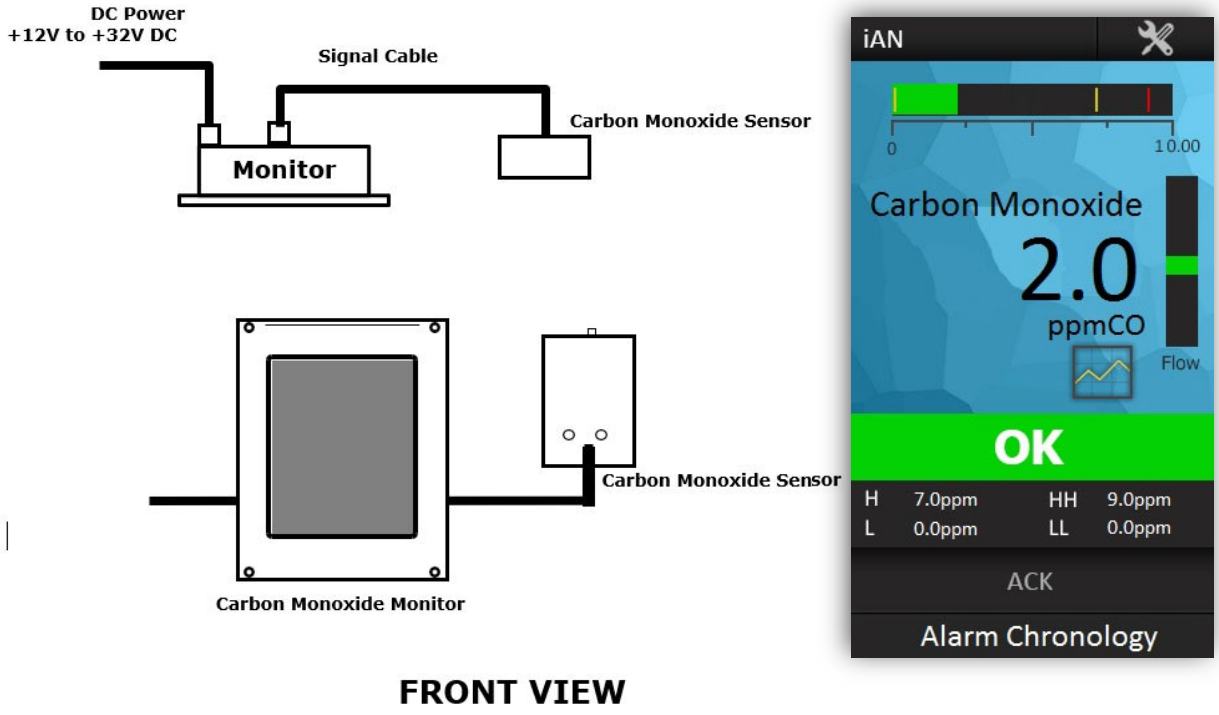


Figure 9 : iAN Carbon Monoxide System and Display Touch Screen

7.6 iAN He

The display shows helium concentration in %. The analyzer can read helium concentration up to 99.99% value.

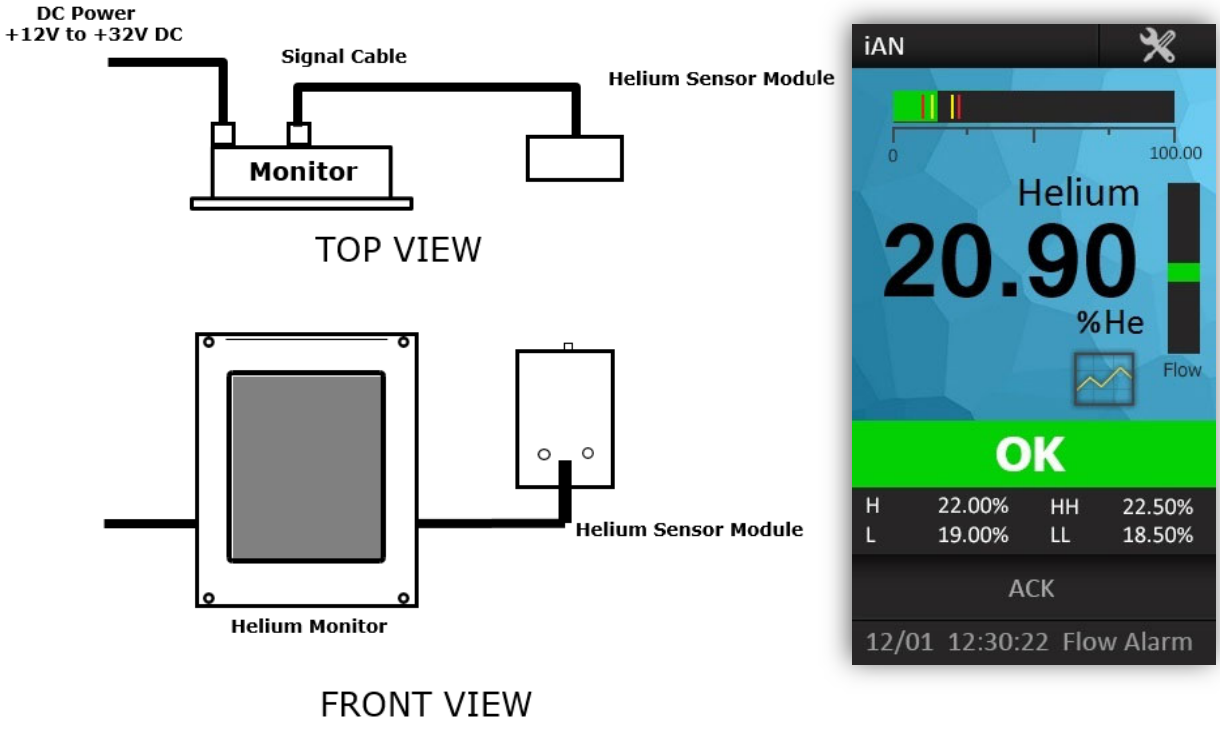


Figure 10 : Helium System and Display Touch Screen

7.7 Monitor

The following figure shows an overview of the iAN monitor with stylus touch screen pen (see red circle located on the bottom left). The software structure includes a quantity of pages that permit management and full customization of the system.

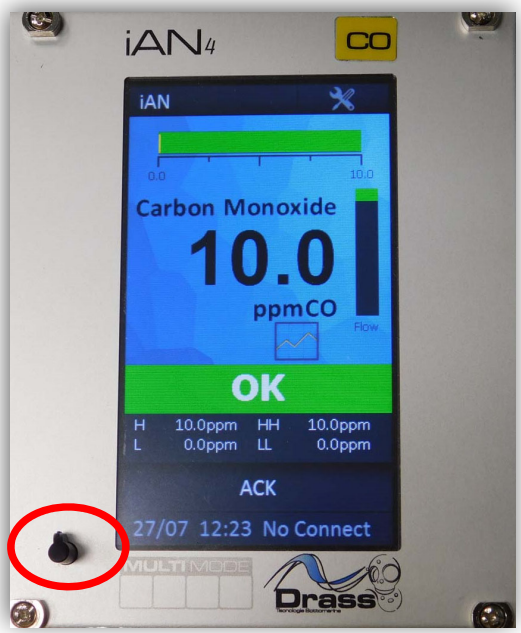


Figure 11 : iAN Monitor Front Panel

7.8 Description of functions

The iAN analyzer series is a family of atmospheric analysis systems which are suitable for applications in situations where continuous monitoring of gas is required. Each type of analyzer provides independent measurement and display of atmospheric variables with clear audible and visual alarms to warn when potentially dangerous levels are reached.

The iAN family is composed of the following analyzer types:

- Oxygen iAN, O_2D, for Nitrox PN: E4105-550
- Oxygen iAN, O_2D, for Heliox PN: E4101-550
- Oxygen iAN, O_2P, for Heliox PN: E4108-550
- Oxygen iAN, O_2P, for Nitrox PN: E4109-550
- Carbon dioxide iAN for Nitrox PN: E4106-550
- Carbon dioxide iAN for Heliox PN: E4102-550
- Carbon monoxide iAN for Nitrox PN: E4107-550
- Carbon monoxide iAN for Heliox PN: E4103-550
- Helium iAN for Heliox PN: E4104-550

The iAN range is designed to be highly modular and flexible so that it can be easily integrated into customized atmospheric monitoring solutions.

The core of each analyzer is a compact monitor unit which provides the display and user interface for the system. A color touch display (dim. 4.3”) gives clear reading and status information and is suitable for a wide range of lighting and mounting positions. The controls provide quick and simple access to the most common system functions such as calibration and alarm adjustment, with more detailed setup and diagnostic information accessed through an easy to use menu system.

The RS-485 communication port on the rear of the monitor provide connection to a range of Drass gas and environmental sensors. These provide the flexibility to install sensors alongside the monitor or up to hundreds of meters away without affecting performance.

The iAN range is compliant with the type approval specifications of the major classification societies in the marine industry for both the general power distribution and bridge zones.

7.9 Technical data

MONITOR		
PHYSICAL DATA		
Height	mm	129
Width	mm	106
Depth	mm	26
Touch Screen	inch	4.3
Weight	kg	0.3
ELECTRICAL DATA		
Power supply	Powered from external source	
Voltage	Vdc	24
Current consumption	mA	350
ENVIRONMENTAL DATA		
Recommended operating temperature	°C	+5 ÷ +55 (class A) (*)
Recommended operating relative humidity	%	Up to 96 (class A) (*)
Vibration and EMC	Class A (**)	

Table 3 : Monitor Technical Data

REMOTE SENSOR BOARD		
PHYSICAL DATA		
Height	mm	145
Width	mm	100
Depth	mm	45
Weight	inch	0.2
Grade protection	IP	20
ELECTRICAL DATA		
Power supply	Powered by monitor	
Voltage	Vdc	24
Current consumption	mA	40 ÷ 60
OPERATIONAL DATA		
Recommended actual usable life for O_2 sensor	months	12

Allowable gas flow range	l/min	0 ÷ 1
Allowable gas temperature range	°C	0 ÷ 65
Allowable inlet gas working pressure	bar	0.1 (*)
O_2 reading range	%	0 ÷ 99.99
CO_2 reading range	ppm	0 ÷ 3000
CO reading range	ppm	0 ÷ 10.0
He reading range	%	0 ÷ 99.99
ENVIRONMENTAL DATA		
Operating temperature	°C	+5 ÷ +55 (class A) (**)
Operating relative humidity	%	Up to 96 (class A) (**)
Operating pressure	mbar	900 ÷ 1100
Vibration and EMC	Class A (**)	

Table 4 : Remote Sensor Board Technical Data

(*) CAUTION: maximum pressure of supplied gas shall be less than 0.2 bar, in order to measure the correct gas flowrate value, see paragraph 10.3.1 *Main Page (Home Page)*.

(**) Class A is defined from IACS UR E10 (Unified Requirements - Test Specification for Type Approval), DNVGL-CG-0339.

For details for mechanical and electrical connections see chapter 9.

7.10 Clearing Alarm and Hysteresis

To avoid nuisance re-triggering of alarms when a sensor reading is fluctuating around an alarm set-point, each alarm has a hysteresis band applied to it. This function is used to the clearing of an already triggered alarm. An alarm will always trigger immediately when the sensor reading passes the set-point in the correct direction. However, when the actual value returns in the opposite direction through the same set-point, it must continue for an amount beyond the set-point before the alarm will clear. This extra amount required to clear an alarm is the alarm's hysteresis.

Figure 12 shows an example of a hysteresis band on a high going alarm as a function of time.

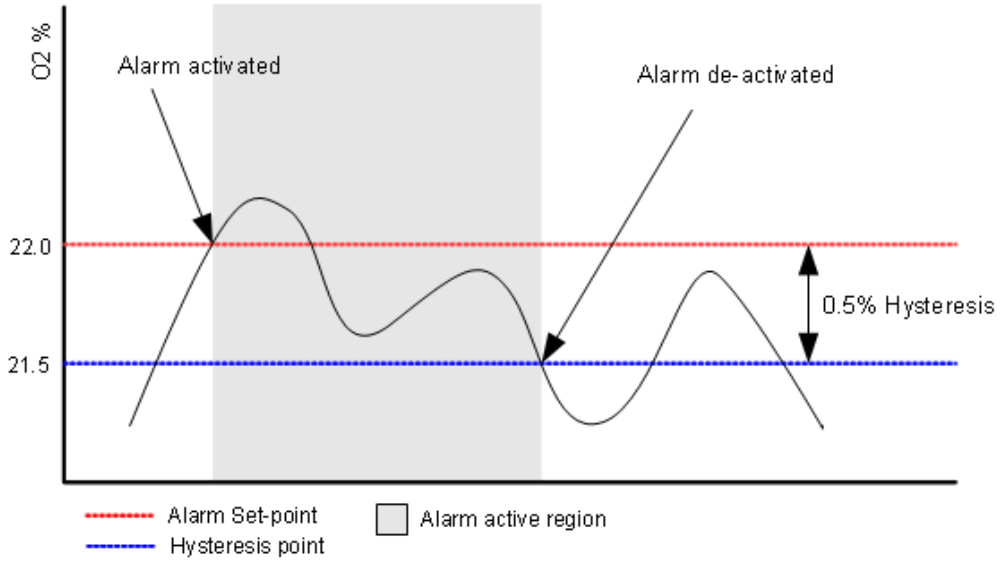


Figure 12 : Example of Hysteresis Band on an Oxygen Alarm

The hysteresis applied to an alarm is adjusted automatically based on the value of the alarm set-point. The *Alarm Settings Page*, sub menu of *Set-Up Page*, defines the hysteresis range for each sensor (see paragraph 10.3.2 and annex 17).

8 STORAGE AND PRESERVATION

When the iAN analyzer has been received, it is packaged in two suitable boxes (see chapter 4 *Content Checklist*). Before storage, check the integrity of packaging: ensure that no damage has been caused during transportation. If necessary open the boxes to check condition of each item and do not remove packings and safely sealings (see paragraph 8.1 *Storage in Warehouse*). The customer should officially confirm the acceptance of the goods to the Manufacturer.

8.1 Storage in warehouse

Keep each iAN Analyzer item in respective box and place them in a dry and clean location, not outdoors, with a maximum temperature of 55 °C, minimum 0 °C and a maximum humidity of 80%.

Remote sensor boards are to be maintained in their sealed package until they are put in service. Opening the sealed package, the aging process will start, shortening the actual usable life of the sensor.

The packaging must not be stored in areas containing organic solvents or in flammable liquid stores and must be placed far from heat sources and working areas; in the event that this is unavoidable, ensure that suitable protection is used.

In case of storage of oxygen remote sensor board as spare parts, it is recommended a maximum storage time of six months, in order to avoid a reduction in the guaranteed life of the O_2 sensor.

8.2 Storage on site

If the iAN Analyzer is installed and stored on working site, ensure that:

- Equipment is positioned far from heat sources and working areas.
- Temperature and humidity conditions as listed in the preview paragraph are respected.

Carry out the following:

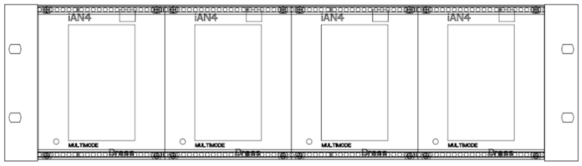
1. Completely cover the item with a fire-proof sheet in order to protect from damage and dirt. In the event that the equipment is placed in proximity of heat sources or working areas, ensure that it is protected appropriately.
2. When the iAN Analyzer is installed, carry out the relevant maintenance operations described in chapter 12 *Maintenance*.

9 INSTALLATION

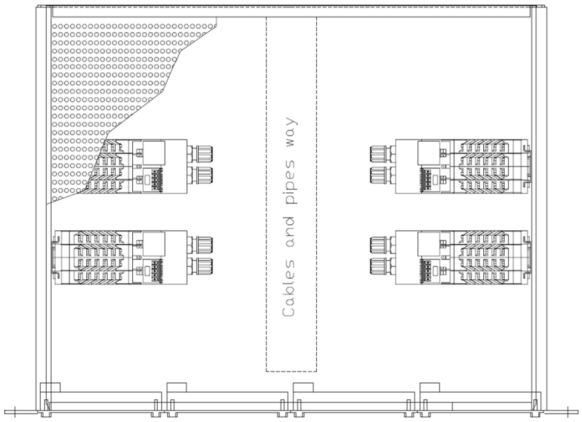
9.1 Rack Panel Mounting Kit (Optional)

To ensure EMC requirements, the rear and top cover shall be installed. Use cable glands and pipe straight coupling for cables and tubing passage (these items are not supplied).

If necessary, it is possible to fit remote sensor boards in a horizontal position by removing the top cover. Note that in this configuration EMC requirements are not ensured.



FRONT VIEW



TOP VIEW

Figure 13 : iAN Rack Panel Mounting Kit

9.2 Panel Mounting Kit (Optional)

The cut-out aperture on the panel should measure as follows:

- Height: 112 mm
- Width: 102 mm

Mounting holes for panel mount and relevant distances should measure as follows:

- Holes: 4 x Φ6 mm
- Height: 122.5 mm
- Width: 91.4 mm

Perform the following procedure:

1 Take the two supplied brackets.

2 Place the brackets behind the panel and align M5 bracket holes with 6 mm panel holes (Figure 14).

3 Fit brackets to the rear of the panel.

4 Align the instrument up to the panel and secure in place with the four screws provided.

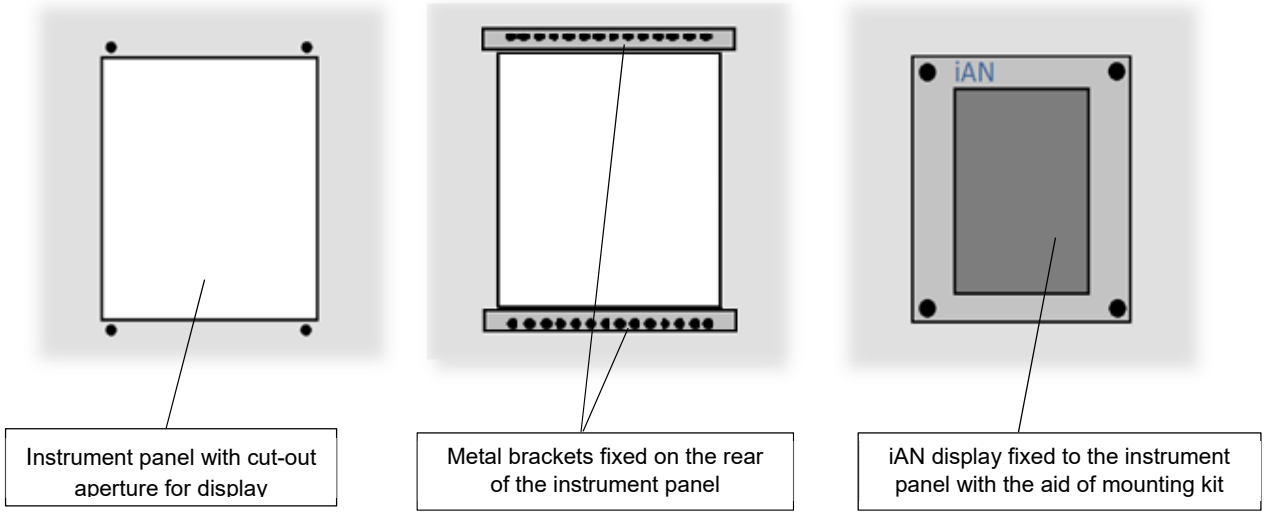


Figure 14 : iAN Panel Mounting Kit

9.3 Wiring

CAUTION:

LONG SIGNAL AND POWER CABLES CAN INCREASE EMC EMISSIONS AND BE MORE SUSCEPTIBLE TO EMC INTERFERENCE.

The iAN monitor provides all the system interconnections on the rear side.

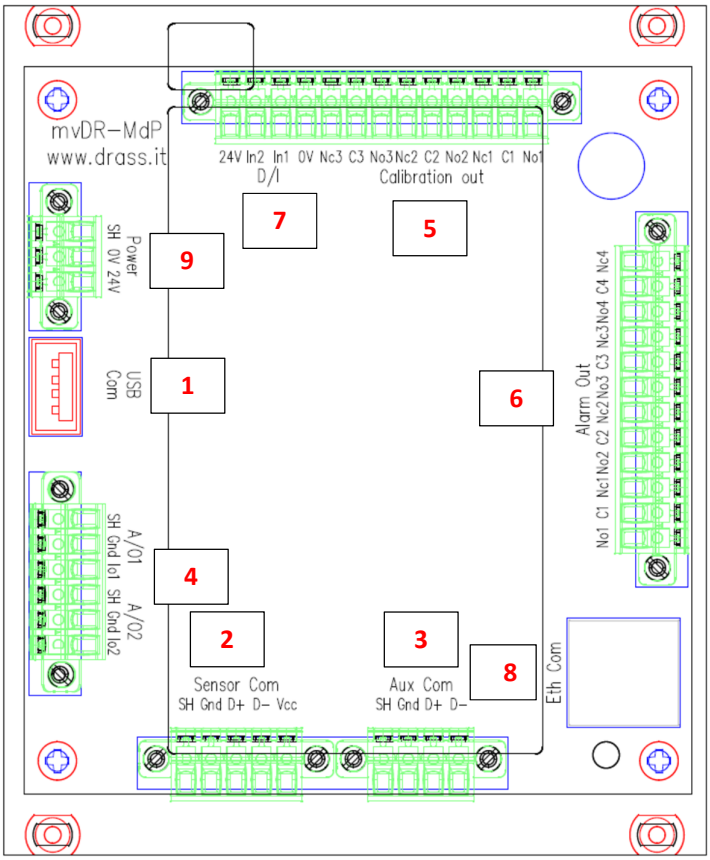


Figure 15 : Monitor Rear with Connection Ports

List and description of connectors (Figure 15):

1	USB port (connection with external pen drive)	Q.ty 1
2	RS485 port (connection with remote sensor board)	Q.ty 1
3	RS485 port (connection with remote pressure sensor)	Q.ty 1
4	4..20mA Analog output	Q.ty 2
5	Volt-free SPDT relay (self-calibration)	Q.ty 3
6	Volt-free SPDT relay (thresholds or alarms events)	Q.ty 4

7	24Vdc Digital input (iAN remote control)	Q.ty 2
8	RJ45 port (interfacing with remote system, e.g. PLC/SCADA system)	Q.ty 1
9	24Vdc power supply port	Q.ty 1

9.4 Power Supply

The monitor can be directly powered from a DC source, using the supplied three-way Phoenix connector.

9.5 Remote Sensor Board

NOTE:

IT IS RECOMMENDED TO REPLACE THE REMOTE OXYGEN SENSOR BOARD AFTER 12 MONTHS FROM THE DATE OF REMOVAL FROM ITS SEALED PACKAGE (SEE CHAPTER 12 MAINTENANCE).

The Remote Sensor Board must be connected to the display monitor using a four-core shielded cable (suggested 2xSTP), one twisted pair used for 24 Vdc power and the other D+/D- for serial communication). Remote Sensor Board pins 1 and 2 must be connected together as they are the termination for the serial communication. See following tables for a description of Remote Sensor Board and Monitor Display pins.

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Tr.	D+	D-	0V	24V

Table 5 : Pins for Remote Sensor Board

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
SH.	0V	D+	D-	24V

Table 6 : Pins for Monitor Display

9.6 Analog Outputs

iAN monitor includes a single port with 6 pin, used to perform a remote gas analysis reading. It is composed of two independent analogue current outputs 4-20 mA. These two output signals are identical and are scaled according to the actual reading.

Analogue outputs are internally powered, thus not requiring an external power source.

Example of current value:

if the reading is 8.7% O_2 (over a 99.99% full range), the current output will be:

*4 + (8.7 / 99.99) * 16 = 5.393 mA*

9.7 Relay Outputs

iAN monitor includes four user-configurable changeover (SPDT, 1NO+1NC contacts) relays; any of such relays can be assigned to a specific event using the iAN configurations.

For true failsafe, the NO-COM contact pair can be used to indicate an *OK* status when closed, so that disconnections or open circuit cable faults will provide a fault status.

9.8 Self Calibration Relays

They are used to command solenoid valves devoted to self-calibration.

iAN monitor includes three pre-programmed relays used to manage three self-calibration solenoid valves (not supplied with iAN analyzer) described below.

- Relay pin No 1: connected to 3-way valve, devoted to swap from analysis to calibration and vice versa. If valve is not powered the analysis mode is selected, otherwise valve switches to calibration mode.
- Relay pin No 2: connected to ON-OFF Zero calibration gas valve.
- Relay pin No 3: connected to ON-OFF Span calibration gas valve.

9.9 Gas Fitting and Connection

Install inlet and outlet connecting pipes to the remote sensor board. Use silicon pipe with a diameter of 4/6 mm.

Upstream of the iAN analyzer it is recommended to arrange a piping system containing the following components:

- Drier: it is strongly recommended especially for condensation environments.
- Pressure reducer: install near the analyzer to respect the maximum working pressure of the inlet gas (value to be set is 0.1 barg).
- Needle valve: install after pressure reducer, to correctly regulate the inlet gas flow (maximum inlet flowrate shall be 1 l/min).

For further details, see paragraph 7.9 *Technical Data*.

10 OPERATION

10.1 Start-Up

The iAN analyzer will automatically start-up when electrical power is supplied to the monitor. Only for the first start-up, it is required to set data and time using the suitable page on the iAN display. Otherwise initially the splash screen appears for 6 seconds (Figure 16), then the warm-up runs for approximately 60 seconds.

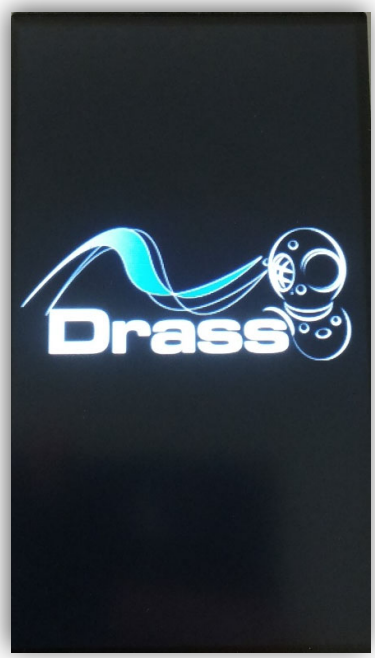


Figure 16 : Start-Up Splash Screen

If a new remote sensor board has been connected to the iAN for the first time, the “Wrong Sensor!” message can appear on the display and both remote sensor LEDs light up (Figure 17). In this case the operator shall select the correct remote sensor (see Figure 18).

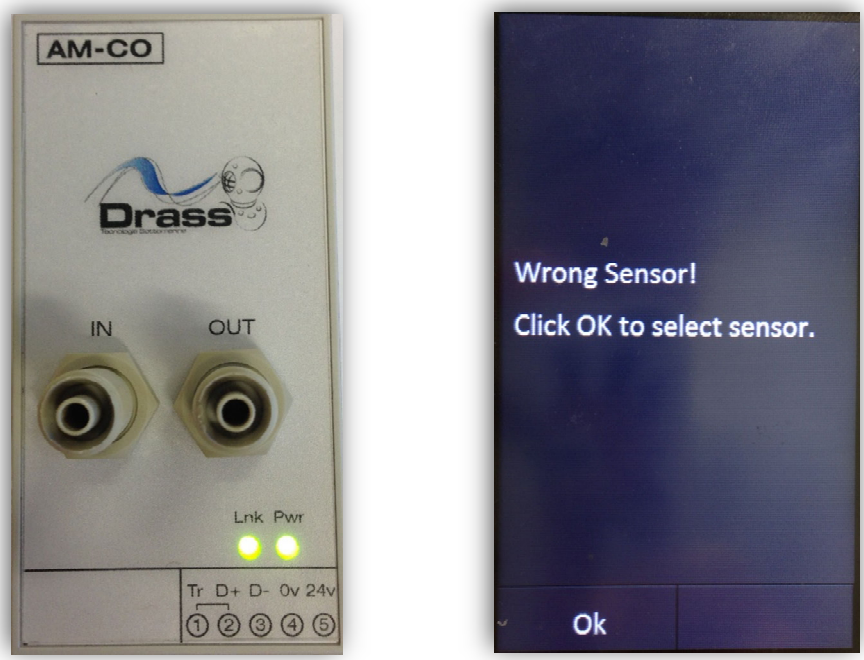


Figure 17 : Wrong Sensor Message

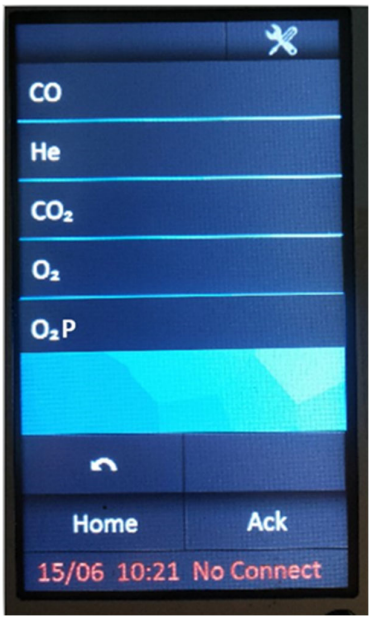


Figure 18 : Remote Sensor Board Selection

10.2 Sensor Readings and Warm-Up

During normal operation of the iAN analyzer, the monitor reads signal from remote sensor board every 250 ms. If the digital sensor connected to the iAN cannot display a valid reading, the display shows dashes, instead of concentration value (see Figure 19).

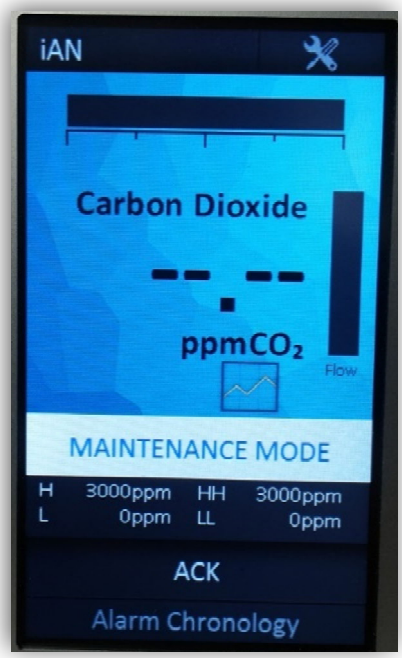


Figure 19 : Example of invalid reading value

Warm-up sensor lasts approximately 60 seconds and occurs in the following conditions:

- when the iAN analyzer is initially powered up;
- if remote sensor board is disconnected and re-connected to the monitor; this procedure could be necessary when sensor board is replaced.

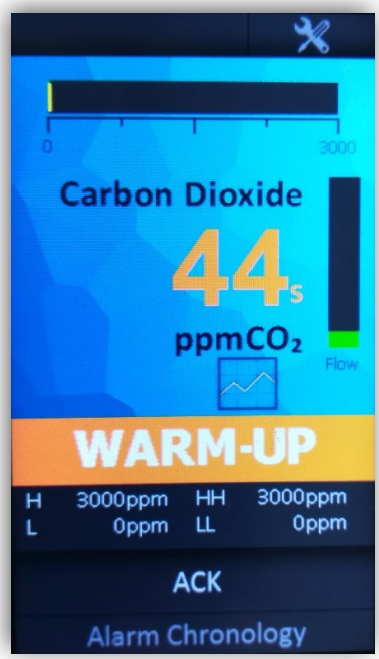


Figure 20 : Warm-Up Process of Remote Sensor

10.3 Display Functions (Normal Operation)

The touchscreen display includes a set of pages allowing a complete customization of the system. The following paragraphs show the pages hierarchy and how it is possible to navigate between them.

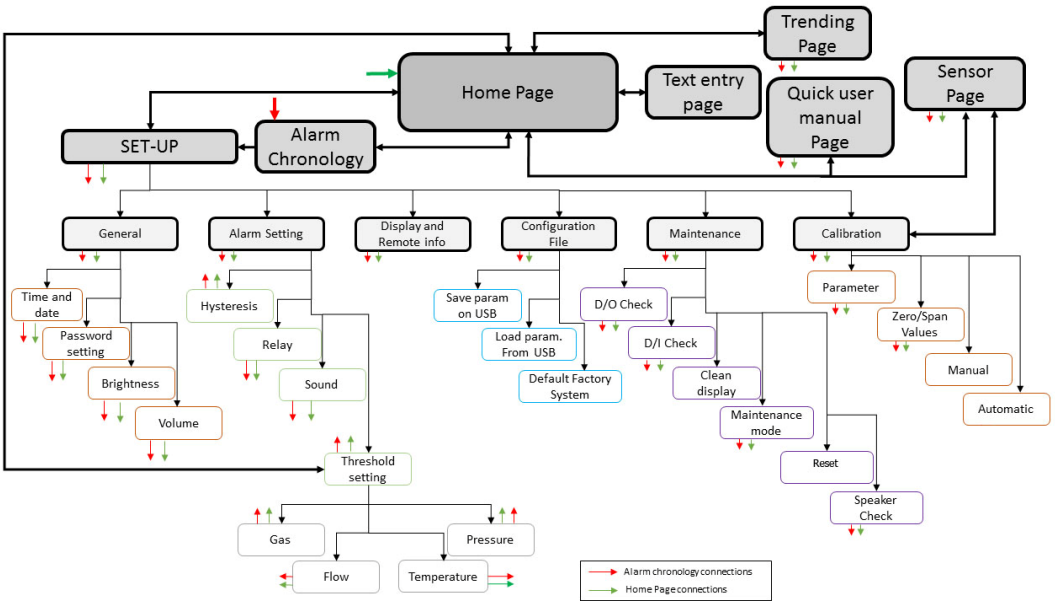


Figure 21 : Flow Chart of Display Pages

10.3.1 Main Page (Home Page)

During normal operation of the iAN analyzer, the display shows the Main Page.

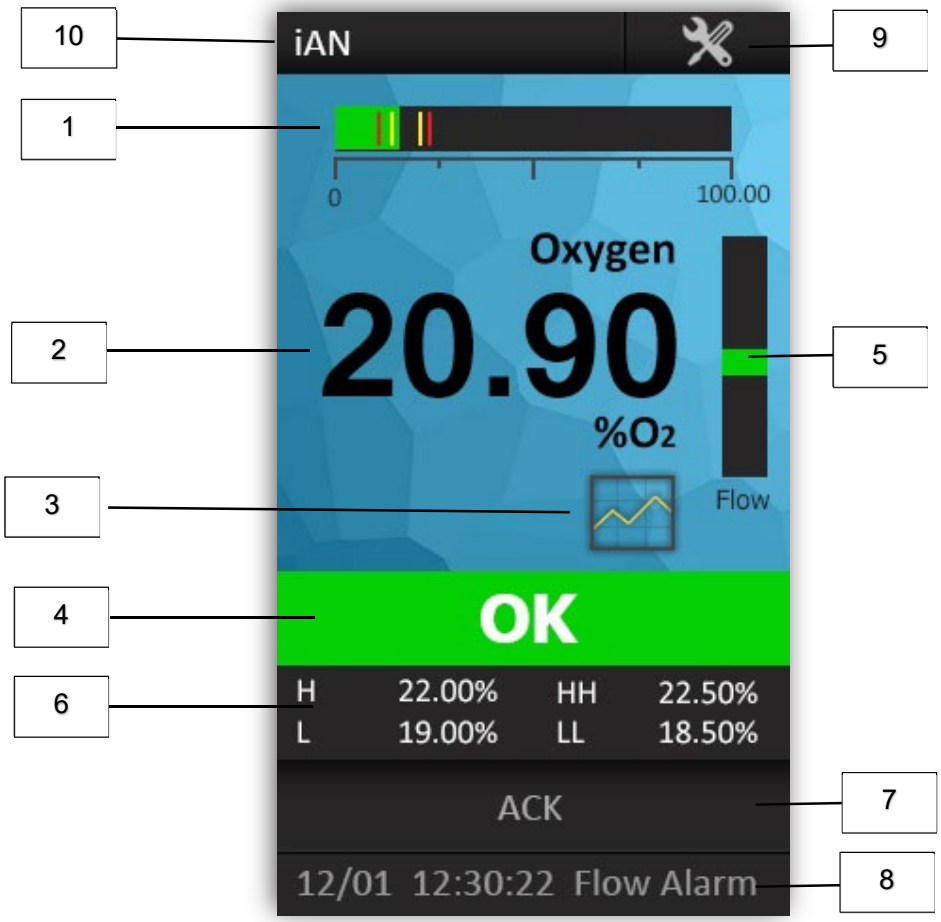


Figure 22 : Main Page

The page shows:

1) **Bar graph of gas concentration:**

   It indicates the actual value in the measuring range and the alarm threshold positions. Alarm thresholds are shown with the following colors:

   - Yellow: High (H) / Low (L) warnings.
   - Red: Very High (HH) / Very Low (LL) alarms.

2) **Concentration of gas:**

   It is the actual value of analyzed gas concentration with relevant unit of measurement. Size of the character is large enough to permit reading even at distance. Pressing this area, it is

possible to have a quick access to *Sensor Page*, sub menu of *Set-Up Page* (see paragraph 10.3.2).

3) Trending page softkey:

It allows to access to the *Trending Page* (see paragraph 10.3.4).

4) Status bar:

It indicates the current status of iAN analyzer. There are five message statuses, identified with different background colors:

- *OK* (green background): iAN system is running correctly.
- *WARNING* (yellow background): a warning status is in progress or has ended, but not yet acknowledged.
- *ALARM* (red background): an alarm status is in progress or has ended, but not yet acknowledged.
- *MAINTENANCE* (white background): during maintenance, status warning and alarm message are disabled. On this configuration, it is possible to perform any parameters setting, preventing alert messages. This status can be activated from *Maintenance page*, that is a sub menu of *Set-Up Page*, see paragraph 10.3.2).
- *WARM-UP* (orange background): the warm-up of the remote sensor board is in progress. This status is automatically activated when the analyzer is switched on, or during resetting function.

The *OK*, *WARNING* and *ALARM* status work in normal mode. It means that the system is on and it is monitoring the environment.

5) Gas flow:

This vertical bar graph shows the actual gas flow entering the remote sensor (unit of measurement is percentage). For the correct analysis, the flowrate indicator shall be around the center of the bar (50%).

6) Thresholds of gas:

On this section threshold setting values are shown. It is possible to change setting (see *Threshold Setting Page*, sub menu of *Alarm Settings Page*, sub menu of *Set-Up Page*, see paragraph 10.3.2).

7) Acknowledge pushbutton:

It permits to mute and acknowledge buzzer and display alarms.

8) Alarm Chronology pushbutton:

This row shows the last occurred alarm with relevant time and date. Pressing the row, it is possible to access to the *Alarm Chronology Page* (see paragraph 10.3.3).

9) Set-up pushbutton:

It allows access to the *Set-Up Page* (see paragraph 10.3.2).

10) iAN analyzer description:

This description can be customized by pressing the text.

10.3.2 Set-Up Page

This is the main configuration page, which allows set-up of all possible system parameters (example: alarm and warning thresholds, time and date parameters). Figure 23 shows the main Set-Up Page containing the list of sub-pages described below.

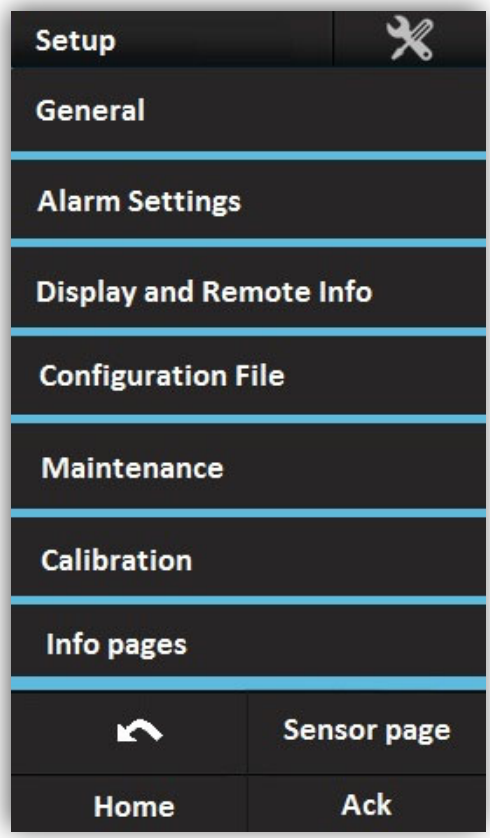


Figure 23 : Set-Up Page (Master Page)

- **General**

It allows to set the following general parameters:

- *Time and Date*.
- *Password Setting*: it is possible to set/enable/disable the password.
- *Brightness*: screen brightness setting.
- *Volume*: volume adjustment.
- *Remote Pressure Sensor*: if the remote pressure sensor is connected, it is possible to activate the local pressure reading. In addition, it is possible to read partial pressure of the analyzed gas instead that gas concentration.
- *Ethernet Settings*: setting of ethernet parameters for iAN remote control. For default values see annex 17.

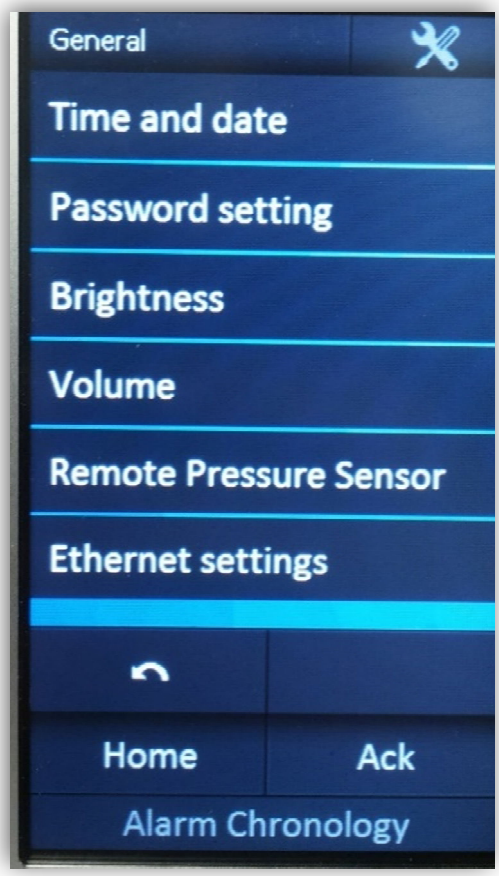


Figure 24 : General Set-Up Page

- **<u>Alarm Settings</u>:**

On this page it is possible to change each default value for alarm set-up. For default setting value see annex 17.

- *Hysteresis*: this page allows to change the hysteresis value for gas concentration, temperature, environmental pressure, flowrate and remote pressure. Each hysteresis unit of measurement is the same used for the relevant parameter.
- *Relay:* the four relays can be associated to four different alarms and/or warnings contained in the event list.
- *Sound:* different sounds can be associated to each event through a sounds list.
- *Threshold setting:* on this page it is possible to set all high and low thresholds: gas concentration, flowrate, temperature, environmental pressure and remote pressure (if remote pressure sensor is connected). For each parameter, it is possible to set threshold values.

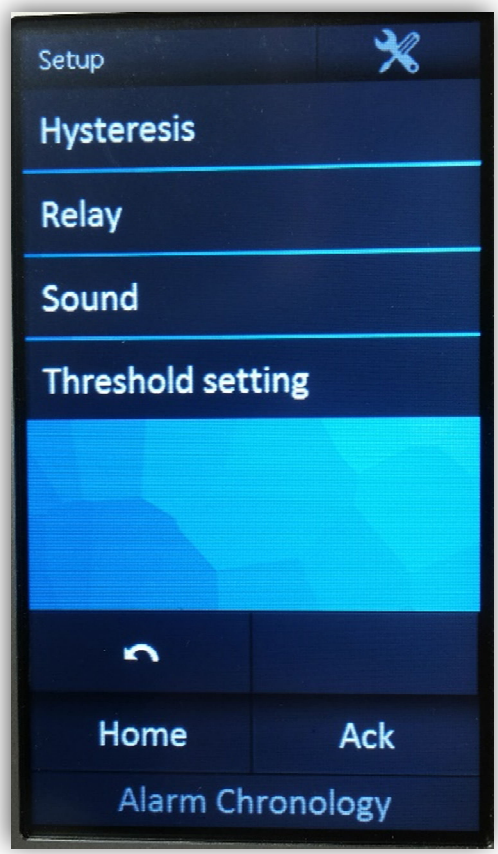


Figure 25 : Alarm Settings Page

- **Display and Remote Info:**

The listed information of firmware version for remote sensor board and for monitor can be found on this page. It is possible to upgrade remote sensor firmware connecting an USB pen drive with suitable firmware and pressing *Upgrade Slave* button.

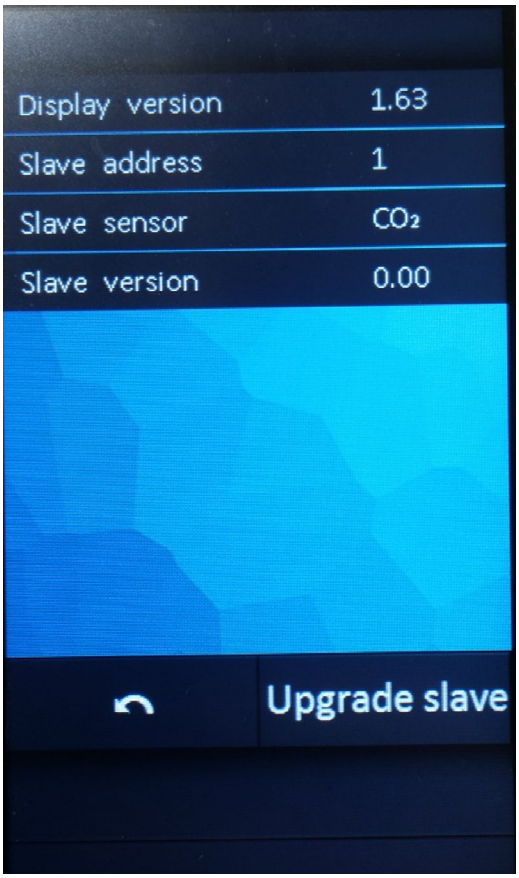


Figure 26 : Display and Remote Info Page

- **Configuration File:**

This page allows the upload and download of all configuration parameters by means of an USB pen drive. Using these functions, it is possible to simply share the same configuration parameters with each iAN analyzer. For example, if several iAN analyzers of the same type are used, this function allows the setting of the same configuration for each one or to collect and check every setting parameters from PC.

Parameter reset button gives the possibility to return to default setting value only for calibration parameters and internal sensor parameters.

Factory reset button gives the possibility to return to default setting value for all parameters system, as listed in annex 17. The button allows the rebooting of the analyzer, recreating initial power-on conditions. This resetting deletes downloaded firmware.

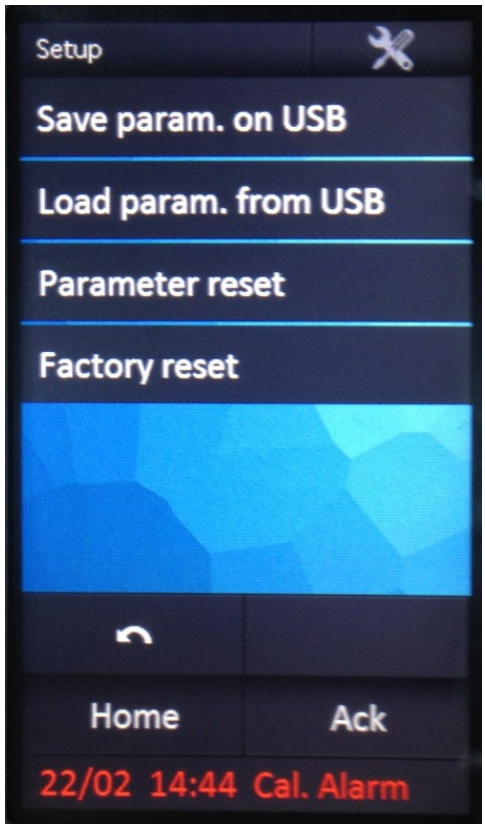


Figure 27 : Configuration File Page

- **<u>Maintenance</u>:**

On this page it is possible to test the system and verify proper functionality of the following parameters:

- *D/O Check:* it enables activation of each singular relay, to check if digital output properly works.
- *D/I Check:* it checks if each singular digital input receives a valid 24Vdc signal.
- *Buzzer test:* it allows the functional test of buzzer.
- *Clean display:* on this page it is possible to clean the display. Pressing this button, the touchscreen display is disabled for 10 seconds.
- *Maintenance mode:* on this page it is possible to switch from *OFF* to *ON* and vice versa. If maintenance mode is *ON*, all alarms are inhibited while all other functions work properly.
- *Reset:* it allows to restart the analyzer.
- *Set Slave Addr.:* it shows the remote sensor address.

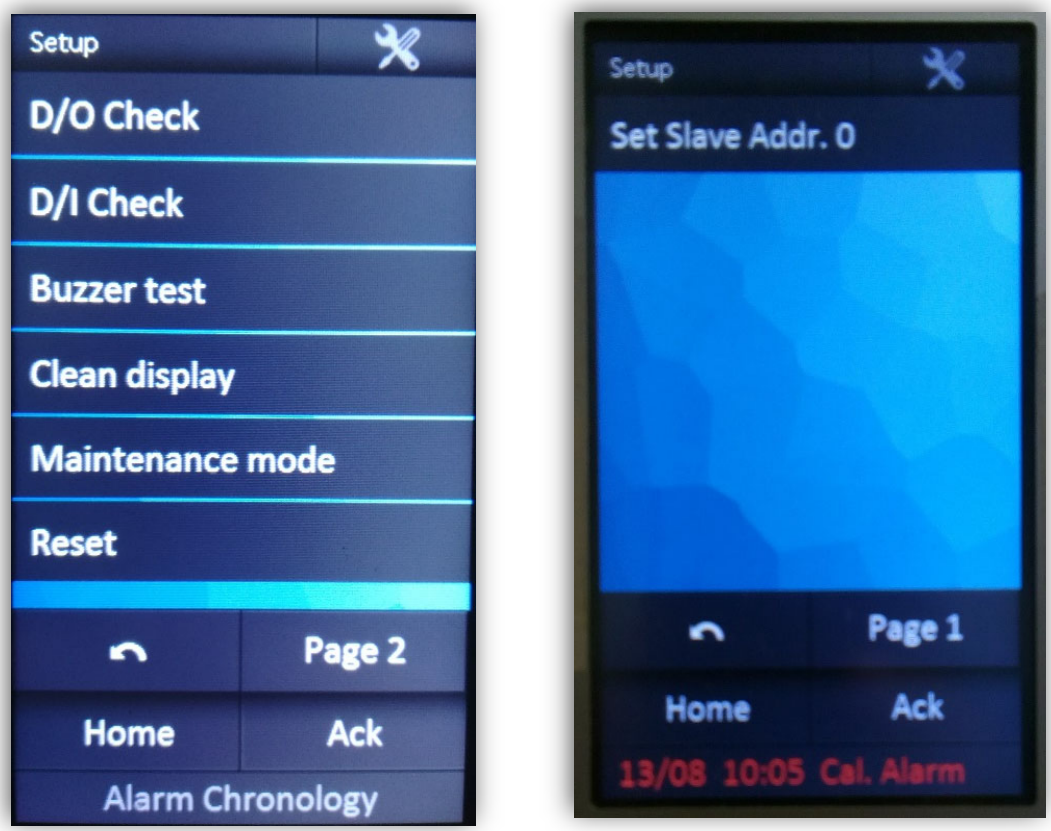


Figure 28 : Maintenance Page – Page 1 & 2

- **Calibration:**

On this page the operator can calibrate the analyzer in *Automatic* or *Manual Calibration*. For calibration procedure refer to paragraph 11.

- *Parameter:* where necessary, it is possible to change all the calibration parameters. For default setting value and description of each parameter see annex 17.
- *Zero/Span Value:* when necessary, it is possible to change setting value of Zero and Span Gas used for calibration.
- *Manual:* from this page it is possible to perform the manual calibration.
- *Automatic:* from this page it is possible to perform the automatic calibration.

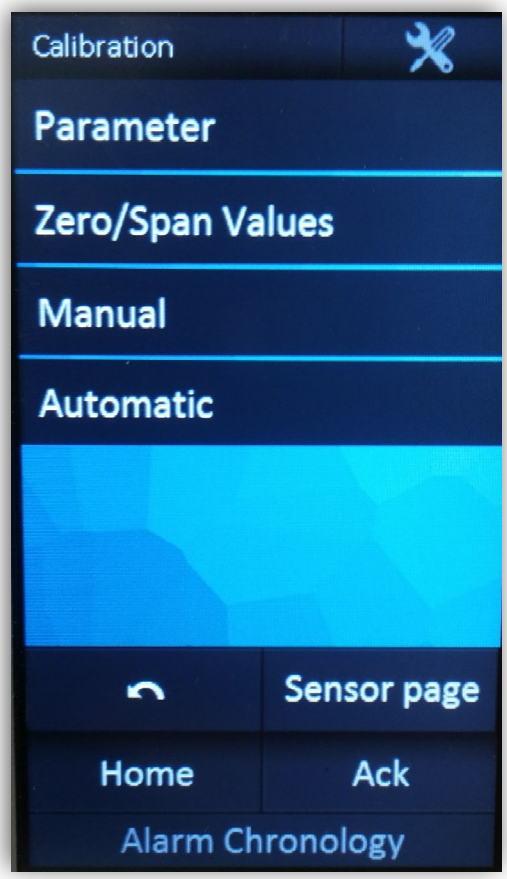


Figure 29 : Calibration Page

- **Info Page:**

This page provides a start-guide manual, containing characteristics and main function description.

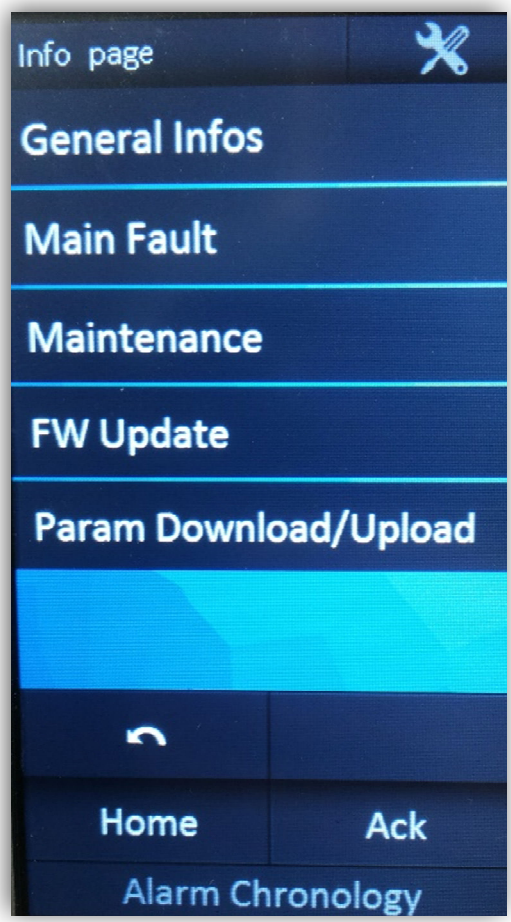


Figure 30 : Info Page

- **Sensor Page:**

This page is accessible, as well as from *Set-Up Page*, also from *Main Page* (pressing gas concentration value, see Figure 22), from *Calibration Page* (see Figure 29) and from *Trending Page* (see paragraph 10.3.4). It shows all the following parameters (with respective units of measurement) received from sensor boards.

- *Time and date.*
- *Gas concentration* (% or ppm).
- *Barometric Pressure* (mbar).
- *Temperature* (°C).
- *Gas flow* (%).

In order to have an easy understanding of these parameters, a bar graph shows values with relevant admissible range. At the bottom of the page, quick access to *Set-Up Page* and *Calibration Page* is possible via the relevant pushbuttons.

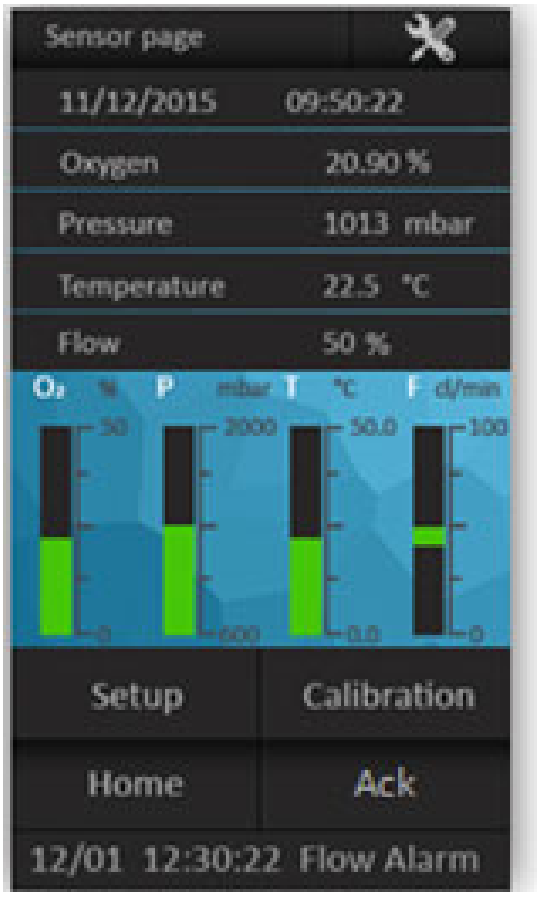
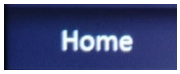


Figure 31 : Sensor Page

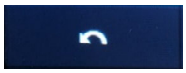
- **Additional pushbutton:**

The following pushbuttons are located at the bottom section of each page:



It allows to skip to *Home Page* (see paragraph 10.3.1).

It allows to mute alarm at any moment, acknowledging the alarm/warning shown.



It allows to skip to preview page.

10.3.3 Alarm Chronology Page

It shows each occurred warning and alarm with respective date and time. The list of these events is chronologically ordered.

The Alarms/Warnings text are shown as follows:

- Alarm active, not yet acknowledged: blinking red.
- Alarm active, acknowledged: red.
- Alarm passed, not yet acknowledged: blinking grey.
- Alarm passed, acknowledged: grey.
- Warning active, not yet acknowledged: blinking yellow.
- Warning active, acknowledged: yellow.
- Warning passed, not yet acknowledged: blinking grey.
- Warning passed, acknowledged: grey.

List of events can be deleted only by resetting the analyzer (see *Maintenance Page*, sub menu of *Set-Up Page*, see paragraph 10.3.2).

At the bottom of page, the following pushbuttons are located:

- *Ack Page:* it is used to acknowledge all the alarms/warnings in the current page.
- *Ack:* it is used to acknowledge only the last current alarm.
- *Home:* it allows to skip to *Home Page* (see paragraph 10.3.1).
- *Threshold:* it allows to go to *Threshold Setting* of *Alarm Settings Page*, sub menu of *Set-Up Page*, see paragraph 10.3.2.

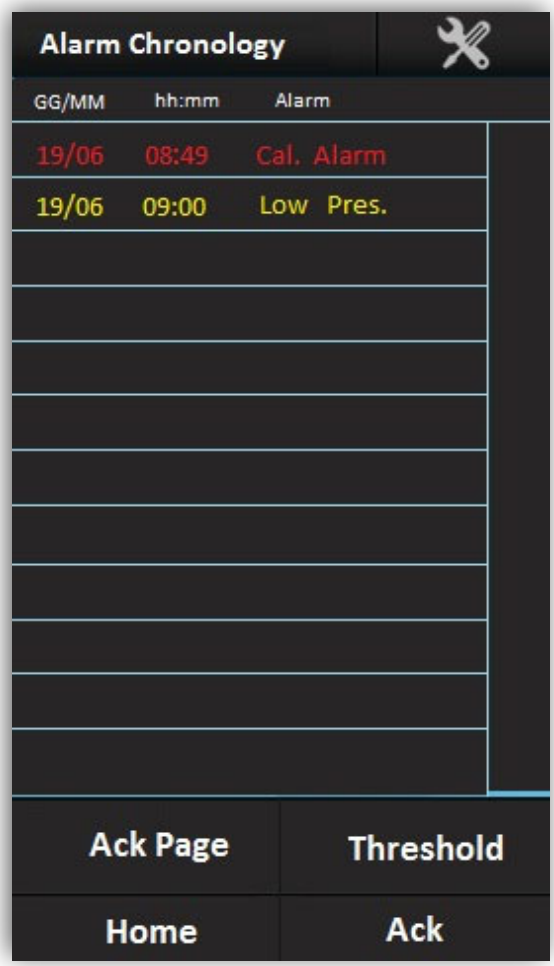


Figure 32 : Alarm Chronology Page

10.3.4 Trending Page

It shows graph of reference gas concentration (O_2D, O_2P, CO_2, He or CO) as a function of time. The chart is divided into two equal sections by a vertical dashed line. At the beginning of the analysis, each section has a duration of 20 minutes. Then, when the analysis duration is longer than 40 minutes, it is possible to change the time scale or to use the scroll bar to move into the graph on the right/left.

The following pushbuttons are located at the bottom of page:

- *Scale:* default scale is 1:1, but it is possible to reduce it when analysis time is higher than 40 minutes. Further allowable scales are 1:2 and 1:4.
- *Ack:* it is used to acknowledge only the last current alarm.
- *Home:* it allows to skip to *Main page* (see paragraph 10.3.1).
- *Sensor Page:* it allows to quickly skip to the relevant page (sub menu of *Set-Up Page*, see paragraph 10.3.2).

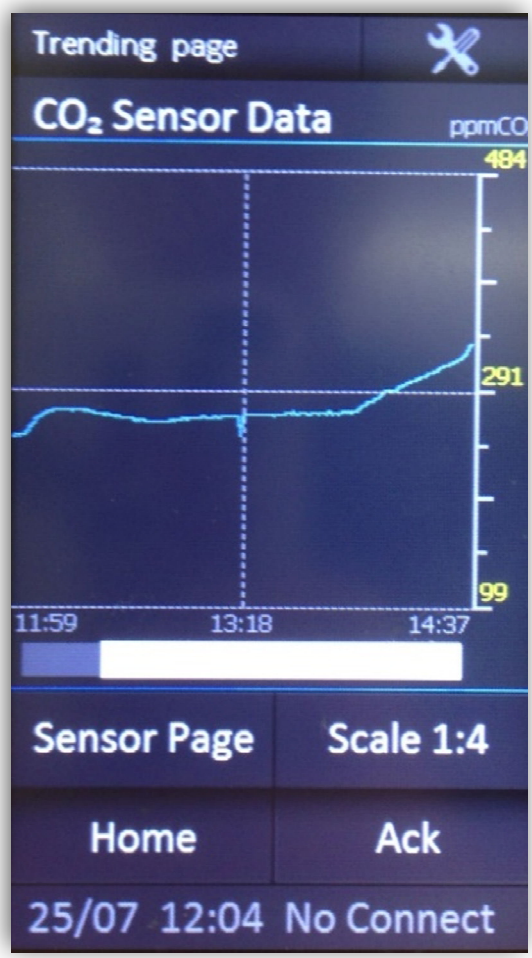


Figure 33 : Trending Page

11 CALIBRATION

11.1 Introduction

It is recommended to perform the analyzer calibration if one of the following conditions occurs:

- The iAN analyzer is switched-on for the first time.
- The sensor board has been replaced or the relevant wiring has just been disconnected and re-connected again.
- A recalibration alert message appears on the display, due to expiring calibration timeout. On the *Calibration Page* (see *Parameter* in Figure 29), it is possible to set the calibration deadline.

11.2 Calibration Gas

11.2.1 General

To perform a calibration adjustment, first expose the sensor to the appropriate calibration gas of known concentration. Two calibration points are required: low concentration of gas to analyze (Zero Gas) and high concentration of gas to analyze (Span Gas).

NOTE:

WHEN CALIBRATING THE CO SENSOR, CARE SHOULD BE TAKEN WHEN SELECTING THE CALIBRATION GAS USED. THE BALANCE OR BACKGROUND GAS CAN HAVE AN EFFECT ON THE SENSOR READING.

THE HIGH AND LOW CALIBRATIONS PERFORMED ON A SENSOR SHOULD BE SELECTED APPROPRIATELY. SOME SENSORS (E.G. CARBON DIOXIDE) REQUIRE THAT THE LOW CALIBRATION IS A TRUE ZERO CALIBRATION ADJUSTMENT, THEREFORE A GAS WITH A KNOWN ZERO CONCENTRATION OF THE TARGET GAS SHOULD BE USED. FOR OTHER SENSORS A HIGH AND LOW CALIBRATION ADJUSTMENT VALUE SHOULD BE SELECTED.

THE SELECTED GAS CONCENTRATIONS SHOULD BEST REFLECT THE RANGE OVER WHICH THE SENSOR IS INTENDED TO BE USED FOR GREATER READING ACCURACY.

Example:

An oxygen sensor monitors a sample line in a saturation diving scenario, at a depth of 200msw. If the oxygen partial pressure is 400mbar ppO2, the iAN analyzer is expected to read 1.90%. Therefore, the high calibration gas in such a case is likely to be chosen between 3 and 5% oxygen in helium, which ensures that the analyzer is calibrated close to the point of interest.

The sensor should be allowed to settle for a while so that the sensor reading can stabilize. The settling time of the sensor depends on the length of pipe-work and on the flowrate of gas from the gas source to the sensor. Once the sensor reading has settled for the applied calibration gas, the calibration adjustment can begin.

Proper selection of suitable calibration gases is of a paramount importance to ensure the

correctness of measures performed by gas analyzers. For each type of iAN, refer to the following guidelines for the selection of the proper calibration gases, which must be sourced locally by the end user. Consider given values as suggestions: slightly different values can be used, depending on the gas selection available locally.

11.2.2 Calibration gas for iAN O_2D e iAN O_2P

- Zero Gas: this must be either pure helium or nitrogen, in accordance with the intended use of the gas analyzers: helium for heliox mixtures, nitrogen for air or nitrox mixtures.
- Span Gas: background gas should be in accordance with the Zero Gas and with an O_2 concentration in the range of the ones analyzed during operation.

Examples:

- Analyser used to monitor O_2 content of heliox mixtures: Zero Gas pure helium, Span Gas 20% O_2 in He.
- Analyser used to monitor O_2 content in air or nitrox mixtures: Zero Gas pure nitrogen, Span Gas 50% O_2 in N_2; alternatively, clean air can be used as Span Gas, setting the O_2 content to 20.9%.

11.2.3 Calibration gas for iAN CO_2

- Zero Gas: this must be either pure helium or nitrogen, in accordance with the intended use of the gas analyzers: helium for heliox mixtures, nitrogen for air or nitrox mixtures.
- Span Gas: background gas should be in accordance with the Zero Gas and with a CO_2 concentration in the range of the ones analyzed during operation.

Examples:

- Analyser used to monitor CO_2 content of heliox mixtures: Zero Gas pure helium, Span Gas 2500 ppm CO_2 in He.
- Analyser used to monitor CO_2 content in air or nitrox mixtures: Zero Gas pure nitrogen, Span Gas 2500 ppm CO_2 in N_2; note that clean air MUST NOT be used, since the content of CO_2 is not constant in the atmosphere and too low for the calibration.

11.2.4 Calibration gas for iAN CO

- Zero Gas: this must be either pure helium or nitrogen, in accordance with the intended use of the gas analyzers: helium for heliox mixtures, nitrogen for air or nitrox mixtures.
- Span Gas: background gas should be in accordance with the Zero Gas and with an CO concentration in the range of the ones analyzed during operation.

Examples:

- Analyser used to monitor CO content of heliox mixtures: Zero Gas pure helium, Span Gas 7 ppm CO in He.
- Analyser used to monitor CO content in air or nitrox mixtures: Zero Gas pure nitrogen, Span Gas 7 ppm CO in N_2.

11.2.5 Calibration gas for iAN He

- Zero Gas: this must be a mixture with known quantity of helium, or pure nitrogen or clean air.
- Span Gas: pure helium (100% He).

Examples:

- Analyser used to monitor He content of heliox mixtures: Zero Gas 20% O_2 / 80% He, Span Gas pure helium.
- Analyser used to monitor He content in trimix mixtures: Zero Gas pure nitrogen or clean air (0% He), Span Gas pure helium.

11.2.6 Setting of calibration gas

To improve the calibration accuracy of all analyzers, it is necessary to select the type of background gas to be used for calibration: starting from Calibration page (Figure 34), select the Parameter menu.

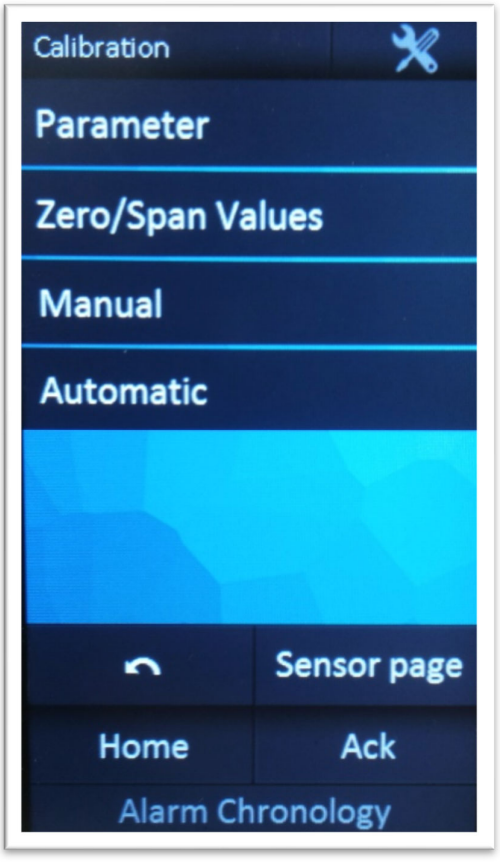


Figure 34 : Calibration Page

Scroll through the Parameters pages using the Next button until the last one (in Figure 35 all Parameters pages are shown sequentially).

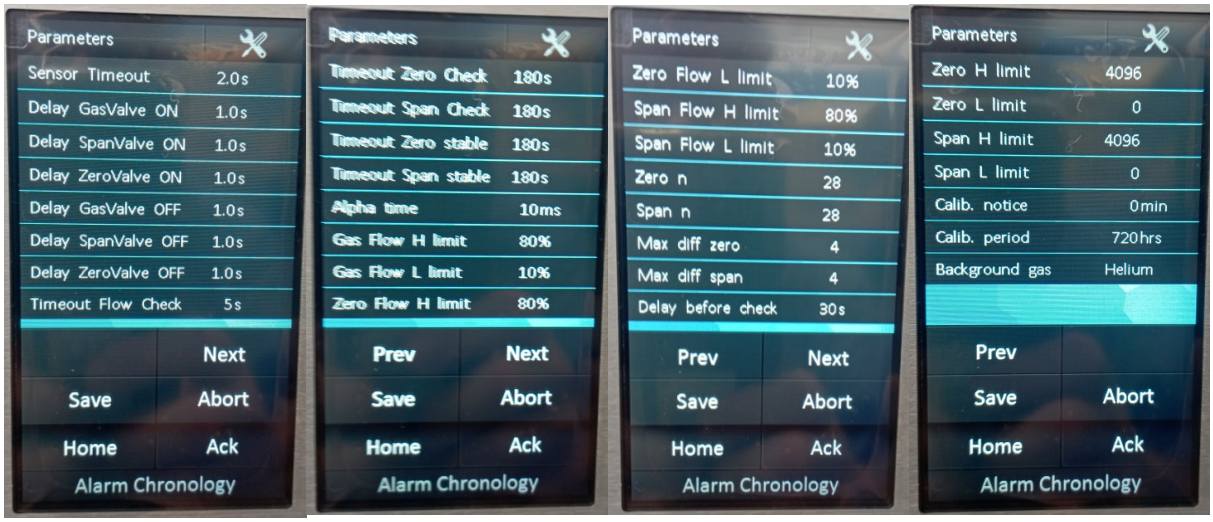


Figure 35 : Parameters Pages

On the last page (the rightmost one in Figure 35) select the background gas (helium or nitrogen) by pressing on Background gas field and then save the selection by pressing the Save button.

11.3 Calibration Page

Calibration can be *Manual* (the operator manages calibration gas supply and manually controls Zero/Span gas analysis) or *Automatic* (solenoid valves for calibration gas supply and calibration analysis procedure are controlled from iAN analyzer). For both modes (Manual and Automatic) the monitor shows the page as per Figure 36.

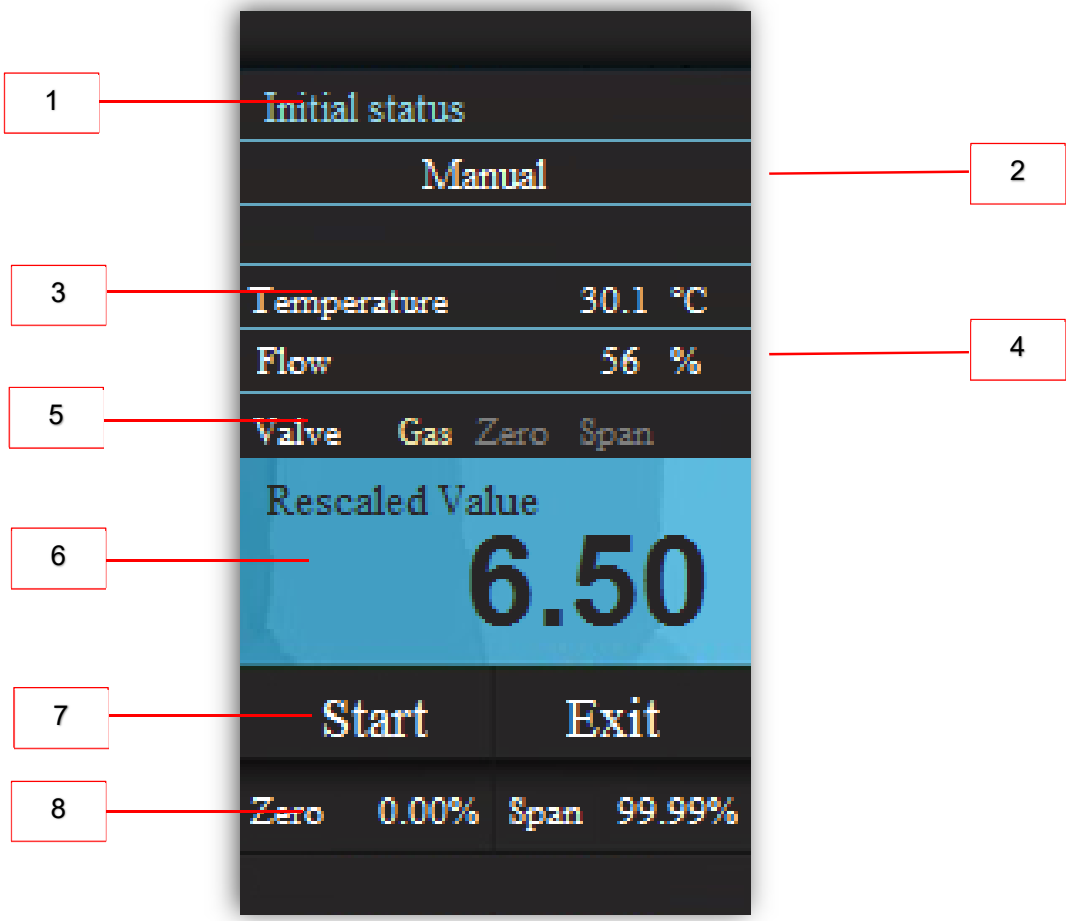


Figure 36 : Details of Calibration Page

This page shows:

1) Status bar:

It indicates the status during the calibration process.

2) Calibration type:

It indicates if the calibration is manual. If the calibration is automatic, the field shows when calibration process is completed.

3) Temperature:

It measures temperature of the analyzed gas (unit of measurement is Celsius degree).

4) Flow:

It measures the actual gas flow that enters in the sensor during calibration (unit of measure is percentage). For the correct analysis, the flowrate indicator shall be around 50%.

5) Configuration valves:

The analyzer controls solenoid valves of the piping system in order to select inlet gas into the sensor analyzer (for further details see paragraph 11.2). The three possible configurations during calibration are: Sample Gas, Zero Gas and Span Gas. The actual configuration is highlighted on this page (in Figure 36 the sample gas configuration is highlighted).

6) Rescaled value / Raw value:

It is the actual value of analyzed gas concentration. Unit of measurement is expressed in *Raw Value* or in *Rescaled Value*, depending from *Calibration Page*. Raw Value is the input signal acquired to the analyzer, while Rescaled Value is the same value converted in concentration unit.

7) Starting bar:

The buttons for start-up and for stopping the calibration procedure are located on this bar. During manual calibration, the *Next* button appears, to skip to the following gas analysis.

8) Zero/Span Set Point:

It is a reference of set point value for Zero Gas and Span Gas. Before performing any calibration activity, it is necessary to check Zero and Span Set Point values used for calibration. On the *Calibration page* (see *Zero/Span Value* in Figure 29), it is possible to modify default setting if necessary, depending on used Zero and Span Gas composition.

11.4 Automatic Calibration

It is possible to carry out this method, only if the three solenoid valves for calibration are installed on and wired to the iAN analyzer.

Before starting calibration procedure, it is necessary to define Zero and Span set points (see point 8 in paragraph 11.3).

Press the *Start* pushbutton in order to begin calibration procedure. During calibration, the display shows information of the actual status. At the end of the calibration process a message on the screen informs the operator if procedure is successful or if it is aborted (see paragraph 11.3).

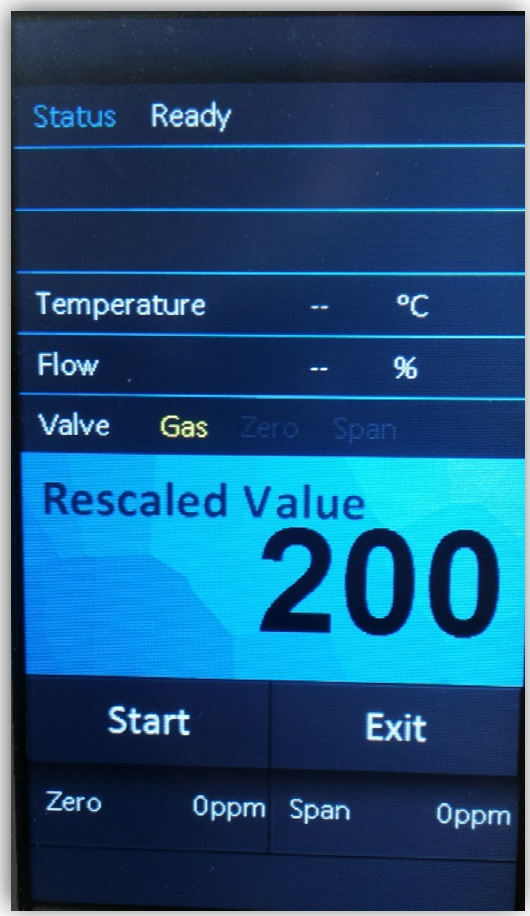


Figure 37 : Automatic Calibration Page

Automatic calibration procedure carries out the following sequence of steps:

a. Alarm and warning messages related to gas flowrate are disabled during the whole procedure.

b. The solenoid valve of the sample/calibration (valve No.1, see paragraph 9.8) is powered on, in order to move it to *Calibration* position.

c. The Zero Gas solenoid valve (valve No 2, see paragraph 9.8) is powered on and Zero Gas analysis starts.

d. Flowmeter installed valve the sensor board controls if Zero Gas flow is within limit. If gas flow is out of admissible range, a status message (*Flow Out of Range*) alerts the operator.

e. Zero Gas raw value is continuously analyzed and shown on the screen, in order to verify that measured value is going toward Zero Set Point. When measured value gets closer to the Zero Set Point and it is stable, the system saves the data.

f. The Zero Gas is calibrated.

g. The Zero Gas solenoid valve (valve No 2, see paragraph 9.8) is powered off and the Span Gas solenoid valve (valve No 3, see paragraph 9.8) is powered on.

h. Flowmeter installed inside the sensor board controls if Span Gas flow is within limit. If gas flow is out of admissible range, a status message (*Flow Out of Range*) alerts the operator.

i. Span Gas raw value is continuously analyzed and shown on the screen, in order to verify that measured value is going toward Span Set Point. When measured value gets closer to the Span Set Point and is stable, the system saves the data.

j. The Span Gas is calibrated.

k. The Span Gas solenoid valve (valve No 3, see paragraph 9.8) is powered off.

l. The solenoid valve of the sample/calibration (valve No.1, see paragraph 9.8) is powered on, in order to move it to *Sample* position.

11.5 Manual calibration

Before starting calibration procedure, it is necessary to define Zero and Span set points (see point 8 in paragraph 11.3).

The manual calibration page shows a start pushbutton to start manual calibration routine.

The procedure performs the same algorithm of the automatic calibration (see steps described in paragraph 11.4). In this case, however, the operator shall decide when the measured value is enough closer to the relevant Set point and shall manually supply Zero and Span gas to the analyzer.

Carry out the following procedure:

a. Supply Zero Gas to iAN analyzer.

b. From *Initial Status* page press *Start* button to begin manual calibration (Figure 38).

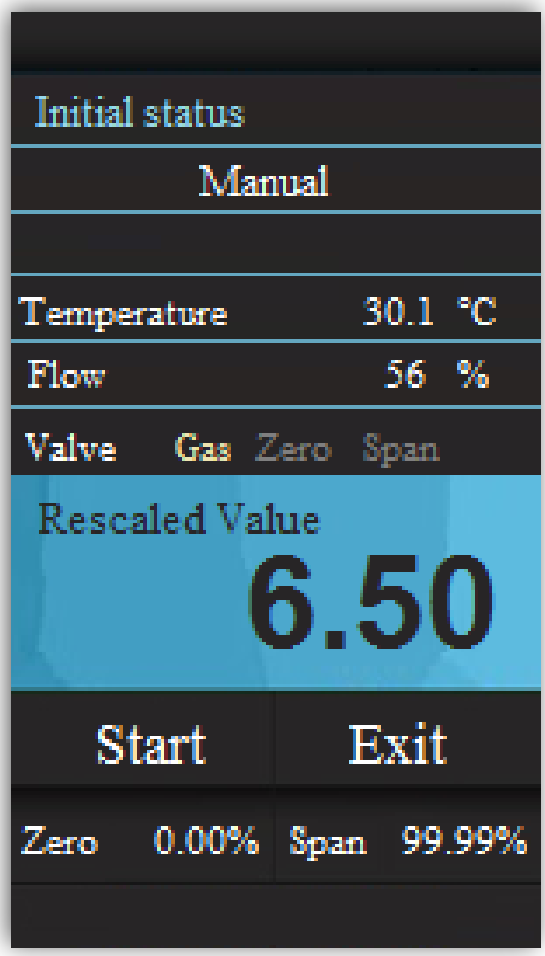


Figure 38 : Initial Status Page for Manual Calibration

c. The Gas Zero page shows the actual value of Zero Gas raw value. When this value is stably close to the Zero Set Point, press *Next* button (Figure 39 on the left). Pressing *Next* button, the analyzer saves the Zero Gas value, then the display skips to the following page. For reference, Zero and Span Set Point values are always shown at the bottom of the screen. At any moment, it is possible to stop the manual calibration procedure by pressing *Abort* button.

d. Supply Span Gas to iAN analyzer.

e. The Gas Span page shows the actual value of Span Gas raw value (Figure 39 on the right). Perform the same operation indicated in point c.

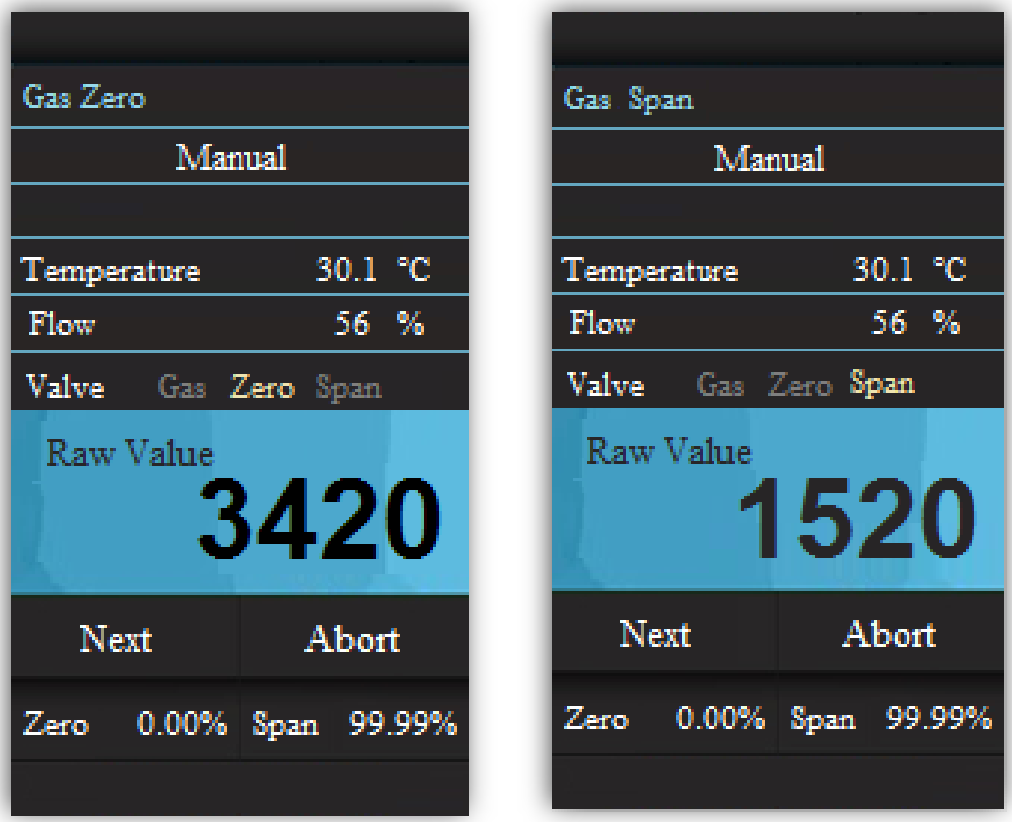


Figure 39 : Gas Zero and Gas Span Pages for Manual Calibration

f. Supply Sample Gas to iAN analyzer.

g. *End Calibration page* shows the actual raw value of sample gas (Figure 40 on the left). If reading value is acceptable, press *Next* button, to confirm calibration and to save relevant data.

h. Manual Calibration Procedure is successfully completed. Press *Exit* button (Figure 40 on the right).

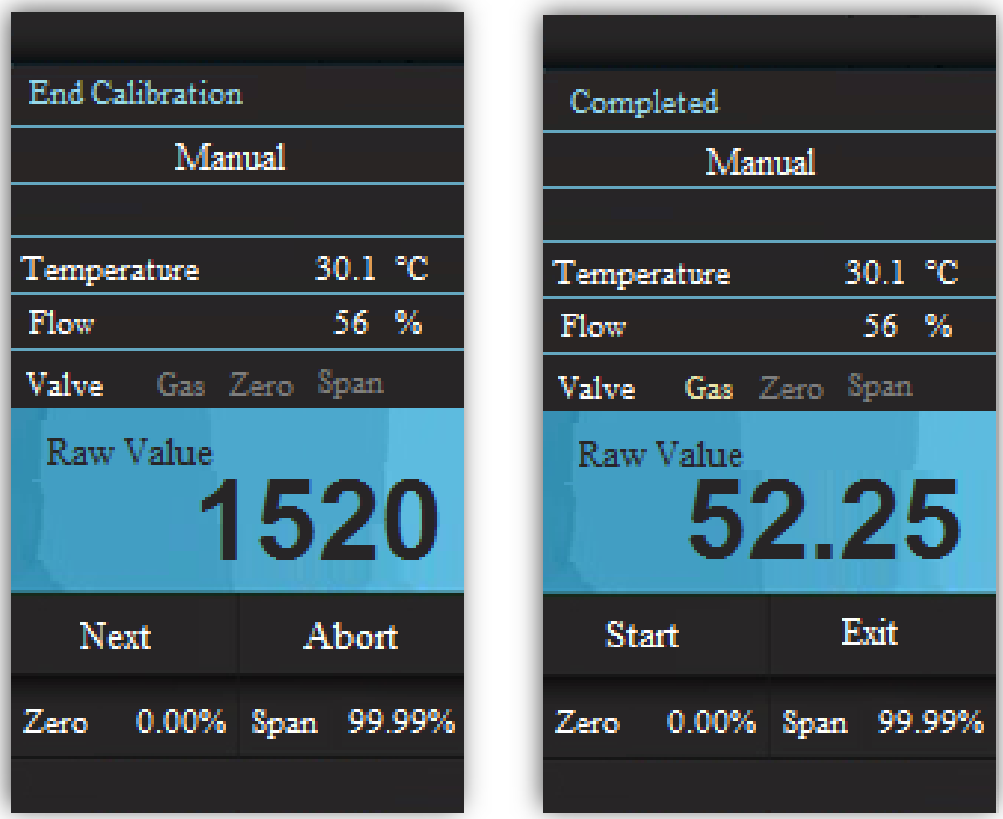


Figure 40 : End Calibration and Completed Pages for Manual Calibration

12 MAINTENANCE

In order to maintain optimum performance of iAN Analyzer, an appropriate maintenance and checks of the equipment must be performed and routine inspections are recommended. Damaged or inefficient parts must be replaced with original spare parts. See chapters 13 *Troubleshooting* and 14 *Part List*.

1. WEEKLY MAINTENANCE:

Clean the monitor and relevant touchscreen to prevent damage. Use a damp soft cloth.

2. MONTHLY MAINTENANCE:

Visually check all electrical and gas connections.

Calibrate all gas sensors (see chapter 11 *Calibration*).

3. MAINTENANCE EVERY SIX MONTHS:

Perform a visual examination and function test of the iAN Analyzer and, if necessary, a continuity and resistance test of cables.

4. MAINTENANCE EVERY FIVE YEARS:

Replace every O_2D, O_2P, CO, CO_2 and He sensor board with new one (see chapter 14 *Part List* and chapter 9 *Installation*), after five years from its removal from the sealed packaging or if faulty (see chapter 13 *Troubleshooting*): the expired remote sensor board must be returned to Drass, who will dispose of it safely and can supply a new remote sensor board. In any case, the replaced sensor board shall be disposed safely in accordance with local regulations (see chapter 15 *Disposal*).

13 TROUBLESHOOTING

The following table contains the most common problems with the suggested remedy action. End-user is encouraged to report to Drass any issue experienced during the use.

POS.	PROBLEM	CHECK LIST		POSSIBLE CAUSES	ACTION
1	Analyzer does not work	Is power supply missing on the analyzer?	Yes	Power supply fault or incorrect electrical connection	Check power supply and restore the connection.
			No	Analyzer failure	Check that Electrical and Environmental Data are respected, see paragraph 7.9 *Technical Data*. If necessary, contact Drass for assistance.
2	No feedback from remote sensor board	Is electrical connection correctly made?	No	Incorrect electrical connection	Restore the connection.
			Yes	Sensor board failure	Replace sensor board with a new equivalent item. Contact Drass for assistance, see chapter 14 *Part List*.
3	Incorrect analysis of gas concentration	Is the oxygen remote sensor board expired?	Yes		Replace oxygen sensor board with a new equivalent item. Contact Drass for assistance, see chapter 14 *Part List*.
			No		See next check list

POS.	PROBLEM	CHECK LIST		POSSIBLE CAUSES	ACTION
		Is analyzer recently calibrated?	No	Analyzer need calibration	Perform calibration procedure, see chapter 11 *Calibration*.
			Yes	Analyzer fault	Contact Drass for assistance.

Table 7 : Troubleshooting

14 PART LIST

Following spare parts can be ordered to Drass and installed on the Remote Module by the customer, following procedures given in chapter 9 *Installation*.

Drass PN	Description
E2620-004	Analyzer Display (with touchscreen stylus)
E2621-004	Remote Board O_2D
E2625-004	Remote Board O_2P
E2622-004	Remote Board CO_2
E2623-004	Remote Board CO
E2624-004	Remote Board He
E2633-004	Touchscreen Stylus for Analyzer Display

Table 8 : Spare Parts

15 DISPOSAL

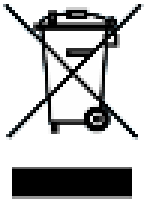


Figure 41 : Symbol of Disposal Product

According to WEEE 2012/19/EU regulation, this electronic product cannot be placed in household waste bins. Please check local regulations for information on the disposal of electronic products in your area.

When the life of the remote sensor board has expired or it is leaking or otherwise damaged, it must be returned to Drass, who will dispose of it safely.

16 FAULT REPORTING TO DRASS

Date	
CUSTOMER DETAILS:	
Customer Contact	
Address	
Country	
Telephone	
Email	
EQUIPMENT DETAILS (where applicable):	
Monitor Serial No	
Board Sensor Serial No	
Others	
System Operating Voltage	
Customer's Description of Fault	
TO BE COMPLETED BY DRASS:	
Date of Manufacturing	
Monitor Firmware Version	
Board Sensor Firmware version	
Design Change Note Ref (if applicable)	
Comments	

Table 9 : Fault Reporting

17 ANNEX: PARAMETERS LIST

The annex shows the analyzer parameters and the procedure necessary to set-up the analyzer.

- **General**
  - **Time and Date = Current Time and Date** — Data and Time to record the events
  - **Password**
    - **Insert new password = 1234** — Changes the password
    - **Enable = 1 (enabled)** — Enables the password
    - **Disable** — Disables the password
  - **Brightness = 10** — Sets the Display brightness
  - **Volume = 1** — Sets the Display alarms sound volume
  - **Remote Pressure Sensor**
    - **Sensor connected = No** — Enable the Remote Pressure Sensor
  - **Ethernet settings**
    - **Permission**
      - **RC allowed = ON** — Enable the possibility to ask the control
    - **Ethernet parameters**
      - **DHCP = OFF** — Enable the DHCP
      - **IP** — View IP address (with DHCP disabled)
        - **IP1 = 192**
        - **IP1 = 168**
        - **IP1 = 3**
        - **IP1 = 10**
      - **MAC** — View the MAC address of iAN
        - **Mac4 = 0**
        - **Mac5 = 148**
        - **Mac6 = 168**
      - **Subnet mask** — View the subnet mask
        - **SN1 = 255**
        - **SN1 = 255**
        - **SN1 = 255**
        - **SN1 = 0**
      - **Gateway** — View the gateway
        - **GW1 = 192**
        - **GW2 = 168**
        - **GW3 = 3**
        - **GW4 = 1**
      - **Port = 502** — View the Modbus communication port

- **Alarm Settings**
  - **Hysteresis**
    - **Hysteresis "Gas"** — Sets the gas hysteresis alarms
      O2 = 0.2%
      CO2 = 20ppm
      CO = 0.2ppm
      He = 1%
      Values depending from which sensor is connected
    - **Hysteresis temp = 1.0°C** — Sets the temperature hysteresis alarms
    - **Hysteresis press = 10mBar** — Sets the pressure hysteresis alarms
    - **Hysteresis flow = 10%** — Sets the flow hysteresis alarms
    - **Hysteresis Rem. Press. 0.0 bar** — Sets the Rem. pressure hysteresis alarms
  - **Relay**
    - **Relay 1 = Gas LL Al.** — Set the Relay 1 alarm event
    - **Relay 2 = Gas HH Al.** — Set the Relay 2 alarm event
    - **Relay 3 = Gen. Alarm** — Set the Relay 3 alarm event
    - **Relay 4 = Low Flow A** — Set the Relay 4 alarm event
  - **Sound** — Set the sound for the alarms
    See below for event meaning
    - **Gen. Alarm = Sound5**
      Error that the user cannot manage (i.e. internal error of Remote Board)
    - **Gas HH Al. = Sound1**
      Analyzed Gas High Threshold Alarm
    - **Gas LL Al. = Sound1**
      Analyzed Gas Low Threshold Alarm
    - **Gas H Warn = Sound3**
      Analysed Gas High Threshold Warning
    - **Gas L Warn = Sound3**
      Analysed Gas Low Threshold Warning
    - **Low Flow A = Sound1**
      Analysed Gas Flow Threshold Alarm
    - **Low Flow W = Sound3**
      Analysed Gas Flow Threshold Warning
    - **Cal. Warn = Sound3**
      Calibration Time Almost Expired
    - **Cal. Alarm = Sound1**
      Calibration Time Expired
    - **High Temp. = Sound2**
      Internal Temperature High Threshold Warning
    - **Low Temp. = Sound2**
      Internal Temperature Low Threshold Warning
    - **High Pres. = Sound2**
      Internal Pressure High Threshold Warning
    - **Low Pres. = Sound2**
      Internal Pressure Low Threshold Warning
    - **Cal. Abort = Sound5**
      Calibration Failed
    - **No Connect = Sound5**
      Remote Board Not Connected

- **No GasPres = Sound5**
  No Gas Pressure Remote sensor
- **GasPres Al = Sound1**
  Remote Gas Pressure
- **GasPres HH = Sound1**
  Gas Pressure Remote Sensor High Threshold Alarm
- **GasPres H = Sound3**
  Gas Pressure Remote Sensor High Threshold Warning
- **GasPres L = Sound3**
  Gas Pressure Remote Sensor Low Threshold Warning
- **GasPres LL = Sound1**
  Gas Pressure Remote Sensor Low Threshold Alarm
- **ED discon. = Sound1**
  Remote CPU Not Connected

- **Threshold setting**
  - **Gas**
    - **Gas HH Al. = Max value** — Sets the gas high level alarm thres.
    - **Gas H Warn = Max value** — Sets the gas high level warning thres.
    - **Gas L Warn = Min value** — Sets the gas low level alarm threshold
    - **Gas LL Al. = Min value** — Sets the gas low level warning threshold
  - **Flow**
    - **Low Flow A = 20%** — Sets the flow low level alarm threshold
    - **Low Flow W = 40%** — Sets the flow low level warning thres.
  - **Temperature**
    - **High Temp. = 40°C** — Sets the temp. high level alarm thres.
    - **Low Temp. = 10.0°C** — Sets the temp. low level alarm threshold
  - **Pressure**
    - **High Pres. = 2000mbar** — Sets the press. high level alarm thres.
    - **Low Pres. = 600mbar** — Sets the press. low level alarm threshold
  - **Remote Pressure**
    - **GasPres HH = 100.0bar** thres. — Sets the rem. pres. high level alarm
    - **GasPres H = 100.0bar** — Sets the rem. pres. high level warn thres.
    - **GasPres L = 0.0bar** — Sets the rem. pres. low level alarm thres.
    - **GasPres LL = 0.0bar** — Sets the rem. pres. low level warn thres.

- **Display and Remote Info** (Only for info. It is not possible set)
  - **Display version** — Views the Display firmware version
  - **Slave address** — Views the Remote Sensor address
  - **Slave sensor** — Views the kind of gas sensor
  - **Slave version** — Views the Slave firmware version

- **Configuration File** (Only for info. It is not possible set)
  - **Save param. on USB** — Used to save the parameters on USB
  - **Load param. from USB** — Used to load the parameters from USB

- **Parameter reset** — Used to return to default setting value for calibration parameters and internal sensor parameters
- **Factory reset** — Used to return to default setting value for all parameters system

- **Maintenance** (Only for info. It is not possible set)
  - **D/O check**
    - **Calibration Relay 1** — Used to active the Calibration Relay 1
    - **Calibration Relay 2** — Used to active the Calibration Relay 2
    - **Calibration Relay 3** — Used to active the Calibration Relay 3
    - **Relay 1** — Used to active the Relay 1
    - **Relay 2** — Used to active the Relay 2
    - **Relay 3** — Used to active the Relay 3
    - **Relay 4** — Used to active the Relay 4 (ON Relay actived)
  - **D/I check**
    - **Input 1** — Views if Input 1 receives a signal
    - **Input 2** — Views if Input 2 receives a signal
  - **Buzzer test** — Used to test the Display buzzer
  - **Clean display** — Used to clean the screen
  - **Maintenance mode** — Used to enter in Maintenance mode
  - **Reset** — Used to restart the Display
  - **Set Slave Addr.** — Views the Remote Sensor address

- **Calibration**
  - **Parameter**
    - **Sensor Timeout = 2.0s**
      Sets the Max Waiting Time to receive a feedback from the Sensor to start the Calibration
    - **Delay GasValve ON = 1.0s**
      Sets the Max Waiting Time to switch the three-way calibration valve in calibration position
    - **Delay SpanValve ON = 1.0s**
      Sets the Max Waiting Time to open the Span Gas Valve
    - **Delay ZeroValve ON = 1.0s**
      Sets the Max Waiting Time to open the Zero Gas Valve
    - **Delay GasValve OFF = 1.0s**
      Sets the Max Waiting Time to switch the three-way calibration valve in operation position
    - **Delay SpanValve OFF = 1.0s**
      Sets the Max Waiting Time to close the Span Gas Valve
    - **Delay ZeroValve OFF = 1.0s**
      Sets Max Waiting Time to close the Zero Gas Valve
    - **Timeout Flow Check = 5s**
      Sets the Timeout for the Flow Check
    - **Timeout Zero Check = 180s**
      Sets the Timeout for the Span Gas Value (if it is between the range)
    - **Timeout Span Check = 180s**
      Sets the Timeout for the Zero Gas Value (if it is between the range)
    - **Timeout Zero stable = 180s**
      Sets the Timeout for the Steadiness of Zero Gas Values (if n values are between the range)
    - **Timeout Span stable = 180s**

Sets the Timeout for the Steadiness of Span Gas Values (if n values are between the range)

- **Alpha time = 10ms**
  Set the time to add at communication time to start the single calibration
- **Gas Flow H limit = 80%**
  Sets the sample flow high level alarm
- **Gas Flow L limit = 10%**
  Sets the sample flow low level alarm
- **Zero Flow H limit = 80%**
  Sets the zero flow high level alarm
- **Zero Flow L limit = 10%**
  Sets the zero flow low level alarm
- **Span Flow H limit = 80%**
  Sets the span flow high level alarm
- **Span Flow L limit = 10%**
  Sets the span flow low level alarm
- **Zero n = 28**
  Sets the values Number to be check for the Steadiness (Zero Gas)
- **Span n = 28**
  Sets the values Number to be check for the Steadiness (Span Gas)
- **Max diff zero = 4**
  Sets the Max Difference between the saved samples (Zero Gas)
- **Max diff span = 4**
  Sets the Max Difference between the saved samples (Span Gas)
- **Delay before check = 30s**
  Sets the Max Waiting Time before to salve the samples
- **Zero H limit = 4096**
  Sets the High limit for Zero Gas Range
- **Zero L limit = 0**
  Sets the Low limit for Zero Gas Range
- **Span H limit = 4096**
  Sets the High limit for Span Gas Range
- **Span L limit = 0**
  Sets the Low limit for Span Gas Range
- **Calib. notice = 0 min**
  Sets the Time to warn "Calibration Time Almost Expired"
- **Calib. period = 720hrs**
  Sets the Time to warn "Calibration Time Expired"
- **Background gas**
  Sets the Background Gas (Helium or Nitrogen)

- **Zero/span Values**
  - **Zero Value** Sets the Zero Value for the calibration
    O2 = 0.0%
    CO2 = 0ppm
    CO = 0.0ppm
    He = 0.0%
    Values depending from which sensor is connected
  - **Span Value** Sets the Span Value for the calibration
    O2 = 99.99%
    CO2 = 3000ppm
    CO = 10.0ppm
    He = 99.99%

Values depending from which sensor is connected

- **Manual** (Only for info. It is not possible set) — Used to calibrate the analyzer
- **Automatic** (Only for info. It is not possible set) — Used to calibrate the analyzer
- **Sensor page** (Only for info. It is not possible set) — Used to view the analyzer status

- **Info pages** (Only for info. It is not possible set) — Used to view a smart guide to use
  - **General Infos**
  - **Main Fault**
  - **Maintenance**
  - **FW Update**
  - **Param Download/Upload**