SENSOTOX C2

User Manual

Sensotran

More than 50 years of
experience in gas detection

Version 2.0
April 2024

READ THE MANUAL BEFORE USING

This manual should be carefully read by those who have or will have responsibility for use, maintenance or repair of the product.
This product will perform properly only if used, maintained and repaired in accordance with the manufacturer's instructions.

CAUTION

Disconnect the power before removing the sensor. Remove the cover and the sensor from the unit only if the work area is known not to be dangerous.

WARNING

Calibration of all new unit should be checked by exposing the sensors to a known gas concentration before putting the instrument into service. For maximum safety, the accuracy of reading of the Sensotox C2 should be checked every six months.

Contents

1. INTRODUCTION

Sensotox C2 EC uses an electrochemical sensor to detect oxygen and toxic gases. It operates with voltages from 12 to 24 V DC or universal power (110–230V AC). It has both an analogue (4-20 mA) and digital (RS-485, ModBus) output. Sensotox2 is equipped with a housing with display for gas reading, status and alarm relays and a configuration keypad.

Sensotox C2 IR uses a non-dispersive infrared sensor to detect combustible gases, carbon dioxide and other gases. It operates with voltages from 12 to 24 V DC or universal power (110–230V AC). It has both an analogue (4-20 mA) and digital (RS-485, ModBus) output. Sensotox2 is equipped with a housing with display for gas reading, status and alarm relays and a configuration keypad.

Sensotox C2 PID uses a sensor to detect volatile organic compounds (VOCs). It operates with voltages from 12 to 24 V DC or universal power (110–230V AC). It has both an analogue (4-20 mA) and digital (RS-485, ModBus) output. Sensotox2 is equipped with a housing with display for gas reading, status and alarm relays and a configuration keypad.

1.1 TECHNICAL SPECIFICATIONS

Sensotox C2 EC specifications

Size	160 mm x 100 mm x 85 mm
Weight	1.6 kg
Sensor	Electrochemical
Calibration	2 points (zero & span)
IP	IP-54
Power supply	12-24 Vdc, 110-230 Vac
Output	4 – 20 mA RS-485, at 4.8, 9.6 or 19.2 Kb/seg.
Display	7 segments, 4 digits and 6 LEDs
User interface	Three key, non-intrusive access for calibration and adjustment
Temperature	-40 a 60 ˚C
Humidity	0-95% RH (non-condensing)
Pressure	0.9 – 1.1 Atm
Relay contacts	250 V, 2 A normally open

Sensotox C2 IR specifications

Size	160 mm x 100 mm x 85 mm
Weight	1.6 kg
Sensor	NDIR (non-dispersive infrared)
Calibration	2 points
IP	IP-54
Power supply	12-24 Vdc, 110-230 Vac
Output	4 – 20 mA RS-485, at 4.8, 9.6 or 19.2 Kb/seg.
Display	7 segments, 4 digits and 6 LEDs
User interface	Three key, non-intrusive access for calibration and adjustment
Temperature	-40 a 60 ˚C
Humidity	0-95% RH (non-condensing)
Pressure	0.9 – 1.1 Atm
Relay contacts	250 V, 2 A normally open

Sensotox C2 PID specifications

Size	160 mm x 100 mm x 85 mm
Weight	1.6 kg
Sensor	Photoionization
Calibration	2 points
IP	IP-54
Power supply	12-24 Vdc, 110-230 Vac
Output	4 – 20 mA RS-485, at 4.8, 9.6 or 19.2 Kb/seg.
Display	7 segments, 4 digits and 6 LEDs
User interface	Three key, non-intrusive access for calibration and adjustment
Temperature	-40 a 60 ˚C
Humidity	0-95% RH (non-condensing)
Pressure	0.9 – 1.1 Atm
Relay contacts	250 V, 2 A normally open

2. OPERATION

The calibration of all new instruments acquired from Sensotran should be checked by exposing the sensor to a known concentration of gas before the instrument is put into service. For maximum safety, accuracy should be verified by exposing the sensor to a known concentration of gas over a period.

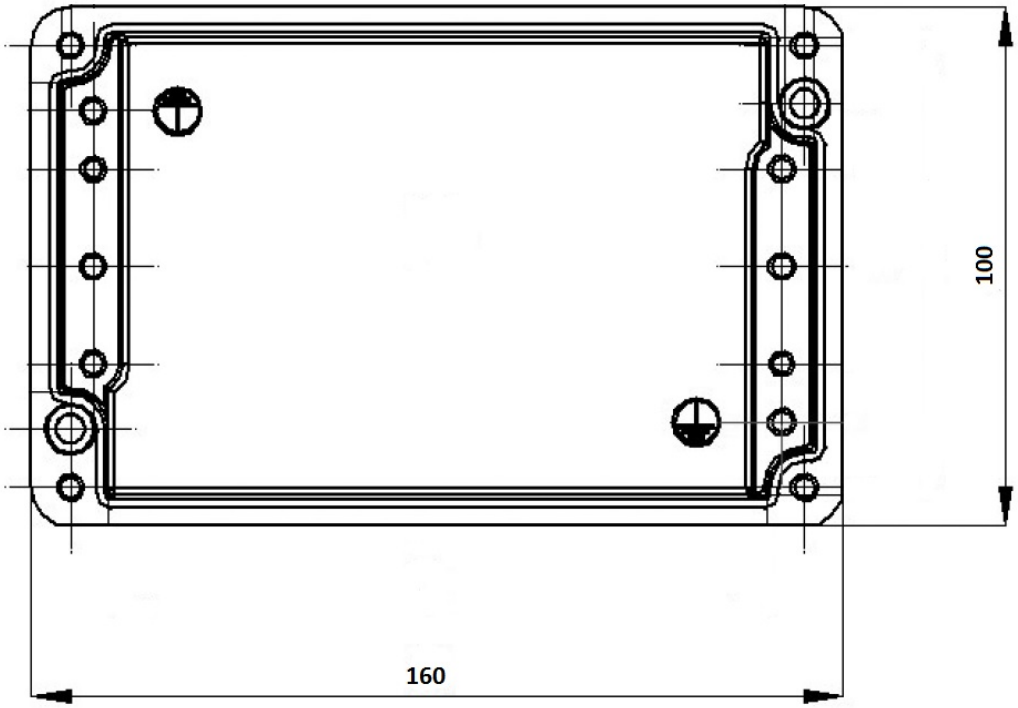
Calibration should be checked daily during the initial period of use to ensure that there are no components in the environment that contaminate the sensor.

Check the calibration with a known gas concentration before use. Recalibrate if the error is excessive.

Prior to shipment, the Sensotox C2 has been calibrated and verified using standard gas. However, the user should check the operation before first use. Once the unit has been installed, leave it running for 24 hours and check it with gas.

2.1 Physical Description

The design of Sensotox C2 makes it easy to place and connect at a fixed location to monitor gas.



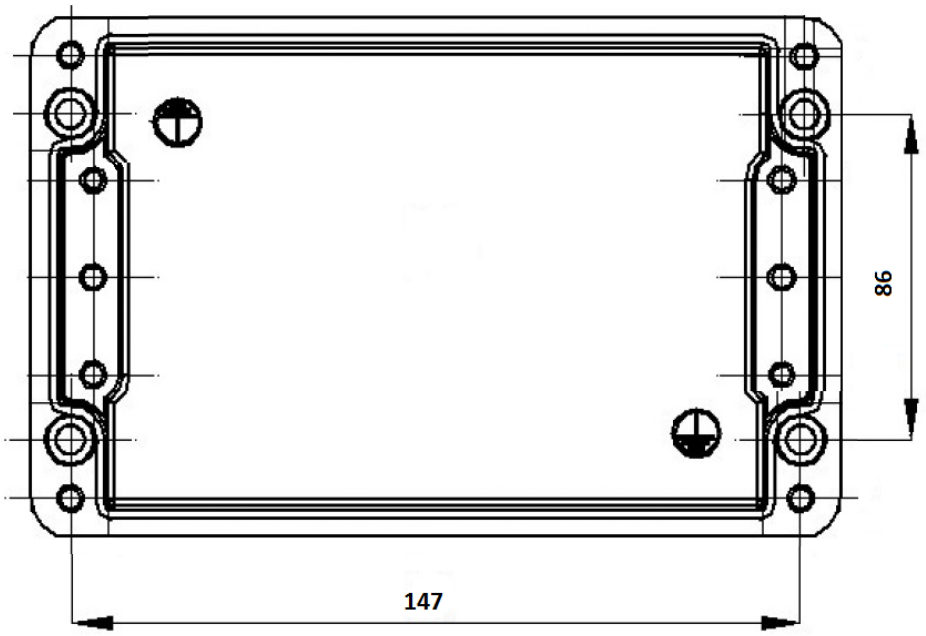
2.2 Installation

ATTENTION

1. **To prevent ignition in explosive atmospheres, the area must be free of flammable gases and the power supply to the detector must be disconnected before opening the cover.**

2.2.1 Installing

Make 2 holes in the mounting surface 126 mm apart.

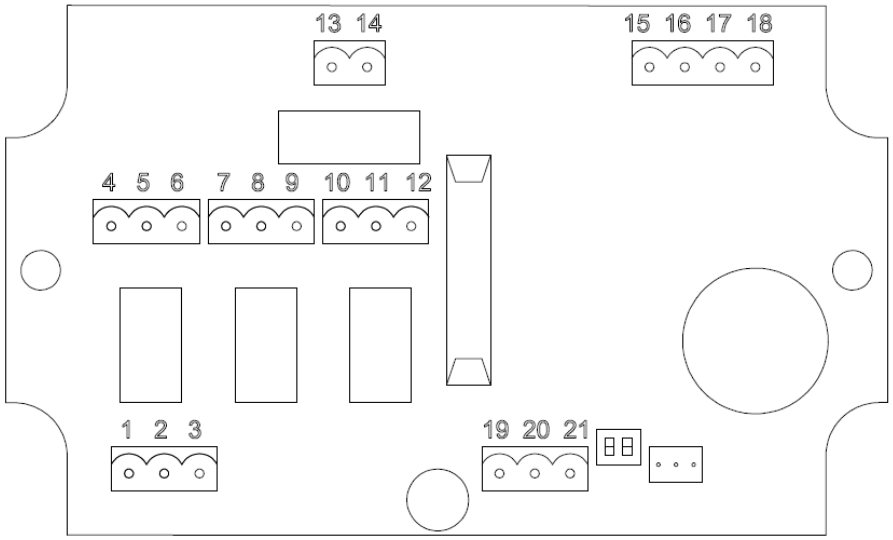


2.2.2 Uninstalling

Before dismantling, make sure that power is disconnected.

1. Unscrew the 4 screws on the lid, remove the lid, and the display flat cable connector.
2. Disconnect the power connectors and communication/relay connectors.
3. Disconnect the sensor connector.
4. Unscrew the 2 main board screws.
5. Remove the main board.
6. Unscrew the sensor.

2.2.3 Wiring



1	Earth	12	Fault Relay (common)
2	Power Supply 110/230 Vac	13	Auxiliary supply (12-24Vdc)
3	Power Supply 110/230 Vac	14	Auxiliary supply (12-24Vdc)
4	Alarm Relay 1 (n/c)	15	RS485A
5	Alarm Relay 1 (n/o)	16	RS485B
6	Alarm Relay 1 (common)	17	4/20 mA (Signal)
7	Alarm Relay 2 (n/c)	18	4/20 mA (common)
8	Alarm Relay 2 (n/o)	19	Sensor PS
9	Alarm Relay 2 (common)	20	4/20 mA In (Common)
10	Fault Relay (n/c)	21	4/20 mA In (Signal)
11	Fault Relay (n/o)		

2.2.4 Installing the unit

1. Fit the connectors into their respective locations. Leave an extra cable length to allow mounting on the wall.
2. Plug the display flat cable.
3. Place the cover.

3 DISPLAY & USER INTERFACE

3.1 User interface

All the Sensotox C2 are equipped with four status LEDs, a four-digit LCD display and three mechanical keys [+], [MODE] and [-].

3.2 Starting up the unit

Detectors require a start-up time that depends on the built-in sensor. “Init” is displayed on the, alternating with a countdown. When the count reaches zero, the detector is operative.

The analogue output current is 2 mA during the start-up time. After the initialization time is over, and if there is no error condition, the 4/20 mA analogue current output will be proportional to the sensor reading.

3.3 Display readout

Once the detector enters reading mode, it begins an automatic check for possible errors and alarm conditions. If there is no error condition and there is no alarm, then the green LED "Ok" is activated and the gas concentration is displayed. If an error appears, the "FAIL" LED and error message flash. Each alarm condition has its corresponding LED.

3.4 Alarm contacts

The alarm contacts or alarm relays can be used to activate sirens or alarms. External alarms have normally open contacts which close when there is an alarm.

	External alarm	**LED**	**LCD**	**Analogue output**
Exceeds the low alarm threshold	Alarm ALM1	Low	Reading	Proportional to reading
Exceeds the high alarm threshold	Alarm ALM1	High	Reading	Proportional to reading
Out of range	Alarm ALM2	High	8888	22 mA
Calibration fault	Alarm ALM2	Fault	E003 flashing	2 mA
Sensor drift	Alarm ALM2	Fault	E004 flashing	2 mA
ADC saturated	Alarm ALM2	Fault	E005 flashing	2 mA

4 CALIBRATION

ATTENTION

The calibration of all unit purchased from Sensotran should be tested by exposing the sensor to a known concentration of gas before putting the instrument into service. For maximum safety, the accuracy of Sensotox C2 should be checked by exposing the sensor to a known concentration of gas over a period of time

Sensotox C2 units are calibrated using a two-point calibration process. First, use the "Zero calibration", then the "SPAN calibration" exposing the sensor to a standard gas concentration to establish the second calibration point.

Note: "Zero calibration" must be carried out before "Span Calibration".

The calibration requires a zero cylinder, a Span cylinder, and a calibration adapter.

I – Zero Calibration

1. Ensure that the area where the detector is located is free of flammable gases or gases that interfere with the sensor reading. If you suspect that the atmosphere is not clean, use a zero gas

such as Nitrogen 5.0 Enter to Calibration Menu by pressing [MODE] twice. “Zero” message will be displayed.

Note: Press [MODE] to bypass and continue to Span calibration.

Press [-] to return to Reading display.

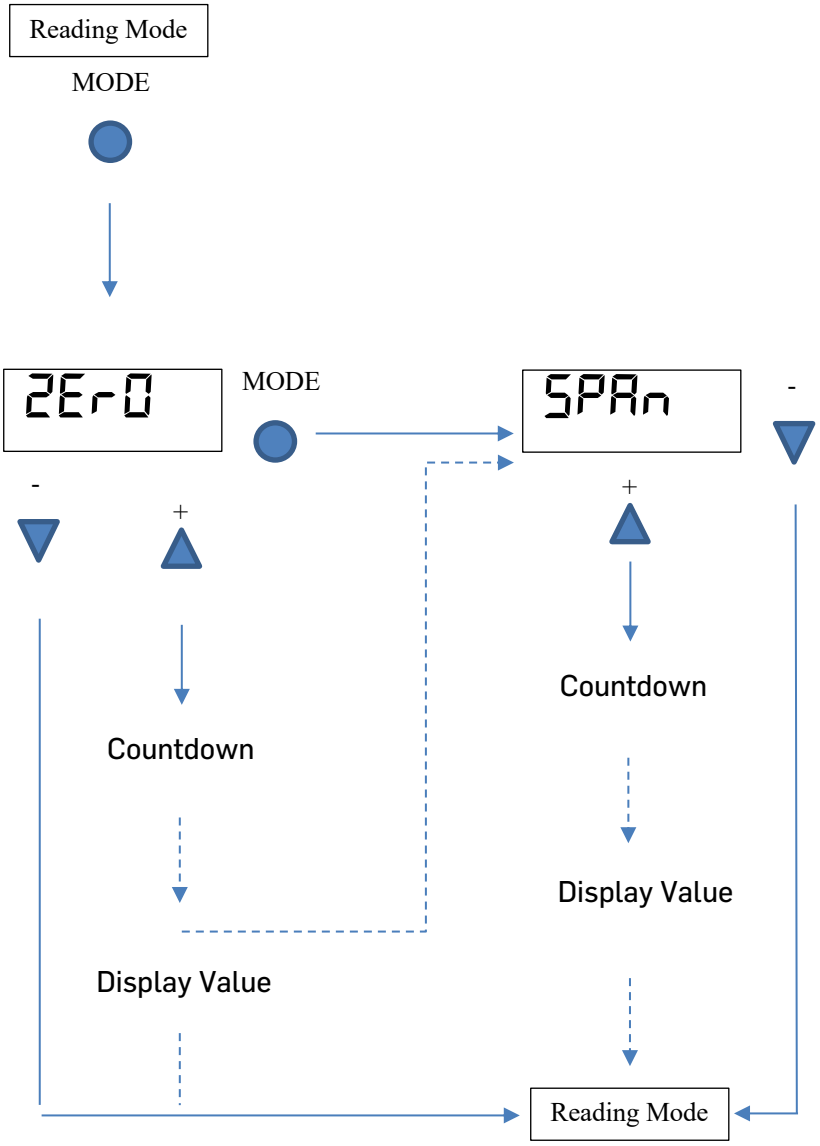
2. In an atmosphere with contaminants, connect the Fresh Air calibration cylinder to the sensor head of the Sensotox C2 using the calibration adapter and apply gas flow.
3. Press [+] to start calibration. The Zero LED will lights up and “Zero” message will be displayed alternatively with a countdown.

   Tip: Before countdown will finish, you can cancel calibration by pressing any key.
4. Once the countdown reaches zero, the "Zero" LED turns off and the Zero calibration data is saved.

   Note: The device returns to display reading after 60 seconds of inactivity.

   When Zero Calibration will be finished, instrument will advance to Span Calibration.

   When finished, program will go to Span Calibration.


Reading Mode
MODE
2Er0
MODE
SPAn
-
+
+
-
Countdown
Countdown
Display Value
Display Value
Reading Mode

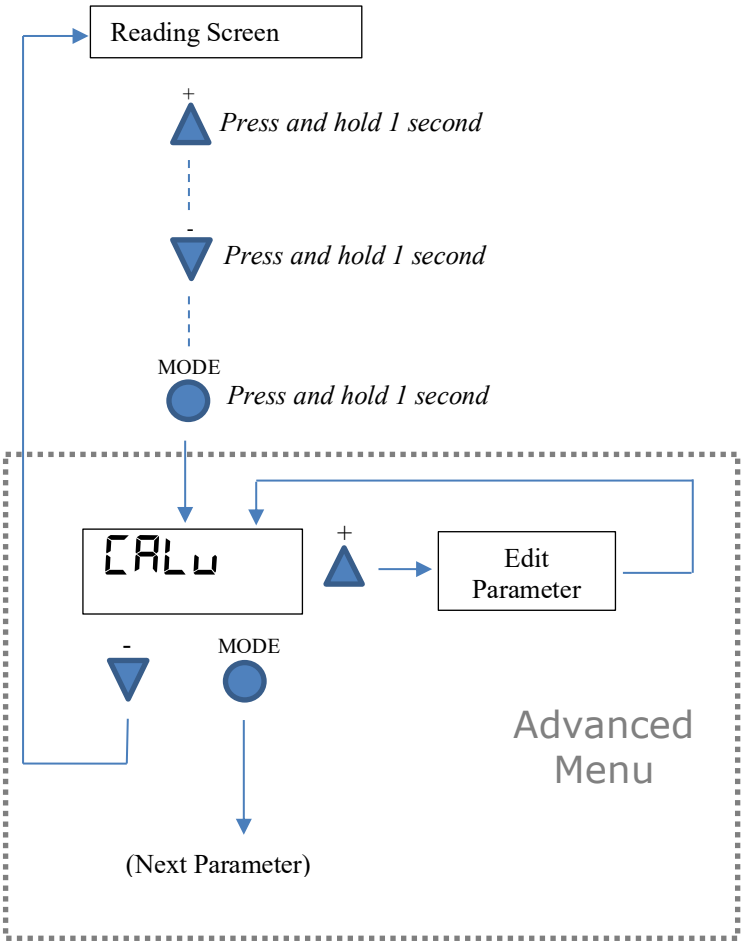
II - Span calibration

1. Connect the SPAN calibration cylinder to the sensor Sensotox C2 head using the calibration adapter and applying a flow of gas.
   Tip: To access Span Calibration from reading display, press [MODE]. When "ZErO" appears, press [MODE] again to go to "Span".
2. Press [+] to start calibration. "Span" LED will light up and "SPAn" will be displayed alternatively with a countdown. Wait for the countdown to be completed for the full calibration.
   Tip: Calibration can be cancelled by pressing any key.
3. When countdown will be completed, LED and "SPAn" disappears, and calibration data will be saved. If the sensor does not have sensitivity enough for being calibrated, "FAIL" and "SPAn" messages will be displayed alternatively; that can suggest than sensor needs to be replaced.
4. To quit the Menu and return to actual reading screen, press [+]. If not, the instrument will return automatically to actual reading screen after a short period.
5. Close the gas valve.

5 ADVANCED MENU

Sensotox C2 Advanced Menu let you modify several configuration parameters. To access the Advanced Menu, press the sequence [+], [-] and [MODE]. Display will show then CALu .

- Pressing [MODE] will move to the next function.
- Pressing [+] will enter into the setting and show the actual value.
- Pressing [-] will leave the Advanced Menu.



After 60 seconds without activity, detector returns to actual reading screen.

Advanced Menu

Display	Setting
CALu	Span Calibration value
FC	Correction Factor (VOC only)
LO	Low Alarm
HI	Hi Alarm
Id	Instrument ID
bAUd	Transmission Speed (19200, 9600 or 4800)
LitE	Backlight
Aout	Analog output (4 / 20 mA)

- To modify a setting, press [MODE] until desired value appears.
- Press [+] to enter into the setting.
- Press [+] to increase/change the value.
- Press [-] to decrease/change the value.
- When finished, press [MODE].

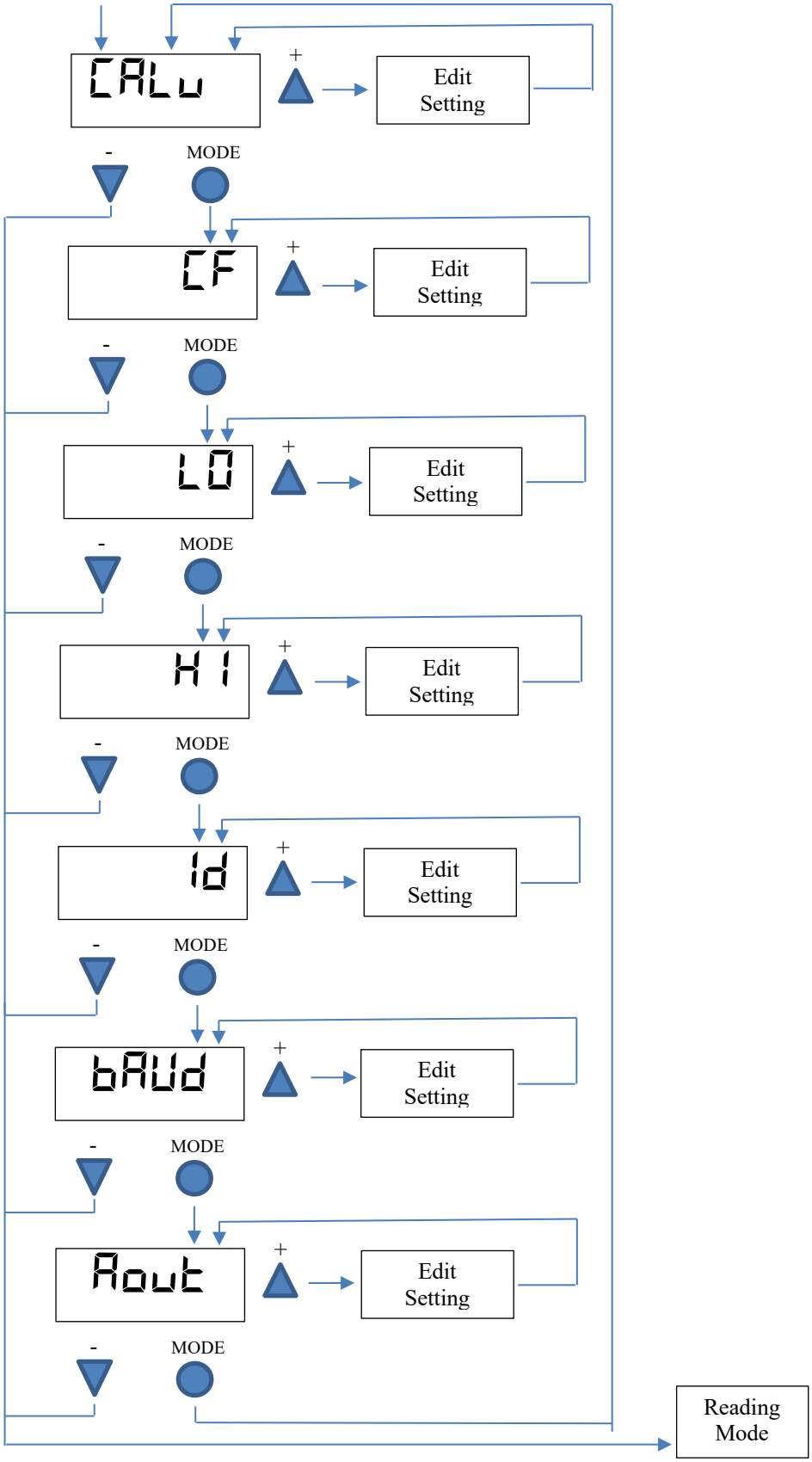
If the setting has been modified, new value will blink.

- Press [-] or [MODE] to dismiss modifications and go to next setting.
- Press [+] to save changes.

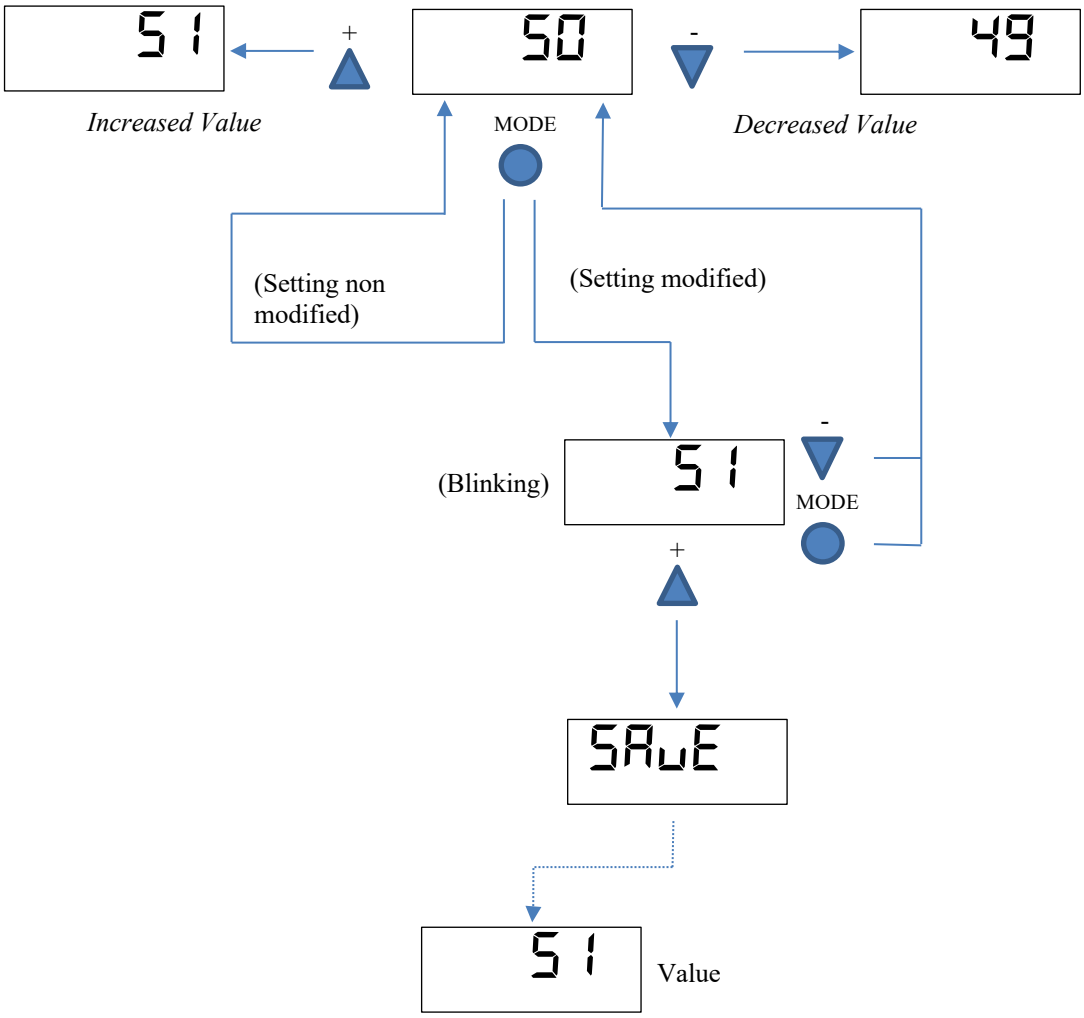
"SAvE" will be displayed to confirm changes have been stored.

Pressing [MODE] will circulate over next option. To edit a value, press [+] and display will show the actual setting for the parameter.

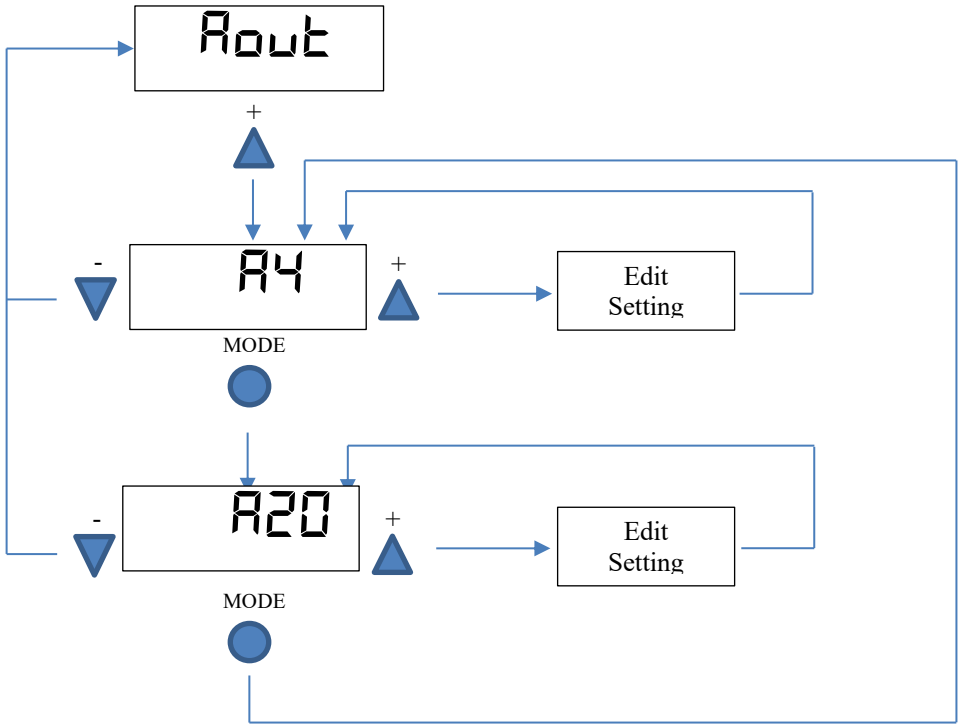
You can exit anytime from Advanced Menu by pressing [-]. If any key press is detected for 60 seconds, system will return to Reading Mode.


CALu
Edit Setting
MODE
CF
Edit Setting
MODE
LO
Edit Setting
MODE
H1
Edit Setting
MODE
Id
Edit Setting
MODE
bAUd
Edit Setting
MODE
Aout
Edit Setting
MODE
Reading Mode

How to edit and modify Settings.



4-20 mA Analogue Output adjustment.



6 TROUBLESHOOTING

Error	Description and solution
E003	**Description**: Calibration error **Solution**: Make sure there is gas flow circulation and repeat calibration. If still fails, replace the sensor.
E004	**Description**: Zero Drift **Solution**: Make sure sensor is in a clean ambient or alternatively, use Nitrogen to do zero calibration.
E005	**Description**: Sensor Over range **Solution**: Call an Authorized Service Center.
E006	**Description**: Wiring Error **Solution**: Verify wiring
E007	**Description**: EEPROM Error **Solution**: Replace main board. Call an Authorized Service Centre.

7 MODBUS/RS-485

Retrieving gas concentration data from Sensotox C2 through RS-485. The Sensotox C2 communicates by means of MODBUS RTU. All monitors provide 4-byte register value. Gas concentration is the only value that can be retrieved.

As example 34 hex = 52 decimal.

1. **Communication Setting**

   Transmission Mode: RTU

   Controller: PC or GasVisor Controller.

Baud Rate: 4800, 9600, 19200 bps.

Client ID: 1 to 32

2. Message Frame/Communication Procedure

Sensotox C2 only support function code 0x03 (read holding registers), which only supports the “Get Reading Value” from the detector.

Requesting Message:

Device Address	**Function Code**	**Register Address High Byte**	**Register Address Low Byte**	**Quantity of Registers High Byte**	**Quantity of Registers Low Byte**	**CRC Low Byte**	**CRC High Byte**
Client ID	03	00	02	00	02	CRC	CRC

Answering Message:

Device Address	**Function Code**	**Byte Count**	**Register Value**				**CRC Low Byte**	**CRC High Byte**
Client ID	03	04	Reading byte 4	Reading byte 3	Reading byte 2	Reading byte 1	CRC	CRC

Note: Detector data length is 4 bytes.

Example:

Request: 01 03 00 02 00 02 CRC CRC

Answer: 01 03 04 **00 00 00 3A** 7A 20

Note: The maximum distance should be less than 1 Km when using a 1.5 mm^2 cable.

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