



Dansensor® **ISM-3**

User Manual **EN**

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Dansensor®
ISM-3
User Manual

EN

Published by:



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1. Introduction

Dansensor® ISM-3 is an oxygen analyser which measures the concentration of oxygen (O₂) in a gas mixture.

The measured O₂ concentration is shown in a large, easy readable display.

ISM-3 can via a simple menu structure be programmed to give alarm in case of a too high or too low O₂ concentration. Besides that an alarm is given in case of insufficient flow of measuring gas, or in case of other faults in the **ISM-3**.

ISM-3 is equipped with a relay for alarm in case of too high/low O₂ concentration, insufficient measuring gas flow or other vital faults.⁴⁰

ISM-3 is specially developed for being incorporated/mounted on nitrogen generators etc. where the control of the O₂ concentration is a vital part of the process.



Fig. 1. ISM-3 Analyser for incorporation



Fig. 2. ISM-3 Analyser designed for retrofitting

The following makes **ISM-3** a unique O₂ analyser:

- Precise and quick measuring
- Covers all measuring ranges from 100% to 0ppm with automatic range shift
- Optional external control of measuring
- Long term stable sensor - long intervals without calibration
- Automatic control of measuring gas flow
- Programmable current outlet/voltage outlet (extra accessories) 0/4-20mA/0/2-10 Volt with galvanic separation
- 2 alarm limits programmable for O₂ content
- Calibration with up to 4 calibration gases plus atmospheric air (20.946% O₂)
- Supplied as stand-alone or for incorporation.

ISM-3 is specifically built for measuring on clean dry gases and gas mixtures where a great measuring precision, reliability and long term stability and alarm control of flow and content of oxygen are required.

As examples of application the following areas can be mentioned:

- Control of gas
- Atmospheric control under industrial or laboratory conditions
- Control of gas mixtures
- Environmental measurements
- Measuring of oxygen within the chemical, metallurgical and medical industry and research

2. Safety precautions

Read and understand this manual for your own safety's sake and for the quality of the work carried out using this equipment.

The following terms are used:

"DANGER"	to designate a condition which MAY involve mortal danger of serious injury
"CAUTION"	to designate a condition which MAY involve serious injury
"NOTE"	to designate a condition which MAY involve faulty operation of the equipment thus causing fault measuring results

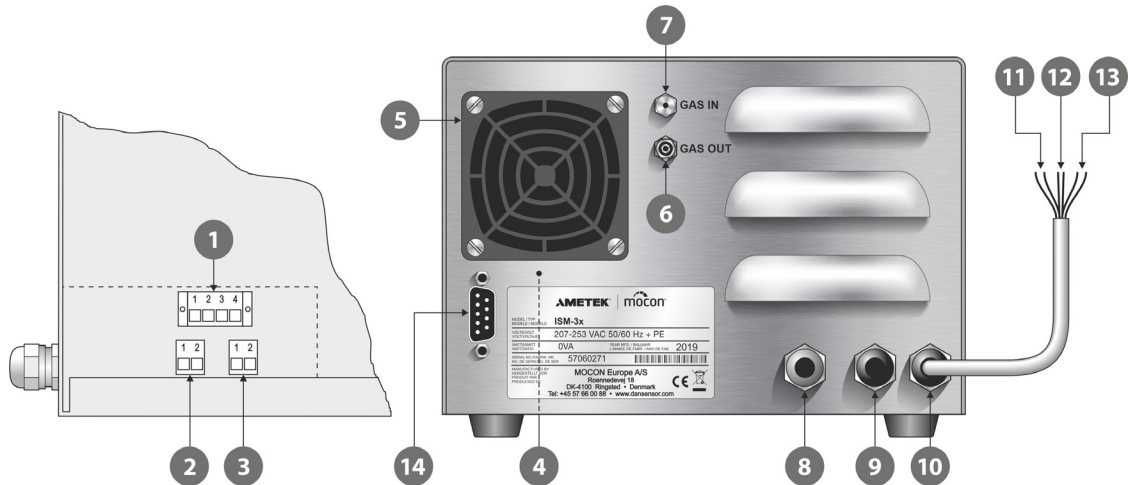
Follow the below instructions carefully:

DANGER:	Opening ISM-3 may involve mortal danger or serious injury as live high-voltage leads may be exposed. By opening the ISM-3, the mains supply must always be switched off. By connecting the net ground must always be connected.
CAUTION:	<p>If ISM-3 is moved or transported, make sure it is not exposed to shocks or impact.</p> <p>Only use water or a mild soap lather to clean the front panel.</p> <p>Always make sure that there is at least 5 cm of free air behind the ventilation holes on the back of ISM-3.</p> <p>Our warranty does not cover unless the above instruction is strictly adhered to.</p>
NOTE:	Always install a hose on the "GAS OUT" connection and make sure that the measuring gas is transported away from the ISM-3, as the surrounding atmospheric air is used as reference. In order to observe the CE's EMC regulation all connections to the ISM-3 (not mains connections) must be protected. The screen must end in a PG sleeve on the back of ISM-3.

Recommendations

- In order to prolong the life of the analyser it is recommended to let ISM-3 be constantly connected to the mains voltage.
- Every 6 months it is recommended to control ISM-3's calibrations by measuring on gases with known content of O₂.
- Recommended control - and calibration interval is 12 months.

3. Connection



- 1 ST1: Gas alarm and system alarm output. Relay connection. Max. 48V, 1A
pin 1: Common terminal (COMMON)
pin 2: Contact set with switch on function (normally connected) (N.C.)
pin 3: Contact set with switch on functions (normally open) (N.O.)
pin 4: Not connected
- 2 ST2: Connection to current output/voltage output
pin 1: +0/4 to 20mA (0/2-10Volt)
pin 2: -/GND
- 3 ST3: Connection for measuring control signal
pin 1: +10 to 32VDC
pin 2: -/GND
- 4 Fuse 0.63 AT (1.6 AT at 115V AC). Placed inside.
- 5 Fan
- 6 GAS OUT
- 7 GAS IN (For ISM-3 without a build-in pump, 2 - 10 bar is labelled upon request)
- 8 Cable inlet for mains connection
- 9 Cable inlet for display cable (only for model for incorporation)
- 10 Cable inlet for signal cable. The cable is internally connected to ST1, ST2 and ST3.
- 11 Current output/voltage output. Yellow (+)/Green (-)
- 12 Alarm relay output. Switch is open in case of an alarm. Grey/Pink
- 13 Measuring control input signal (10 to 32 VDC). Brown (+)/White (-)
- 14 RS232C serial communication port (for internal use only)

4. Operation

ISM-3 is equipped with four keys and a large LED display for indication of the O₂ concentration.

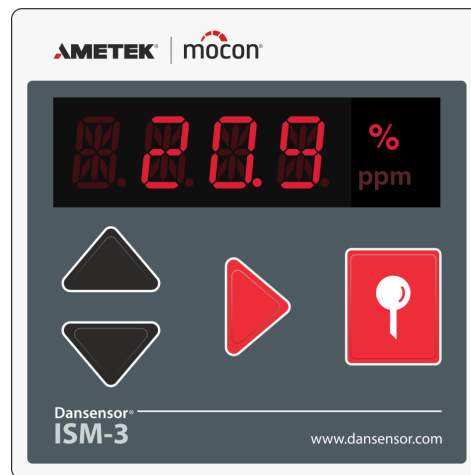


Fig. 3. ISM-3 operation panel

Start up

ISM-3 starts up with a self-test lasting about 10 seconds. After the self-test the heating which takes 10 minutes begins. If ISM-3 only has been switched off shortly the heating time is reduced. Minimum heating time is 2 minutes.

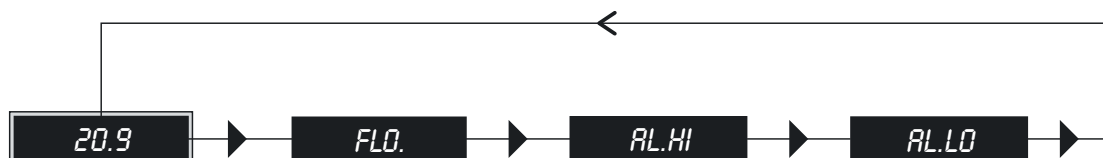
The rest of the heating time in minutes is indicated in the display as *H 10* (H for heating). When the time is counted down to zero the ISM-3 is ready. After 10 minutes ISM-3 has a read-out difference of max 3% of the read value. It takes the total heating time of 20 minutes until the read-out difference is below the specified 1% for the shown value.

If the measuring had been activated when the ISM-3 was switched off, the measuring is automatically started when ISM-3 is turned on. If an external measuring control has been chosen, the measuring will start when the measuring control signal is set to ON.

General use of buttons




The functions of the single buttons are only activated when you release the button. When a parameter is displayed, first the parameter name appears, for example *FLO* for flow *AL.HI* for high oxygen alarm etc. for about 1 second. Then the actual value is displayed.



With the ► button it is easy to scroll between *FLO*, *AL.HI*. and *AL.LO* and return to the output of the actual O₂ (20.9)





No matter which parameter is currently displayed, the device automatically returns to display the actual O₂ when there has been no activation of any button for about 5 seconds (the sensor flow can be read constantly. See "*Indication of sensor flow*" on page 13.

Start and stop of measuring

In the set-up menu it is selected whether the measuring is controlled via the  button, via external pump control signal, button as well as external control signal or if the measuring is always activated. If only an external control of measuring has been chosen or the measuring is always activated, the button  is inactive. If either of the two other set-up possibilities has been chosen, the measuring can be started and stopped using the button .

1. Press  and the measuring starts. As soon as the measuring has started, the measured O₂ concentration is read out on the display.
2. Press  again and the measuring stops and the displays turns off (only % will be lit).

External/manual start and stop of measuring

If an external and manual control of measuring has been chosen in the set-up menu, the measuring will start when the external measuring control signal is set to ON and stop when the signal is set to OFF. It is only when the external control signal is changing condition that the measuring starts/stops. Every time the  key is pressed the conditions change, meaning that if the measuring has been started by the external control signal the measuring stops when  is activated. Now measuring can only be started by the external signal if signal is set to OFF and the ON again.

Set-up of alarm limits

ISM-3 has two programmable alarm limits, *AL.HI* (high oxygen alarm) and *AL.LO* (low oxygen alarm).

In case of measurements above or below the alarm limits the relay is activated.

In order to change one of the alarm limits, the following procedure must be followed:

1. Press **▶** 2 or 3 times depending on whether it is a high alarm or a low alarm which must be changed.
2. The alarm value is displayed. Press and hold the **▶** button for 3 seconds in order to change the alarm.
3. With **▲** and **▼** it is possible to switch between % and ppm.
After choosing % or ppm press **▶** and the first digit will flash.
4. Use **▲** and **▼** to set the flashing digit.
5. Press **▶** in order to set the next digit.
6. When the last digit has been set, press the button **▶** to store the value.
The set alarm limit is active immediately.

Indication of sensor flow

1. Press **▶** and *FLD.* will appear in the display followed by an indication of the sensor flow in ml/min.
2. If you wish to continuously display the flow, press and hold the **▶** button for 3 sec. while the flow is displayed. After about 3 seconds the display will flash shortly.
3. The gas flow value will be displayed until the **▶** button is activated again.

Flow alarm

A flow alarm appears if the indicated flow is below or above the min. and max. values as set in the set-up menu. In case of a flow alarm, display will change in 2 secs. turns between *FL.ER* and *O₂* value until the flow error stops. The relay is activated for min. 4 seconds independently of the duration of the alarm.

The flow alarm has a higher priority than the oxygen alarms. If a flow alarm and an oxygen alarm occurs at the same time, only the flow alarm appears in the display.

Current output/voltage output

ISM-3 is equipped with a current output.

The current output is configured in the set-up (*SET.*) menu by means of the *CU.0*, *CU.4* and *CU.20* parameters and can be set to the ranges 0-20mA or 4-20mA/0-10V or 2-10V respectively.

The output is configured as a current output from the factory, but it can be converted to a voltage output by mounting the supplied resistor between the output terminals (see the instruction that comes with the resistor).

Sub menus

ISM-3 is equipped with 3 sub menus as shown in Fig. 4.

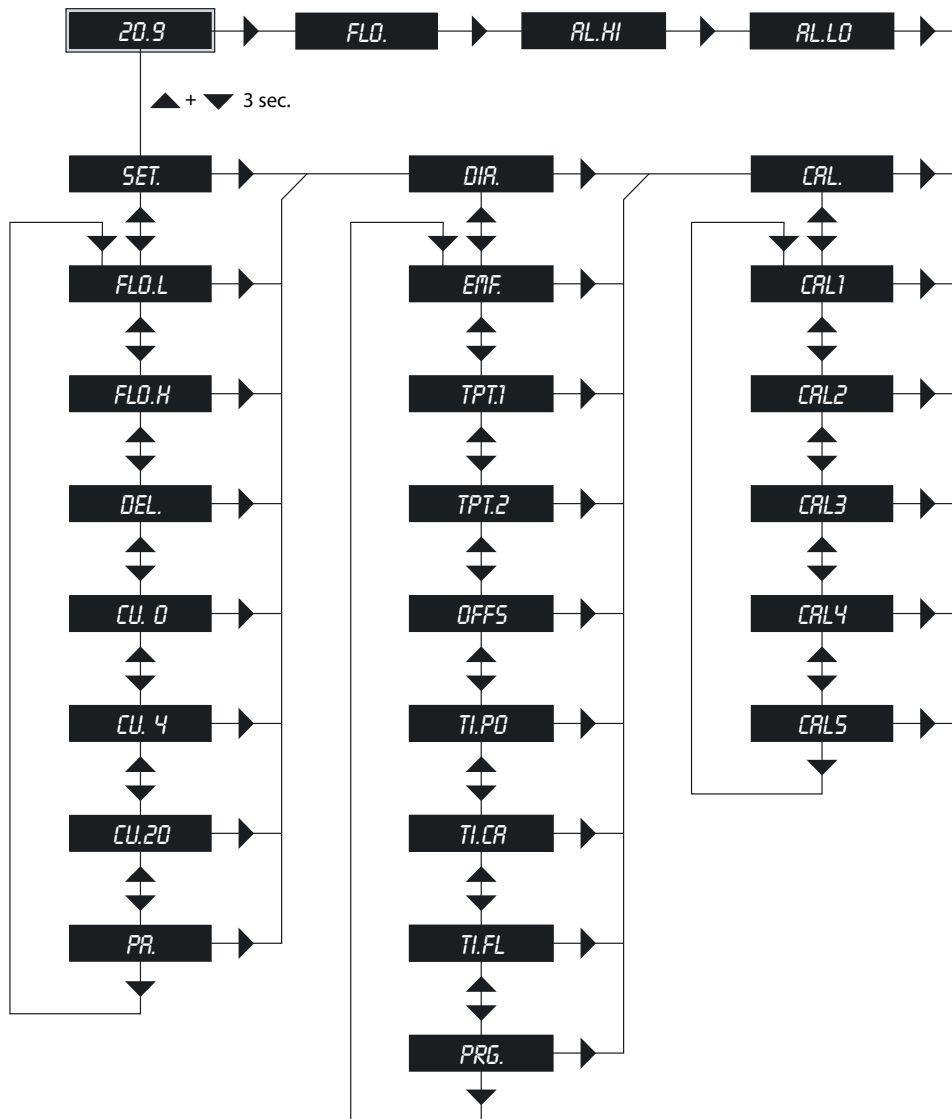


Fig. 4. ISM-3 sub menus

- Press and hold ▲ and ▼ simultaneously for 3 seconds (ISM-3 must not be in a sub menu).
- Now you have access to the 3 sub menus:
 - Set-up menu (SET.)
 - Diagnostic menu (DIR.)
 - Calibration menu (CAL.)
 No matter which menu you are in, the device will return to display the actual O₂ when no key has been activated for about 20 seconds.
 The parameters in the diagnostic menu can be set to permanent readout.
- Use ► to display the next sub menu.

The setup menu SET.

1. Press ▼ when SET. appears on the display.
2. Use ▲ and ▼ to set required value.
3. Press and hold ► for 3 seconds to change the value. (for typing in values, see "Set-up of alarm limits" on page 13).

• FLO.L	100	Flow alarm limit. Alarm limit for min. flow in ml/min.
• FLO.H	150	Flow alarm limit. Alarm limit for max. flow in ml/min.
• DEL.	3	Gas flushing time in seconds before activation of alarms. Valid area 0 to 250.
• CU.0	----	O ₂ value which must correspond to 0mA (0 V)
• CU.4	0%	O ₂ value which must correspond to 4mA (2 V)
• CU.20	10%	O ₂ value which must correspond to 20mA/10V
• PR.	1001	Setting up of options, relay function and external measurement control.

When typing in values for FLO.L and FLO.H, error ER.1 appears, if FLO.L is set to a higher value than FLO.H.

Only one of the parameters CU.0 and CU.4 can be set, the other one is displayed as "----". If identical values are entered for the 0 and 20mA or the 4 and 20 mA values, error code ER. 1 will be displayed.

Diagnostic menu DIR.

1. Press ▼ when DIR. appears in the display.
2. Use ▲ and ▼ to set required value. For a permanent readout of the chosen value press and hold ► for about 3 seconds. The value will now be displayed until you press ►, ▼ or ▲ again.

• EMF.	165.0	Present sensor EMF in mV.
• TPT.1	33	Present internal ISM-3 temperature in °C.
• TPT.2	0	Present difference in heater temperature in °C. Difference between present temperature and ideal temperature.
• OFFS	-0.12	Sensor offset. Result of latest off set adjustment in mV.
• TI.PO	1234	Hour counter in number of 10 hours. Number of hours in which ISM-3 has been switched on.
• TI.CR	678	Hour counter in numbers of 10 hours. Number of hours since the last calibration of ISM-3.
• TI.FL	983	Hour counter in number of 10 hours. Number of hours in which the flow has passed through the sensor (flow >30ml/min).
• PRG.	1.0	Installed program version.

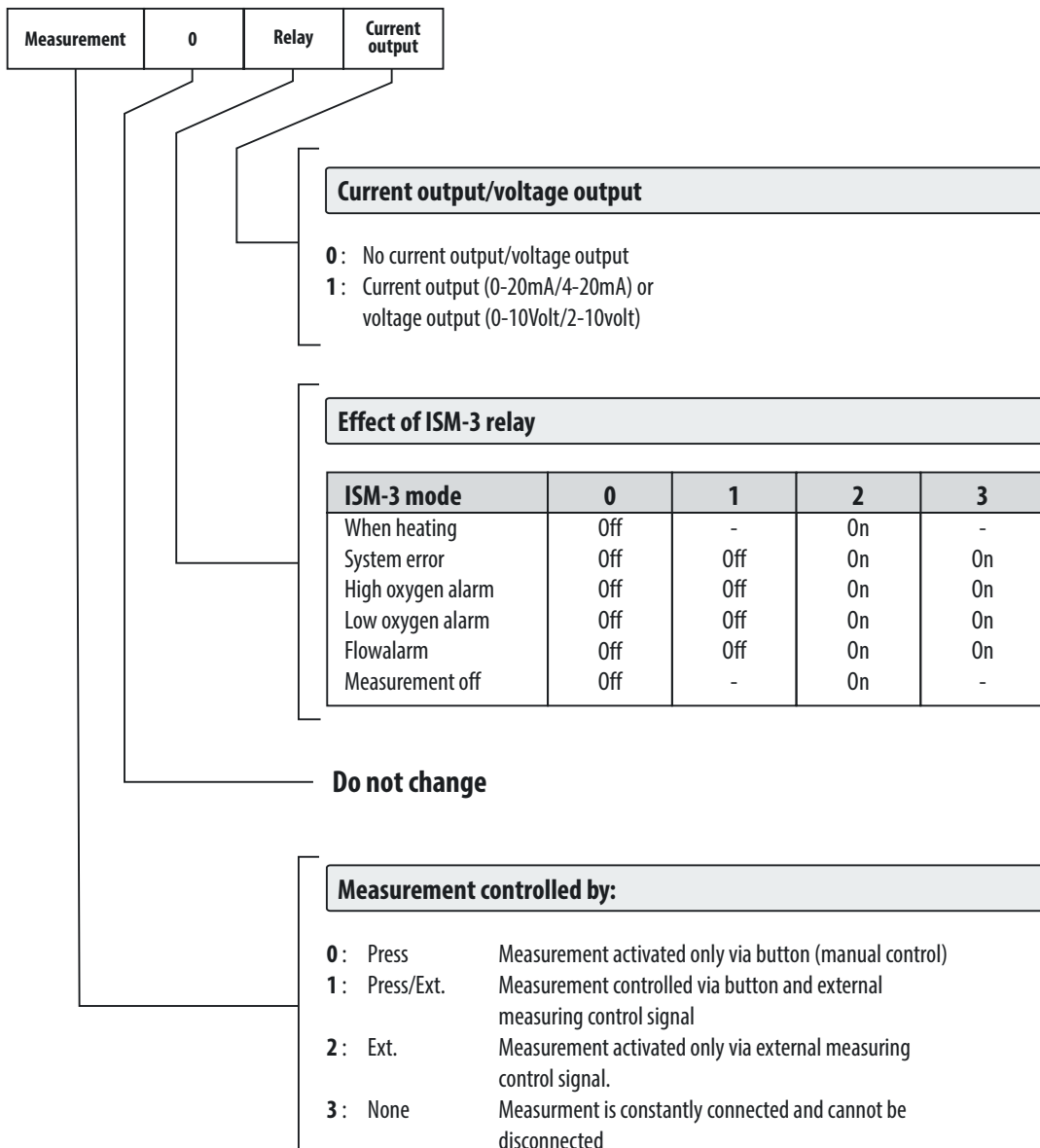
Calibration menu CAL.

See the chapter about calibration.

Setting up of options, relay and external measurement control

In the set-up menu the *PR* parameter is defined as follows:

- The first digit (from the left) determines from where and how the measurement can be started and stopped.
- The second digit must be 0 and is reserved for future use.
- The third digit determines how the relay works.
- The last digit indicates if there has been installed options as current output/ voltage output.



5. Maintenance

ISM-3 requires for a minimum of maintenance and as the oxygen-sensor itself is very long term stable, no calibration of the analyser in a normal application situation is needed between the obligatory 12 months service control intervals.

See "*Recommendations*" on page 7 for details.

If ISM-3 is installed in places with more dust than normal, it may be necessary to change the cooling air filter between the obligatory 12 months service control intervals.

When cleaning the front panel, use only water or a mild soap lather.

6. Calibration

Besides atmospheric air, you can calibrate with up to 4 calibration gases. If an offset adjustment has been made after the last calibration, a calibration of ISM-3 must always be started from the beginning again, meaning that calibration with 20.946% O₂ must be carried out initially. If an off set adjustment has been made and calibration is attempted with another gas than 20.946% O₂ the error message *ER.B* will appear (cannot calibrate after the offset adjustment).

When calibrating with 20.946% O₂ the result is compared with the latest 20.946% O₂ calibration. All other calibrations are adjusted using the difference between the new and the preceding 20.946% O₂ calibration. If an offset adjustment has been carried out, it is reset. After the calibration with 20.946% O₂, calibration must be performed with the selected calibration gases. See below.

The device is factory calibrated by default to perform O₂ measurements in the range of 20.9% to 1ppm using calibration gasses of 20.9%, 1%, 1000ppm, 100ppm, and 25ppm respectively.

If you want to measure on gasses up to 100%, the device must be re-calibrated with a gas of min. 80% O₂ replacing the 25ppm calibration.



New measuring range of the device will hereafter be 100% - 100ppm.

If you want to measure on gasses below 20.9% O₂ we recommend that you calibrate the device with minimum 2 gases (besides 20.9%), one above and one below the range in which you want to measure.

Calibration

NOTE! ISM-3 must warm up for at least 1 hour before making the calibration.

The following procedure must be used in order to calibrate ISM-3:

1. Before the calibration is started, it must be assured that the measurement can be started via the  button and that the measurement cannot be started/ stopped via an external measurement control signal during the calibration. You can choose manual start/stop measurement alone, by setting the first digit in the *PR* parameter in the set-up menu to "0 - - -". Make a note of the setting before making the change.
2. If ISM-3 is not equipped with an internal pump: Connect the calibration gas to gas in and adjust the input pressure in order to produce a flow of 125±5ml/min.
If ISM-3 is equipped with an internal pump: Establish a gas overflow of approx. 0.5 l/min (hose with inner diameter of min. 3 mm) and let ISM-3 suck the calibration gas from here. See illustration on [page 28](#) for details.
3. Start the measurement with .
4. Let ISM-3 measure on the gas for at least 4 minutes. When calibrating with gases of less than 1000ppm it is recommended to measure for about 10 minutes. Then check that the output of O₂ in the display is stable for about 1 minute before carrying out the calibration. When the output is stable check that the output O₂ value corresponds to or is very close to the analysis value of the calibration gas. If this is not the case, check for leaks in the measurement gas hose and for a sufficient gas supply pressure.

5. Go to the calibration menu.
 - Press and hold the buttons ▲ and ▼ about 3 seconds until display shows *SET*.
 - Press ► twice and the calibration menu *CAL* is shown.
6. Press ▼ and the value for the first calibration gas *CAL1* will appear. The calibration gas number 1 is reserved for calibration with 20.946% O₂ (atmospheric air) and cannot be changed. In case of calibration with 20.946% O₂ choose this field. If the calibration gas is different from 20.946% O₂, press ▼ button until an empty field appears (a field for the readout of 0ppm) or a field with an old calibration.
Type in the gas concentration - see item 2 to 6 in "*Set-up of alarm limits*" on page 13.
7. Press ► and ? simultaneously to start the actual the calibration.
The display will then flash *CAL* for about 10 seconds while performing the calibration.
Following the calibration result is displayed. Press ? and the related EMF value in mV is displayed. If calibration with the current gas has not taken place the display shows "----".
8. Press ► in order to return to the normal display of O₂. Repeat level 2 to 8 for each calibration gas.
9. Set *PA* to the original value.

Offset adjustment

By changing the measurement set-up (flow, pressure etc.) an offset adjustment might be necessary. This has to be carried out from the main menu.

Add atmospheric air to the analyser. When a stable O₂ value is displayed, the offset adjustment is started by pressing ► + ? simultaneously. The display will then flash *OFFS* for about 5 to 10 seconds while performing the offset adjustment.

7. Error indication/error correction

In the ISM-3 all error indications are presented as *ER.XX* where *XX* is a specific error number. The error numbers are grouped in the following way.

Error number range	Description
1 - 9	User error. The value entered is not within the valid range, etc.
30 - 31	Possible hardware error. Mains supply line failure signal error.
32 - 34	When ISM-3 is switched on all set-up values are read from the Flash memory. Data has been read OK but the data contains errors (outside the valid range etc.). The data in question is reset (lost) and written to the Flash memory. Always control the data in question in the set-up menu subsequently.
50 - 57	Fatal hardware errors (not error 54)

Problem	Possible cause	Possible solution
The display does not show O ₂ values even though measurement has been started	ISM-3 is not warm.	Wait until ISM-3 has warmed up. If the unit is cold, this will take 10 min. (less after shorter interruptions).
The display is not lit	ISM-3 is not supplied with the correct voltage	Check connections and switches
	The fuse in ISM-3 is blown	Replace the fuse (see specification)
The display flashes <i>FL.ER</i>	Gas inlet tube blocked	Replace the tube
	Too low/high gas inlet pressure (ISM-3 without pump)	Check the set-up in set-up menu
	Wrong set-up of min./max. flow limits	Check the set-up in the set-up menu
	Defective pump	Return ISM-3 for repair.
ISM-3 shows a higher oxygen content than expected	Leaks in the system Incorrect calibration	Check measuring gas hose connections. Check the calibration data

Problem	Possible cause	Possible solution
The display shows: <i>ER. 1</i>	Invalid programming of the set-up menu	Check within which range the set values must be. See <i>"The setup menu SET"</i> on page 15 for details.
The display shows: <i>ER. 2</i>	Programming outside the valid range for the Flush delay (<i>DEL.</i>) parameter	
The display shows: <i>ER. 3</i>	Invalid setting of <i>PR.</i>	See <i>"Setting up of options, relay and external measurement control"</i> on page 16
The display shows: <i>ER. 4</i>	An attempt has been made to change calibration gas No. 1 (20.946%O ₂). This gas is reserved for atmospheric air.	Select one of the other calibration gas entries (where readout is 0ppm) for entry of a new calibration gas.
The display shows: <i>ER. 5</i>	An attempt has been made to enter two calibration gases with the same value	Find the calibration gas with the same value as the one you tried to enter and calibrate
The display shows: <i>ER. 6</i>	An attempt has been made to calibrate with a 0ppm gas	Type in a gas that is not 0.
The display shows: <i>ER. 7</i>	The result of the offset adjustment is too high (> 10mV)	Check that ISM-3 is only supplied with atmospheric air during offset adjustment
The display shows: <i>ER. 8</i>	An attempt has been made to calibrate with an other gas than 20.946% O ₂ (atmospheric air) after offset adjustment has been carried out	When offset adjustment has been carried out, all calibrations are locked. See <i>"Calibration"</i> on page 19.
The display shows: <i>ER. 9</i>	An attempt has been made to calibrate or adjust the offset where measurement has been disabled or where warm-up period has not been completed.	See <i>"Calibration"</i> on page 19 and/or <i>"Offset adjustment"</i> on page 20.

Problem	Possible cause	Possible solution
The display shows: <i>ER.30</i>	Hardware error. The mains supply line failure signal is constantly high	Switch off ISM-3, wait for 10 seconds and switch it on again. If an error is still indicated, ISM-3 should be returned for repair. It is possible to continue by pressing ►. However, the mains supply unit is defective and should be replaced / repaired (possibly a bad wire connection).
The display shows: <i>ER.31</i>	The last time ISM-3 was switched off, the line failure signal from the mains supply unit was not detected. If this error occurs in connection with each start, there is a hardware error	Switch off ISM-3, wait for ten seconds and switch it on again. If an error is still indicated, ISM-3 should be returned for repair. It is possible to continue by pressing ►. However, the mains supply unit is defective and should be replaced / repaired (possibly a bad wire connection).
The display shows: <i>ER.32</i>	Errors in the oxygen sensor calibration data. The checksum does not match.	The calibration data and the offset adjustment is reset and stored in the Flash memory. Calibrate the device.
The display shows: <i>ER.33</i>	Errors in one of or more of the set-up values	All set-up values are changed to factory settings. Please check the values in the set-up menu and the set-up of the alarm limit values <i>AL.HI</i> and <i>AL.LO</i> .
The display shows: <i>ER.34</i>	Errors in the flow sensor calibration data.	Switch off the ISM-3 and wait 10 seconds and switch on again. Press ► if there is still an error message. The readout of flow might be erroneous. Eventually send ISM-3 for repair
The display shows: <i>ER.50</i>	Hardware error. Check sum error in the EPROM containing all program code	Switch off ISM-3, wait for 10 seconds and switch it on again. If an error is still indicated, ISM-3 must be returned for repair.
The display shows: <i>ER.51</i>	Hardware error. Furnace thermo element alarm. Thermo element switched off	Switch off ISM-3, wait for 10 seconds and switch it on again. If an error is still indicated, ISM-3 must be returned for repair.
The display shows: <i>ER.52</i>	Cannot reach stable heating temperature. Fluctuates more than $\pm 30^{\circ}\text{C}$	Switch the ISM-3 off and wait 10 seconds and then switch on again. If message of error is still given, ISM-3 must be returned for repair.

Problem	Possible cause	Possible solution
The display shows: <i>ER.53</i>	Hardware error. Missing ready signal from A/D converter	Switch the ISM-3 off and wait 10 seconds and then switch on again. If message of error is still given, ISM-3 must be returned for repair.
The display shows: <i>ER.54</i>	Too high internal temperature (>60 °C)	Replace the filter of the fan and check that the ventilator is not blocked. Check also that the surrounding temperature does not exceed 40°C. If message of error is still given the ISM-3 must be returned for repair.
The display shows: <i>ER.55</i>	Hardware error. Read error from the A/D - Converter	Switch the ISM-3 off and wait 10 seconds and then switch on again. If message of error is still given, ISM-3 must be returned for repair.
The display shows: <i>ER.56</i>	Hardware error. Error caused by initialisation of I ² C bus.	Switch ISM-3 off, wait 10 seconds and switch on again, if there is still message of error, ISM-3 must be returned for repair.
The display shows: <i>ER.57</i>	Hardware error. Error in connection with the reading or writing via I ² C bus.	Switch ISM-3 off, wait 10 seconds and switch on again, if there is still message of error, ISM-3 must be returned for repair.

8. Spare parts and accessories

Standard accessories (included)

- USB, User Manuals
- 1 meter stainless steel tube 1/16x1.0
- T-fitting 1/8" for extraction of measuring gas
- Mounting brackets, 4 pcs. (only for the built-in model)
- 1 meter hose ø5/3 mm
- Option, voltage output, ISM-3

Accessories (extra)

- Fuses, 5x20mm 0.63 AT (4 pcs), ser. cpl. P/N 210548
- Fuses, 5x20mm 1.6 AT (4 pcs), ser. cpl..... P/N 210549
- Filter, cooling 60x60 (10 pcs), ser. cpl. P/N 210648

Options

- Option, connection kit ISM-3 w/pump P/N 270165
- Plug, mains, 3pin, EN, ser. cpl..... P/N 301167
- Plug, mains, DE/FR, ser. cpl..... P/N 301168
- Plug, mains, DA, ser. cpl..... P/N 301169
- Plug, mains, 115V, US, ser. cpl. P/N 301170
- Plug, mains, IT, ser. cpl. P/N 301171

9. Specifications

Sensor

Type	Solid-state ionic conductor with stabilized zirconium oxide electrolyte
Temperature	1000K (727°C)
Warm-up time	10 min., full specification after 20 min.
Calibration interval	12 months
Reference gas	Atmospheric air (20.946% oxygen)
Sensor response time	Less than 50 msec.
System response time	T90 (100-1000ppm): Typically 8 seconds T90 (1000-100ppm): Typically 15 seconds Response time depends on the flow and the measuring gas hose
Calibration	Atmospheric air 20.946% + up to 4 optional calibration gases

Flow system

For ISM-3 without an internal pump, the measuring gas is supplied at a pressure of 2 - 10 bar. By means of the restriction hose the flow is limited to 125 ml/min, before the gas is led through the flow sensor and the oxygen sensor.

When ordering a ISM-3 without a build-in pump, the actual inlet pressure must be indicated so that ISM-3 can be delivered with a restriction hose which is adapted to the actual pressure.

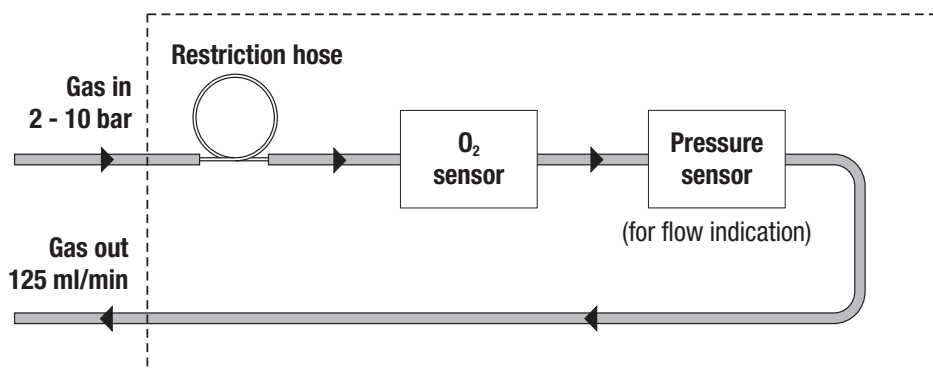


Fig. 5. Flow diagram of ISM-3 without pump.

If the ISM-3 is equipped with an internal pump, the gas is sucked from measure point at atmospheric pressure. When calibrating, the gas is sucked from a gas overflow, to which approx. 0.5 l/min must be supplied.

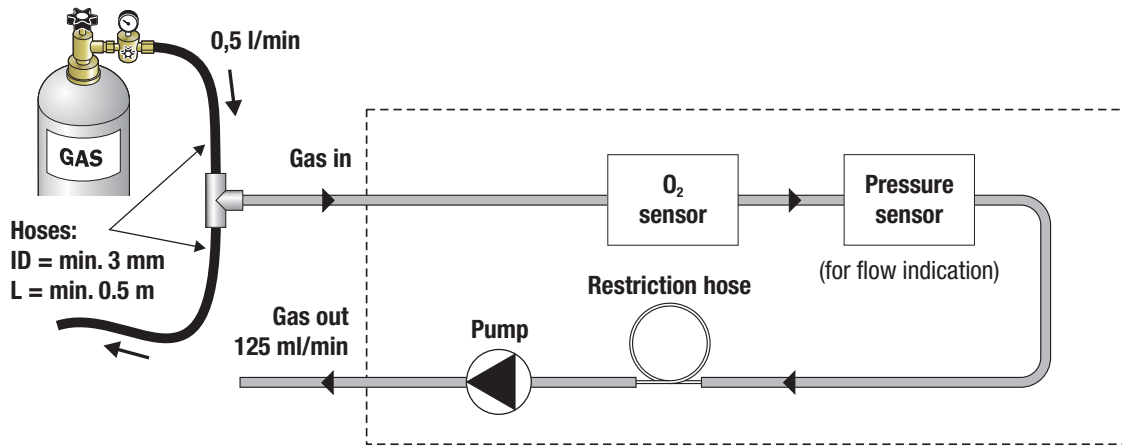


Fig. 6. Flow diagram of ISM-3 with pump. Gas overflow for calibration use is shown

Operation and connection

Operation of ISM-3:

Display	4 digit red LED display
Control	4 front keys. Key function is activated when key is released.
Measuring accuracy	Better than +/- 1% of the measured value +/- 1 digit in calibrated measuring range
Measuring range	20.9% - 1 ppm (standard) *

* For measuring in other ranges device must be recalibrated - see "[Calibration](#)" on page 19 for details

Possible connection to the ISM-3:

Gas supply	Gas inlet on the back
Relay	Max. 48V, 1A. (COMMON, N.O. and N.C.)
Current output	Programmable 0-20 or 4-20 mA, with user-defined scale (e.g. 0-1%, 10-20.9% or 0-100ppm O ₂).
Voltage output (Option)	Programmable 0-10 volt or 2-10 volt with user defined scale
Measure input	10-32VDC external pump control. Consumption 10mA.
RS232C (Option)	For serial communication with a PC (for internal use only)

All electrical inputs and outputs, except for the RS232C port, is galvanically separated from the internal electronics by means of optocouplers and/or a relay.

Technical data

Mains connection	230 VAC (115 VAC) +/- 10%, 50-60 Hz
Consumption	max. 70 VA
Mains fuse	0.63 AT at 230 V (1.6 AT at 115 V)
Permissible ambient temp. during operation	0 to 40°C. Less than 95% RH up to 35°C. Linear RH reduction by 3%RH/°C between 35°C and 40°C
Permissible ambient temp. while stored	-20°C to +45°C. Less than 75%RH between 35°C and 45°C.
IP classification	IP 23
Dimensions (HxWxD)	Model with remote display ①: Control panel: 96 x 96 x 33 mm Analyser (pressure): 129 x 189 x 139 mm Analyser (pump): 129 x 189 x 179 mm Model with built-in display ②: 129 x 189 x 179 mm



Weight	5.8 kg
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