For Your Safety

Strictly follow the Instructions for Use
Any use of the device requires full understanding and strict observation of these Instructions for Use. The device is to be used for the purposes specified here only.

Maintenance
The maintenance intervals and measures specified in the Technical Handbook[1)] as well as the specifications in the Instructions for Use/data sheets of the DrägerSensors[1)] used must be carefully observed.
Device maintenance must only be carried out by trained service personnel.

Accessories
Only the accessories specified in the order list in the Technical Handbook[1)] may be used.

Safe coupling with electrical devices
Devices that are not mentioned in these Instructions for Use or in the Technical Handbook[1)] can only be coupled electronically after consultation with the manufacturers or an expert.

Use in areas subject to explosion hazards
Devices or components for use in explosion-hazard areas, which have been tested and approved according to national, European or international Explosion Protection Regulations, may only be used under the conditions explicitly specified in the approval and with consideration of the relevant legal regulations. The equipment or components may not be modified in any manner. The use of faulty or incomplete parts is forbidden. The appropriate regulations must be observed at all times when carrying out repairs on these devices or components. Repairs to the device may only be carried out by trained service personnel in accordance with the maintenance instructions of Dräger Safety.

Safety symbols used in these Instructions for Use
These Instructions for Use use a number of warnings for risks and hazards that might occur when using the device. These warnings contain signal words, which will alert you to the degree of hazard you may encounter. These signal words and corresponding hazards are as follows:

⚠ DANGER
Death or severe bodily injuries may result in a situation of immediate danger unless appropriate precautions have been taken.

⚠ WARNING
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ CAUTION
Indicates an imminently hazardous situation which, if not avoided, could result in injury or damage to property.
Can also be used to warn against any wanton actions.

NOTICE
Additional information for the use of the device.

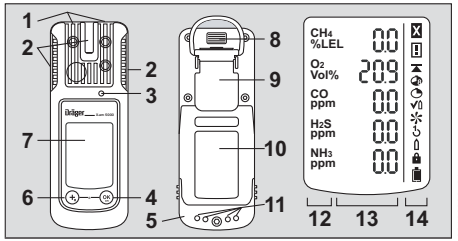
Intended Use

Portable gas measuring device for the continuous monitoring of the concentration of several gases in the ambient air in the working area and in explosion-hazard areas.
Independent measurement of up to five gases, in accordance with the Dräger sensors installed.

Areas subject to explosion hazards, classified by zones
The device is intended for use in explosion-hazard areas or mines, in which firedamp classified by zone 0, zone 1 or zone 2 may occur. It is determined for use within a temperature range of –20 °C to +50 °C, and for areas in which gases of explosion groups IIA, IIB or IIC and temperature class T3 or T4 (depending on the batteries and rechargeable battery) may be present. For zone 0, the temperature class is limited to T3.
If used in mines, the device is only to be used in areas known to have a low risk of mechanical impact.

Areas subject to explosion hazards, classified by divisions.
The device is intended for use in explosion-hazard areas or mines, in which firedamp classified by class I&II, Div. 1 or Div. 2 may occur.
It is determined for use within a temperature range of –20 °C to +50 °C, and for areas in which gases or dusts of groups A, B, C, D or E, F, G, and temperature class T3 or T4 (depending on the batteries and rechargeable battery) may be present.

What is What



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1	Gas entry	**8**	IR interface
2	Alarm LED	**9**	Fastening clip
3	Buzzer	**10**	Type plate
4	**[OK]** key	**11**	Charging contacts
5	Power pack	**12**	Measured gas display
6	**[+]** key	**13**	Measured value display
7	Display	**14**	Special symbols

Special symbols:

	Fault		1-button calibration
	Warning		Single gas calibration
	Display peak value		Password required
	Show TWA		Battery 100 % full
	Show STEL		Battery 2/3 full
	Bump test mode		Battery 1/3 full
	Fresh air calibration		Battery empty

Configuration

For the individual configuration of a device with standard configuration the device must be connected to a PC via the USB infrared cable (order no. 83 17 409) or the E-Cal system. The PC software "Dräger CC-Vision" is used to perform the configuration.
– Changing the configuration: see the Technical Handbook[1)].

1) The Technical Handbook, the Instructions for Use/data sheets of the sensors used, and the PC software CC-Vision for Dräger X-am 5000, are included on CD.

Standard device configuration:

Dräger X-am 5000	
Bump test mode [2]	Off
Fresh air calibr. [2]	On
Life sign [2]	On
Switch off [2]	Blocked for A2
LEL factor [2] (CH_4)	4.4 (4.4 vol. % corresponds to 100 % LEL)
Averaging time [2]	15 minutes for STEL 8 hours for TWA

First Commissioning

Before using the device for the first time, insert the batteries supplied or a charged NiMH power pack T4 (order no. 83 18 704), refer to chapter "Replacing the Batteries". The Dräger X-am 5000 is ready for operation.

Operation

Switching on the device

- Press and hold the **[OK]** key for approx. 3 seconds until the countdown **» 3 . 2 . 1 «** shown in the display has expired.
- All the display segments, including the visual, audible and vibration alarms, are activated for a short time.
- The software version is displayed.
- The device performs a self test.
- The next sensor to be calibrated/adjusted is displayed, along with the remaining days to the next calibration/adjustment, e.g. **» Ex %UEG CAL 20 «**.
- The time until the bump test interval elapses is displayed in days, e.g. **» bt 123 «**.
- All alarm setpoints A1 and A2 as well as **»** (TWA)[3] **«** and **»** (STEL)[3] **«** for H_2S and CO are displayed in succession.
- During the running-in period of the sensors, the respective display of the measured value flashes and the special symbol **»** [!] **«** (for warning) is displayed. No alarms are issued during the running-in period of the sensors.
- Press the **[OK]** key to cancel the display of the activation sequence.

Switching off the device

- Press and hold the **[OK]** key and the **[+]** key simultaneously until the countdown **» 3 . 2 . 1 «** shown in the display has elapsed.
- Before the device is switched off, the visual, audible and vibration alarms are activated for a short time.

Before entering the workplace

⚠ CAUTION

Check and, if necessary, adjust the calibration before carrying out safety-relevant measurements. A bump test must be performed according to the national regulations.

- Switch on the device. The current measured values are shown in the display.
- Observe any warning **»** [!] **«** or fault messages **»** [X] **«**.

  [!] The device can be operated normally. If the warning message does not disappear automatically during operation, the device must be serviced after the end of use.

  [X] The device is not ready to measure and requires maintenance.

⚠ WARNING

The presence of catalyst poisons in the measured gas (e.g. volatile silicone, sulphur, heavy metal compounds or halogenated hydrocarbons) can damage the Cat Ex sensor. If the Cat Ex sensor cannot be calibrated to the target concentration anymore, the sensor must be replaced.
The display of the Cat Ex sensor may be incorrect in an oxygen-poor atmosphere.
Electrical operating safety (Ex protection) is not guaranteed in an oxygen-enriched atmosphere.

- Check that the gas inlet opening on the device is not covered.

During operation

- During operation, the measured values for every measured gas are displayed.
- If a measuring range is exceeded or a negative drift occurs, the following displays are shown instead of the measured value display:

  » ⌜ ⌜ **«** (concentration too high) or

  » - - « (concentration too high at Ex channel) or

  » ⌞ ⌞ **«** (negative drift).

- Concentrations of combustible materials that are too high, may result in a lack of oxygen.
- For O_2 concentrations below 10 vol. % a fault is indicated for the Ex channel as **» - - «** instead of the measurement (only if measuring range ≤100 % LEL, not for >100 % LEL (heat conduction)).
- In the event of an alarm, the corresponding displays, the visual, audible and vibration alarms are activated – see Chapter "Identifying Alarms".

After a measuring range has been exceeded, sensitivity to Ex gases may be increased temporarily.This sensor effect lasts for a maximum of 4 hours. Recalibration is not allowed during this time.

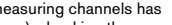
After the measuring range of the TOX measuring channels has been exceeded temporarily (up to one hour), checking the measuring channels is not necessary.

If using a Cat Ex sensor in Dräger X-am 5000, a fresh-air calibration may be required if the zero point has changed by more than 3 % LEL after an extreme impact load.

Identifying Alarms

An alarm is displayed visually, audibly and through vibration in a specific pattern.

Concentration pre-alarm A1

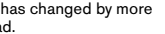
The alarm is indicated by an intermittent  alarm message:

Display **» A1 «** and measured value alternating: not for O_2!

The pre-alarm A1 is not self-latching and disappears when the concentration has dropped below the alarm threshold A1.
In the case of A1, a single tone is audible and the alarm LED flashes.
In the case of A2, a double tone is audible and the alarm LED flashes twice.

Acknowledging the pre-alarm:
- Press the **[OK]** key, only the audible alarm and the vibration alarm are switched off.

Concentration main alarm A2

The alarm is indicated by an intermittent  alarm message:

Display **» A2 «** and measured value alternating:
for O_2: **A1** = lack of oxygen
A2 = excess oxygen

2) Different settings can be selected to meet customer requirements on delivery. The current setting can be checked and changed with the software "Dräger CC-Vision".
3) Only when activated in the device configuration. Delivery status: not activated.

⚠ WARNING

Leave the area immediately. You are in mortal danger! A main alarm is self-latching and cannot be acknowledged or cancelled.

After leaving the area, if the concentration is less than the alarm threshold A2:

- Press the **[OK]** key, the alarm messages are switched off.

STEL / TWA exposure alarm

The alarm is indicated by an intermittent alarm message:

Display » **A2** « and » ◔ « (STEL) or » 🕓 « (TWA) and measured value alternating:

⚠ CAUTION

Leave the area immediately. After this alarm, the deployment of personnel is subject to the relevant national regulations.

– The STEL and TWA alarm cannot be acknowledged or cancelled.
- Switch off the device. The values for the exposure evaluation are deleted after the device is switched on again.

Battery pre-alarm

The alarm is indicated by an intermittent alarm message:

Flashing special symbol » 🔋 « on the right side of the display:

Acknowledging the pre-alarm:

- Press the **[OK]** key, only the audible alarm and the vibration alarm are switched off.

– The battery still lasts approx. 20 minutes after the first battery pre-alarm.

Battery main alarm

The alarm is indicated by an intermittent alarm message:

Flashing special symbol » 🔋 « on the right side of the display:

The battery main alarm cannot be acknowledged or cancelled:

– The device is automatically switched off again after 10 seconds.
– Before the device is switched off, the visual, audible and vibration alarms are activated for a short time.

Device alarm

The alarm is indicated by an intermittent alarm message:

Special symbol » X « displayed on the right side of the display:

– The device is not ready for operation.
- Commission maintenance personnel or the Dräger Safety Service Centre to eliminate the error.

Calling the Info Mode

- In measuring mode, press the **[OK]** key for approx. 3 seconds.

– If any warning or fault messages exist, the corresponding note or error codes are displayed (see the Technical Handbook).
Press the **[OK]** key successively for the next display. The peak values and the exposition values TWA and STEV will be displayed.
– If no key is pressed for 10 seconds, the device returns automatically to measuring mode.

Info Off Mode

With the device switched off, press the **[+]** key. Gas name, measuring unit and measuring range limit value will be displayed for all channels.
Pressing the **[+]** key again exits the Info Off Mode (or via timeout).

Calling the Quick Menu

- In measuring mode, press the **[+]** key three times.

– If functions in the quick menu are activated using the PC software "Dräger CC-Vision", you can select these functions using the **[+]** key. If no functions have been activated in the quick menu, the device remains in measuring mode.

Possible functions:

1. Bump test mode
2. Fresh air calibr.
3. Display and deletion of the peak values

- Press the **[OK]** key to call the selected function.
- Press the **[+]** key to cancel the active function and to switch to measuring mode.

– If no key is pressed for 60 seconds, the device returns automatically to measuring mode.

Replacing the Batteries / Rechargeable Batteries

⚠ WARNING

Do not replace the batteries / rechargeable batteries in hazardous areas. Danger of explosion!
Batteries / rechargeable batteries are part of the Ex approval.
Only the following types may be used:
– Alkaline batteries – T4 – (not rechargeable!)
Energizer No. E91, Energizer No. EN91 (Industrial),
Varta Type 4106 (power one) or
Varta Type 4006 (industrial)
– NiMHy rechargeable batteries – T3 – (rechargeable)
GP 180AAHC (1800) max. 40 °C ambient temperature.

Switch off the device:

- Press and hold the **[OK]** key and the **[+]** key simultaneously.
- Loosen the screw on the power pack and remove the power pack.

For the battery holder (order no. 83 18 703):

- Replace alkaline batteries or NiMHy rechargeable batteries. Ensure correct polarity.

For the NiMH power pack T4 (order no. 83 18 704):

- Completely replace the power pack.
- Insert the power pack into the device and tighten the screw, the device switches on automatically.

⚠ WARNING

Do not throw used batteries into fire or try to open them by force. Danger of explosion!
Dispose of the batteries in accordance with local regulations.

Charge the device with NiMH power pack T4 (83 18 704)

⚠ WARNING

Do not charge underground or in explosion-hazard areas! Danger of explosion!
The chargers are not designed in accordance with the regulations for firedamp and explosion protection.

Even if the device is not used, we recommend that you store the device in the charger!

- Insert the switched off device into the charger.

– Display LED on the charger:

Charge
Fault
Full

To maintain the lifetime of the batteries, charging is temperature controlled and only performed in a temperature range of 5 to 35 °C. When this temperature range is left, the charging is automatically interrupted and automatically continued after the temperature range has been reached again. The charging time is typically 4 hours. A new NiMH power pack reaches its full capacity after three complete load/unload cycles. Never store the device for extended periods (maximum 2 months) without being connected to a power source, as this drains the internal buffer battery.

Carrying Out the Function Test with Gas (Bump Test)

- Prepare a test gas cylinder, the volume flow must be 0.5 L/min and the gas concentration must be higher than the alarm setpoint concentration to be tested.
- Connect the test gas cylinder to the calibration cradle (order no. 83 18 752).

⚠ CAUTION
Test gas must not be inhaled. Risk to health! Observe the hazard warnings of the relevant safety data sheets.

- Switch on the device and insert it into the calibration cradle – press downwards until it engages.
- Open the test gas cylinder valve to let test gas flow over the sensors.
- Wait until the device displays the test gas concentration with sufficient tolerance:
  Ex: ±20 % [1)]
  O_2: ±0.6 vol. % [1)]
  TOX: ±20 %. [1)]
- If the alarm setpoints are exceeded, the device displays the gas concentration in alternation with **» A1 «** or **» A2 «** depending on the test gas concentration.
- Close the test gas cylinder valve and remove the device from the calibration cradle.

If the displays are outside of the above-mentioned ranges:

- Have the device calibrated by the service personnel.

Calibration

Calibration may not be possible due to device and channel errors.

Carrying out the fresh air calibration

Calibrate the device to fresh air, free of measured gases or other interfering gases. During the fresh air calibration, the zero point of all the sensors (with the exception of the DrägerSensor XXS O_2 and XXS CO_2) is set to 0. For the DrägerSensor XXS O_2 the display is set to 20.9 vol. % and for the DrägerSensor XXS CO_2 to 0.03 vol. %.

- Switch on the device.
- Press the **[+]** key 3 times, the symbol for fresh air calibration **»** ✳ **«** appears.
- Press the **[OK]** key to start the fresh air calibration function.

– The measured values flash.

When the measured values are stable:

- Press the **[OK]** key to perform the calibration.

– The display containing the current gas concentration changes with the display **» OK «**.

- Press the **[OK]** key to exit the calibration function or wait for approx. 5 seconds.

If a fault has occurred during the fresh air calibration:

– The fault message **»** X **«** appears and **»** ▬ ▬ **«** is displayed for the respective sensor instead of the measured value.

- In this case, repeat the fresh air calibration. If necessary, have the sensor replaced by qualified personnel.

Calibrating the sensitivity for an individual measuring channel

– The span calibration can be carried out specifically for individual sensors.
– During the span calibration, the sensitivity of the selected sensor is set to the value of the used test gas.
– Use a standard test gas.

Allowed test gas concentration:

Ex: 40 to 100 %LEL

O_2 10 to 25 vol. %

CO: 20 to 999 ppm

H_2S: 5 to 99 ppm

Test gas concentration of other gases: see Instructions for Use for the respective DrägerSensors.

- Connect the test gas cylinder with the calibration cradle.
- Vent the test gas leaving the adapter into a fume cupboard or into the open air (with a hose connected to the second connector of the calibration cradle).

⚠ CAUTION
Test gas must not be inhaled. Risk to health! Observe the hazard warnings of the relevant safety data sheets.

- Switch on the device and insert it into the calibration cradle.
- Press the **[+]** key and keep it depressed for 5 seconds to call the calibration menu, enter the password (password on delivery = 001).
- Use the **[+]** key to select the single gas calibration function. The symbol for span calibration **»** ⏢ **«** flashes.
- Press the **[OK]** key to start the channel selection.

– The display flashes the gas of the first measuring channel, e.g. **» Ex -** %**LEL «**.

- Press the **[OK]** key to start the calibration function of this measuring channel, or use the **[+]** key to select another measuring channel (O_2 - vol. %, H_2S - ppm or CO - ppm, etc.).

– The calibration gas concentration is displayed.

- Press the **[OK]** key to confirm the calibration gas concentration or use the **[+]** key to change the calibration gas concentration and complete the process by pressing the **[OK]** key.

– The measurement value flashes.

- Open the test gas cylinder valve to let gas flow over the sensor with a volume flow of 0.5 L/min.

– The displayed, flashing measurement value changes to the value according to the supplied test gas.

When the measurement value displayed is stable (after at least 120 seconds):

- Press the **[OK]** key to perform the calibration.

– The display containing the current gas concentration changes with the display **» OK «**.

- Press the **[OK]** key or wait about 5 seconds in order to complete the calibration/adjustment of this measuring channel.

– The next measuring channel may appear for calibration.

– After the calibration of the last measuring channel, the device changes to the measuring mode.

- Close the test gas cylinder valve and remove the device from the calibration cradle.

If a fault occurred during the span calibration:

– The fault message **»** X **«** appears and **»** ▬ ▬ **«** is displayed for the respective sensor instead of the measured value.

- In this case, repeat the calibration.
- If necessary, replace the sensor.

1) Upon application of the Dräger mixed gas (order no. 68 11 130) the displays should be within this range.

Maintenance

The device does not need any special maintenance.

- Dirt and deposits can be removed from the device by washing it with cold water. A sponge can be used for wiping if necessary.

NOTICE
Abrasive cleaning implements (brushes etc.), cleaning agents and cleaning solvents can destroy the dust and water filters.

- Carefully dab dry the device using a cloth.

Technical Data

Extract: see the Technical Handbook[1] for details.

Ambient conditions:	
During operation and storage	–20 to 50 °C (–20 to 40 °C for NiMH single cells type 180AAHC) 700 to 1300 hPa 10 to 90% (to 95 % briefly) rH.
Ingress protection	IP 67 for device with sensors
Intensity of alarm	Typically 90 dB (A) in 30 cm distance
Operation time	
– Alkaline battery	Typically 12 hours under standard conditions
– NiMHy rechargeable batteries	Typically 12 hours under standard conditions
Dimensions	approx. 130 x 48 x 44 mm (H x W x D)
Weight	approx. 220 to 250 g
CE marking:	Electromagnetic compatibility (Directive 89/336/EEC) Low Voltage Directive (Directive 72/23/EEC) Explosion protection (Directive 94/9/EEC)
Approvals:	(see “Notes on Approval” on page 114)

1) The Technical Handbook and Instructions for Use/data sheets for the sensors used and the PC software CC-Vision for Dräger X-am 5000 are available on CD. The Instructions for Use/data sheets for the sensors used can also be downloaded at the following Internet address: http://www.draeger.com/ST/internet/DE/de/Produkte/Detection/DragerSensors/Tragbar/sensors_tragbar.jsp

Maintenance

The device should be inspected and maintained annually by suitably qualified persons (consult: EN 50073 – Guide for the selection, installation, use and maintenance of apparatus for the detection and measurement of combustible gases or oxygen, EN 45544-4 – Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 4: Guide for selection, installation, use and maintenance and national regulations).
Recommended calibration interval for measuring channels Ex, O_2, H_2S and CO: 6 months. Calibration intervals of other gases: see Instructions for Use for the respective DrägerSensors.

Extract: For details, see the Instructions for Use/ data sheets for the sensors used[1].

	Ex	O_2	H_2S	CO
Measuring principle	Catalytic combustion	Electrochemical	Electrochemical	Electrochemical
Measurement value configuration time $t_{0...90}$ for methane for propane	 ≤20 seconds ≤35 seconds	≤10 seconds	≤15 seconds	≤25 seconds
Measurement value configuration time $t_{0...50}$ for methane for nonane	 ≤7 seconds ≤30 seconds[5]	≤6 seconds	≤6 seconds	≤6 seconds
Measuring range	0 to 100 %LEL [6]	0 to 25 vol. %	0 to 200 ppm H_2S [7]	0 to 2000 ppm CO [8]
Zero error (EN 45544)	– – –	– – –	2 ppm	6 ppm
Device drift	– – –	– – –	≤1 % of measured value/month	≤1 % of measured value/month
Warm-up time	35 seconds	≤5 minutes	≤5 minutes	≤5 minutes
Effect of sensor poisons Hydrogen sulphide H_2S, 10 ppm halogenated hydrocarbons, heavy metals, gases containing silicone, sulphur or polymerizable substances	≤1 %LEL/ 8 hours Poisoning possible	– – –	– – –	– – –
Measuring accuracy [% of the measured value]	≤5	≤1	≤2	≤2
Standards (Measuring function for explosion protection and measurement of oxygen deficiency and surplus as well as toxic gases, EXAM, Essen, Germany: BVS 08 ATEX G 002 X), PFG 08 G 001	EN 61779-1 [2] EN 61779-4 EN 50271 EN 60079-29-1	EN 50104 (measurement of oxygen deficiency and oxygen surplus) EN 50271	EN 45544-1 [3] EN 45544-2 EN 50271	EN 45544-1 [4] EN 45544-2 EN 50271

2) The device responds to most combustible gases and vapors.The sensitivities differ depending on the type of gas. We recommend a calibration using the target gas to be measured. For the range of alkanes, the sensitivity decreases from methane to nonane.
3) The measuring signals can be affected additively by sulphur dioxide and nitrogen dioxide and negatively by chlorine.
4) The measuring signals can be affected additively by acetylene, hydrogen and nitrate monoxide.
5) For decreasing concentrations, the nonane response time can be considerably longer (up to 170 seconds).
6) Alkane from methane to nonane, LEL values in accordance with EN 61779-1
7) Certified for 1 to 100 ppm
8) Certified for 3 to 500 ppm

Disposing of the Device

EU-wide regulations for the disposal of electric and electronic appliances which have been defined in the EU Directive 2002/96/EC and in national laws have been effective since August 2005 and apply to this device.
Common household appliances can be disposed of using special collecting and recycling facilities. However, as this device has not been registered for household usage, it must not be disposed of through these means. The device can be returned to your national Dräger Safety Sales Organisation for disposal. Please do not hesitate to contact the above if you have any further questions on this issue.