



Dräger X-am[®] 5100 (MQG 0020) Technical Manual

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1 For Your Safety

1.1 Follow the Instructions for Use

- Any use of the instrument requires full understanding and strict observation of the Instructions for Use supplied with the instrument. The instrument is only to be used for the purposes specified here.

1.2 Safety symbols used in this Technical Manual

This Technical Manual contains a number of warnings for risks and hazards which might occur when using the instrument. These warnings contain signal words to alert you to the degree of hazard you may encounter. These signal words and corresponding hazards are as follows:



WARNING

Death or serious physical injury may occur as a result of a potential hazard situation if appropriate precautionary measures are not taken.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in injury or damage to property or to the environment. Can also be used to warn against any wanton actions.

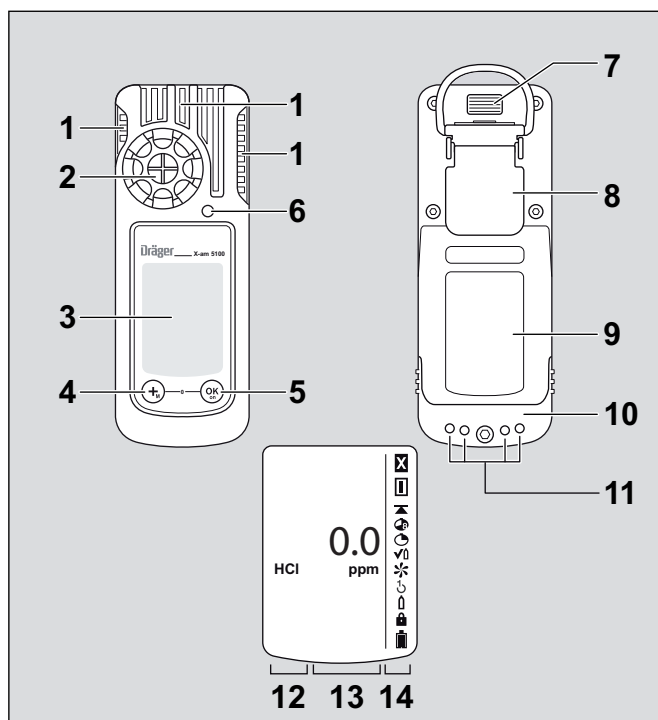


NOTICE

Additional information on the use of the product.

2 Description

2.1 Product overview



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

Special symbols:

Fault message

Warning message

Display peak value

Show TWA

Show STEL

Bump test mode

Fresh air calibration



1-button span calibration

Standard span calibration

Password required

Battery 100 % full

Battery 2/3 full

Battery 1/3 full

Battery empty



2.2 Intended Use

Portable single gas detection instrument for the continuous monitoring of the concentration of HCl, HF, H₂O₂ or hydrazine in the ambient air within the working area and in explosion-hazard areas.

Areas subject to explosion hazards, classified by zones

This instrument is intended for use in hazardous areas classified as Zone 0, Zone 1 or Zone 2, or in mines in which there is a danger of firedamp, in a temperature range of -20 °C to +50 °C, and in areas where gases of explosion groups IIA, IIB or IIC and temperature class T3 or T4 (depending on batteries and rechargeable battery) may be present. In mines, the instrument may only be used in areas with a low risk of mechanical influence.

For applications in accordance with CSA (Canadian Standards Association), the following should be observed:

Only the performance of the detector part of this instrument for flammable gases has been tested. The instrument has not been approved for use in mines by the CSA.



WARNING

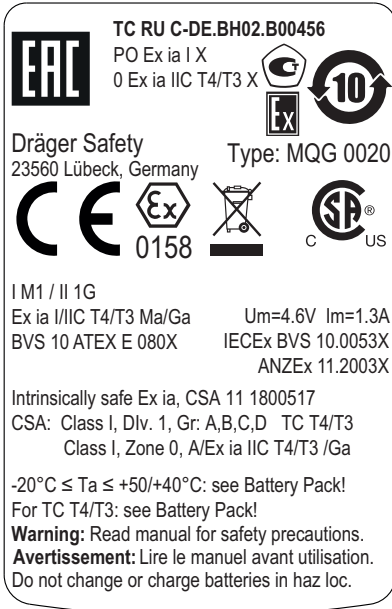
CSA requirement: The sensitivity must be tested every day before first use using a known concentration of the gas being measured corresponding to 25 to 50 % of the full concentration value. The accuracy must be 0 to +20 % of the daily value. The accuracy may be corrected via calibration.

2.3 Approvals

The approvals are shown on the rating plate. Do not stick anything on the name plate on the gas detector.

CE marking: See declaration of conformity on page 23.

2.3.1 Marking



Serial No.¹ on a separate label

2.3.2 Permissible power packs

Power pack 83 22 237, approved as Type ABT 0100

Temperature class T4
-20 °C ≤ Ta ≤ +50 °C
use with alkaline batteries
Duracell Procell MN1500
Duracell Plus Power MN 1500

Temperature class T3
-20 °C ≤ Ta ≤ +40 °C
use with NiMH batteries
GP 180AAHC (1800 mAh)

use with alkaline batteries
Varta Powerone 4006
Varta Powerone 4106
Panasonic Powerline LR6

Power pack 83 18 704; approved as HBT 0000

Temperature class T4
-20 °C ≤ Ta ≤ +50 °C

Power pack 83 22 244; approved as HBT 0100

Temperature class T4
-20 °C ≤ Ta ≤ +50 °C

¹ The year of manufacture is coded by the third capital letter of the serial number:
Y = 2007, Z = 2008, A = 2009, B = 2010, C = 2011, D = 2012, E = 2013, etc.
Example: Serial No. ARCH-0054: the third letter is C, so the year of manufacture is 2011.

2.3.3 Safety instructions



WARNING

Read the safety measures in the Instructions for Use.

Do not replace or charge batteries in potentially explosive areas. Danger of explosion!

To reduce the danger of explosion, do not mix new batteries with old batteries and do not mix batteries made by different manufacturers.

Always disconnect the instrument from the power pack before carrying out any maintenance operations.

Substitution of components may impair intrinsic safety.

High off-scale readings may indicate an explosive concentration.



CAUTION

Not tested in oxygen enriched atmospheres (>21 % O₂).

Only use power packs ABT 0100 (Order No. 83 22 237), HBT 0000 (Order No. 83 18 704) or HBT 0100 (Order No. 83 22 244). See marking on power pack for approved batteries and related temperature class.

3 Use

3.1 Preparations for use



WARNING

Only use batteries of type ABT 01xx, 00xx HBT or HBT 01xx. See labelling on the battery for approved batteries and associated temperature class.

Replacing components may compromise intrinsic safety.

- Before using the instrument for the first time, the enclosed batteries or a charged T4 NiMH power pack (Order No. 83 18 704 / 83 22 244) must be inserted, see "Replacing the batteries / rechargeable batteries" on page 8.
- The X-am 5100 is ready for operation.

3.1.1 Charging the rechargeable batteries



WARNING

Danger of explosion! To reduce the risk of ignition of a flammable or explosive atmosphere, strictly observe the following warnings:

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

Charge power packs type HBT 0000 or HBT 0100 with the appropriate Dräger charger. Charge single NiMH cells for battery holder ABT 0100 in accordance with the manufacturer's specifications. Ambient temperature during the charging procedure: 0 to +40 °C.



NOTICE

Even if the instrument is not in use, Dräger recommends that you store it in the charger (chargermodule X-am 1/2/5000, Order No. 83 18 639).

- To maintain the lifetime of the batteries, charging is only performed within a temperature range of 5 to 35 °C. Outside this temperature range, the charging is automatically interrupted and resumes automatically after the temperature is within the range again.
- The charging time is typically 4 hours.
- A new NiMH power pack reaches its full capacity after three complete charging/discharging cycles.
- Never store the instrument for extended periods without being connected to a power source (maximum of 2 months) because the internal buffer battery will drain.

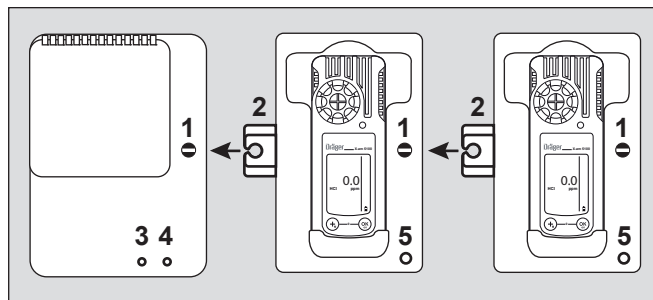
Charging with the multiple charging station

- A maximum of 20 instruments can be charged at the same time on the power pack (Order No. 83 18 805) of the multiple charging station.
- When attaching the charging modules, disconnect the power pack from the mains supply!



CAUTION

Always connect or disconnect the charging modules individually and not in groups in order to prevent the charging station from becoming damaged. During transportation, the power pack and the charging modules should also always be handled individually and without inserted instruments.



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- Position the instrument on an even and level surface.
- 1. Turn the slots of the interlock into a horizontal position by using a screwdriver or coin.
- 2. Insert the projecting tongue (2) of the charging module (doubles as power feed) until it engages.
- 3. Close the lock (1) with a quarter turn (slot is positioned vertically).
- 4. Attach additional charging modules in the same way.
- 5. Connect the power pack to the mains.
 - The green "Mains" LED (1) lights.
- 6. Insert the switched-off instrument into the charging module.
 - LED indicator (5) on the charger:
 - Charge

Charge

Fault

Full

- If a fault occurs:
 - Remove the instrument from the charging module and insert it again.
- If the fault still occurs, have the charging module repaired.
 - It takes approx. 4 hours to fully charge an empty rechargeable battery.

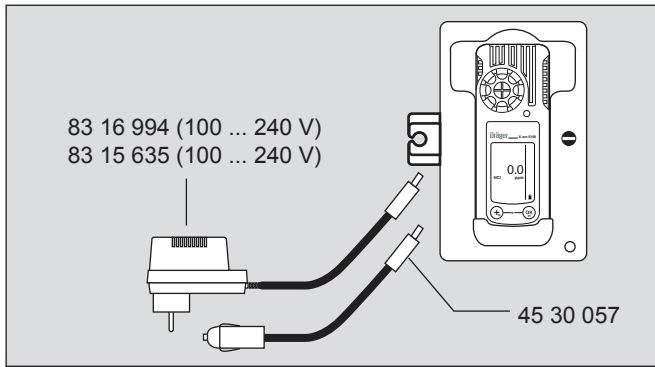


CAUTION

A short circuit of the charging contacts in the charging modules, e.g., by metallic objects that have fallen in, will not result in damage to the charging station. It should, however, be avoided due to possible heating hazards and incorrect displays on the charging module.

- In the event of a short circuit or if the power pack is overloaded:
 - The red "Overload" LED (3) lights, and an audible alarm sounds.
 - After the fault has been corrected, the alarm is switched off automatically and the charging process is restarted.
 - In the event of a power failure, the instruments already charged will be protected from discharging.

Charging with charger module and plug-in power pack or vehicle charging adapter



- When the power pack is used (Order No. 83 16 994) up to 5 instruments, or with power pack (Order No. 83 15 635), up to 2 instruments can be charged at the same time.
- The power pack contained in the rechargeable battery and charging set (Order No. 83 18 785) is suitable for charging one instrument.
- When the vehicle charging adapter is used (Order No. 45 30 057) it is recommended that each charging module is supplied separately.
- The charging process is carried out analogue to charging with the multiple charging station.

3.1.2 Replacing the batteries / rechargeable batteries



WARNING

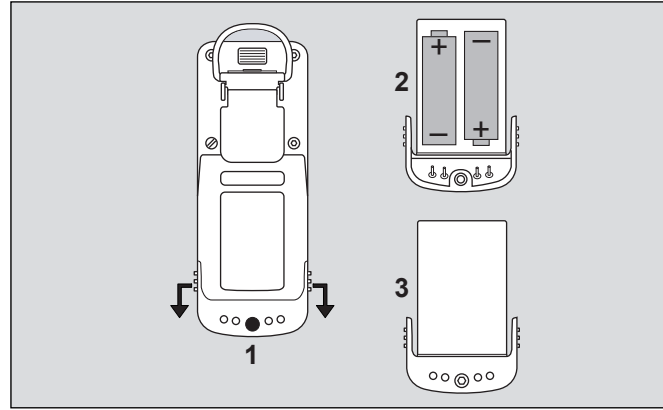
Danger of explosion! To reduce the risk of ignition of a flammable or explosive atmosphere, strictly observe the following warnings:

Do not throw used batteries into fire or try to open them by force.
Do not replace the batteries / rechargeable batteries in areas where there is a danger of explosion.
Do not mix new batteries with used batteries, and do not mix batteries from different manufacturers or of different types.
Remove batteries before maintenance work.

Batteries / rechargeable batteries are part of the Ex approval.

Only the following types may be used:

- Alkaline batteries – T4 – (not rechargeable)
 - Duracell Procell MN1500
- Alkaline batteries – T3 – (not rechargeable)
 - Varta Powerone 4006
 - Varta Powerone 4106
 - Panasonic Powerline LR6
- NiMH rechargeable batteries – T3 – (rechargeable)
 - GP 180AAHC (1800)
max. 40 °C ambient temperature.



1. Switch off the instrument if necessary (see "Switching off the instrument" on page 9).
 2. Loosen the screw (2.0 mm hexagon socket) on the power pack and remove the power pack.
 3. Replace the alkaline batteries with new ones or the rechargeable NiMH batteries with charged ones – ensure correct polarity.
 4. Completely replace the T4 power pack (with sealed rechargeable batteries, Order No. 83 18 704 / 83 22 244).
 5. Insert the power pack into the instrument and tighten the screw, the instrument switches on automatically.
- After replacing the power pack T4, it is recommended that a complete charging is carried out.

After the batteries have been replaced:

- The settings and data are stored when the battery is replaced. The sensors warm up again.

3.1.3 Switching on the instrument

1. Press and hold the **OK** key for approx. 3 seconds until the countdown » **3 . 2 . 1** « shown in the display has elapsed.
 - All the display segments, including the visual, audible and vibration alarms, are activated for a short time.
 - The software version is displayed.
 - The instrument performs a self test.
 - The next sensor to be calibrated is shown, together with the days remaining until the next calibration, e.g. » **HCl ppm CAL 20** «.
 - The time until the bump test interval elapses is displayed in days, e.g., » **bt 123** «.
 - All alarm thresholds A1 and A2 as well as » **☼** « (TWA)¹ and » **☼** « (STEL)¹, are displayed consecutively.
 - During the sensor warm-up period, the respective display of the measured value flashes and the special symbol » **☼** « (for warning) is displayed. No alarms are issued during the sensor warm-up period.
2. Press the **OK** key to cancel the display of the activation sequence.

¹ Only when activated in the instrument configuration. Delivery status: not activated.

3.1.4 Switching off the instrument

1. Press and hold the  key and  key at the same time until the countdown » 3.2.1 « shown in the display has elapsed.
 - Before the instrument is switched off, the visual, audible and vibration alarms are activated for a short time.

3.1.5 Before entering the workplace



WARNING

Before performing safety measurements, check the calibration by way of a bump test, adjust as necessary, and check all alarm elements. If national regulations exist, the bump test must be performed in accordance with these regulations. An incorrect calibration can lead to incorrect measurement results, which may result in serious damage to health.

1. Switch on the instrument. The current measured values are shown in the display.
 - Observe any warning »  « or fault messages »  «.
 -  The instrument can be operated normally. If the warning message does not disappear automatically during operation, the instrument must be serviced after the end of use.
 -  The instrument is not ready to measure and requires maintenance.
2. Check that the gas inlet opening on the instrument is not covered.

3.2 Configuration

3.2.1 Standard gas configuration

DrägerSensor	Measuring range ¹	Alarm A1 ¹			Alarm A2 ¹		
		threshold	can be acknowledged	self-latching	threshold	can be acknowledged	self-latching
XS EC HF/HCl [ppm] ²	0 to 30	5	Yes	No	10	No	Yes
XS EC H ₂ O ₂ [ppm]	0 to 20	1	Yes	No	2	No	Yes
XS EC N ₂ H ₄ [ppm]	0 to 3	0.1	Yes	No	0.2	No	Yes

¹ Different settings can be selected to meet customer requirements on delivery. The current setting can be checked and changed with the Dräger CC Vision software. A version of the CC-Vision software that can be used for Dräger X-am 5100 is available for download from the product page for the X-am 5100 at the following web address: www.draeger.com

² Valid for HCl.

3.2.2 Standard instrument configuration



NOTICE

Only trained persons are permitted to carry out modifications to the instrument configuration.

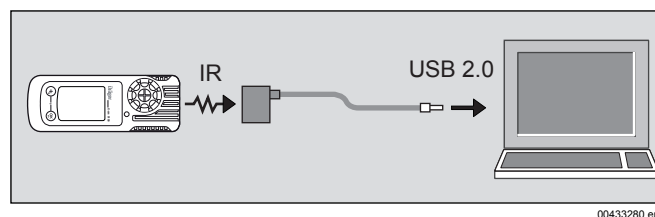
Different settings can be selected to meet customer requirements on delivery. The current setting can be checked and changed with the Dräger CC Vision software.

Dräger X-am 5100	
Bump test mode	Off
Fresh air calibration	On
Operating signal ¹	On
Disabling	permitted / blocked for A2
Averaging time	15 minutes for STEL 8 hours for TWA

¹ A periodic short flashing indicates the operating capacity of the instrument. If there is no operating signal, correct operation cannot be guaranteed.

3.2.3 Configuring the instrument

To customise its configuration, the instrument must be connected to a PC with the USB-DIRA adapter (Order No. 83 17 409). Dräger CC-Vision PC software is used to perform the configuration.



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Changing the standard configuration

- The installed Dräger CC Vision PC software is used for configuration.
- Observe the documentation and online help of the software.
- A version of the CC-Vision software that can be used for Dräger X-am 5100 is available for download from the product page for the X-am 5100 at the following web address: www.draeger.com.

Reading the database and displaying it Graphically

- The installed PC software Dräger GasVision is used for reading and displaying the database.
- Observe the documentation and online help of the software.
- Changing the configuration: See "Troubleshooting" on page 18.



WARNING

After a basic initialization has been carried out with the Dräger CC Vision PC software, individual alarm settings may have been changed.

3.3 Performing the bump test

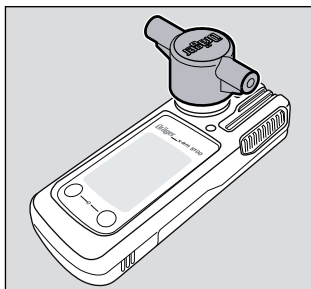
3.3.1 Manual testing without documentation of results in the instrument memory



NOTICE

Sensor-specific features affecting the bump test are described in the respective sensor data sheets.

1. Prepare a test gas source (e.g., cylinder, permeation oven); the volume flow must be 0.5 L/min and the gas concentration must be higher than the alarm threshold concentration to be tested.
2. Fit the calibration adapter (68 06 291) to the sensor cap.
3. Connect the test gas source to the calibration adapter.
4. Vent the test gas into a fume cupboard or into the open air (with a hose connected to the second connector of the calibration adapter).



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WARNING

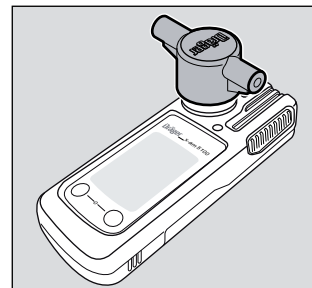
Never inhale the test gas. Danger to health! Observe the hazard warnings in the relevant Safety Data Sheets.

5. Switch on the instrument.
6. Open the valve on the test gas source to let test gas flow over the sensor.
7. Recommendation: Wait until the instrument displays the test gas concentration with sufficient tolerance. However, wait at least until alarm threshold A1 or A2 has been exceeded.
 - If the alarm thresholds are exceeded, the instrument displays the gas concentration in alternation with » A1 « or » A2 « depending on the test gas concentration.
8. Close the valve on the test gas source.
 - If the concentration has now fallen under the A1 alarm threshold:
 - Acknowledge the alarm.
 - If the displays are outside of the above-mentioned ranges:
 - Calibrate the instrument, see "Calibrating the instrument" on page 14.

3.3.2 Bump test with documentation of results in the instrument memory.

- The "Quick bump test" or the "Extended bump test" is selected using the Dräger CC Vision PC software. The "Quick bump test" checks whether the gas concentration has exceeded the Alarm 1 threshold (with oxygen, the check is whether the concentration has fallen below the Alarm 1 threshold). The "Extended bump test" checks whether the gas concentration has exceeded the Alarm 1 threshold (with oxygen, the check is whether the concentration has fallen below the Alarm 1 threshold) and whether the gas concentration has reached the preset bump test concentration.
- Setting on delivery: Quick bump test.

1. Prepare a test gas source (e.g., cylinder, permeation oven); the volume flow must be 0.5 L/min and the gas concentration must be higher than the alarm threshold concentration to be tested.
2. Fit the calibration adapter (68 06 291) to the sensor cap.
3. Connect the test gas source to the calibration adapter.
4. Vent the test gas into a fume cupboard or into the open air (with a hose connected to the second connector of the calibration adapter).



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WARNING

Never inhale the test gas. Danger to health! Observe the hazard warnings in the relevant Safety Data Sheets.

5. Switch on the instrument.
6. Call up the Quick Menu and select the bump test, see "Quick Menu" on page 13.

- The current gas concentration values and the special symbol » √ « (for bump test) flash.

7. Press the **OK** key to start the bump test.
8. Open the valve on the test gas source to let test gas flow over the sensor.

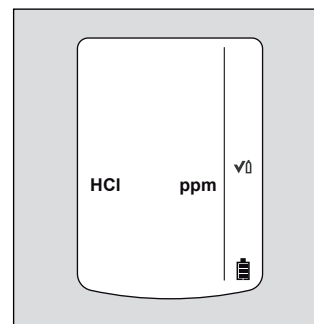
- If gas concentration exceeds the alarm thresholds A 1 the corresponding alarm will occur.

- If a gas alarm (Quick bump test) is triggered or the preset bump test concentration (Extended bump test) is reached within the specified time:

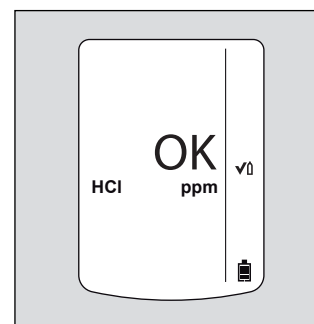
- The display containing the current gas concentration changes with the display » OK «.
- The bump test that was carried out is documented with the result and date in the instrument memory.

9. Close the valve on the test gas source.

- If the concentration has now fallen below the A1 alarm threshold, the instrument returns to the measuring mode.
- If the set bump test concentration is not reached after a sensor-specific time interval, an instrument error is generated.



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3.4 During use



CAUTION

To ensure correct measurement operation, the gas inlet opening on the instrument must not be covered or dirty.

The sensor cap must not be twisted.

- During operation, the measured values for the 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:

» « (Too high concentration) or
» « (Negative drift).

- In the event of an alarm, the corresponding displays, including the visual, audible and vibration alarms, are activated, see "Identifying Alarms" on page 12.

3.5 Identifying Alarms

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

3.5.1 Concentration pre-alarm A1

The alarm is indicated by an intermittent alarm message: message:

Display » **A1** « and measured value alternating.

The pre-alarm A1 is not self-latching and stops 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.

Acknowledging the pre-alarm:

- Press the key. Only the audible alarm and the vibration alarm are switched off.

3.5.2 Concentration main alarm A2



WARNING

Danger to life! Leave the area immediately. A main alarm is self-latching and cannot be acknowledged or cancelled.

The alarm is indicated by an intermittent alarm message: message:

Display » **A2 and measured value** alternating.

- In the case of A2, a double tone is audible and the alarm LED flashes twice.

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

- Press the key. The alarm messages are switched off.

3.5.3 STEL / TWA exposure alarm



WARNING

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

The alarm is indicated by an intermittent alarm message: message:

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

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

3.5.4 Battery pre-alarm

The alarm is indicated by an intermittent alarm message: message:

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

Acknowledging the pre-alarm:

- Press the key. Only the audible alarm and the vibration alarm are switched off.
- The battery lasts for at least another 20 minutes after the first battery pre-alarm.

3.5.5 Battery main alarm

The alarm is indicated by an intermittent alarm message: message:

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

The battery main alarm cannot be acknowledged or cancelled:

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

3.5.6 Instrument alarm

The alarm is indicated by an intermittent alarm message: message:

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

- The instrument is not ready for operation.
- For remedies, see "Troubleshooting" on page 18 to page 19.
- Commission maintenance personnel or DrägerService to rectify the error.

4 Menu functions

4.1 Calling the Info Mode

- In measuring mode, press the **OK** key for approx. 3 seconds.
 - If any warning or fault messages are present, the corresponding information or error codes are displayed (see "Troubleshooting" on page 18 to page 19).
- Press the **OK** key successively for the next display. The peak values and the exposure values TWA¹ and STEL¹ are displayed.

I Warning messages are displayed. Numerical codes of warning messages: see "Warning messages" on page 18.

OK key

X Fault messages are displayed. Numerical codes of fault messages: see "Fault messages" on page 19.

OK key

▲ The peak values = the maximum measured values are displayed.

OK key

⌚ The average values of the exposures based on a shift of, e.g., 8 hours (TWA) are displayed

OK key

🕒 The short-term values (STEL) = average values of the concentrations over the average value duration are displayed

OK key

The instrument is in measuring mode again

- If no key is pressed for 10 seconds, the instrument reverts automatically to measuring mode.

4.2 Calling the Info-Off Mode

- When the instrument is in a deactivated state, press the **+** key.
 - The name of the gas, measuring unit and measuring range limit value are displayed.
- Pressing the **OK** key again exits the Info Off mode (or via timeout).

4.3 Quick Menu

4.3.1 Quick menu functions

- ✓ **Bump test**, see "Performing the bump test" on page 11.
- ✳ **Fresh air calibration**, see "Performing a fresh air calibration" on page 14.
- ▲ **Display and deletion of the peak values**, see "Quick menu "Displaying and deleting peak values"" on page 13.

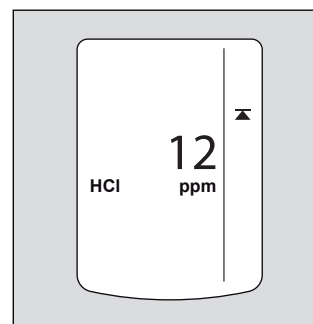
4.3.2 Calling the Quick Menu

The fresh air calibration and the bump test are activated in the quick menu on delivery. The function for displaying and deleting peak values can additionally be activated with the Dräger CC Vision PC software.

1. In measuring mode, press the **+** key three times.
 - If functions in the quick menu have been activated using the Dräger CC-Vision PC software, you can select these functions using the **+** key. If no functions have been activated in the quick menu, the instrument remains in measuring mode.
2. You can select the activated functions of the quick menu by pressing the **+** key.
 - 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 instrument reverts automatically to measuring mode.

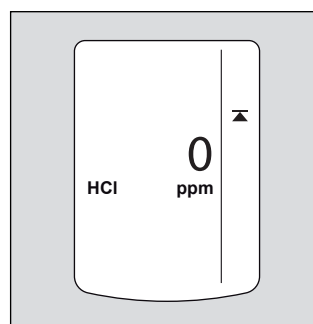
4.3.3 Quick menu "Displaying and deleting peak values"

- After the function has been selected, the current peak values are displayed; the special peak values symbol appears in the display at the same time.



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1. The peak values can be deleted by pressing the **OK** key for 5 seconds. The next display appears.
2. Press the **OK** key to end the function.



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¹ Only when activated in the instrument configuration. Delivery status: not activated.

4.4 Adjustment menu

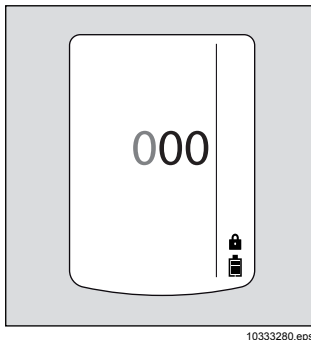
4.4.1 Functions of the adjustment menu

- * Fresh air calibration, see "Performing a fresh air calibration" on page 14
- 1-button span calibration
- Standard span calibration

4.4.2 Calling the adjustment menu

- The adjustment menu can only be accessed by entering a password.
Password on delivery: » 001 «
- The default password on delivery can be changed using the PC software Dräger CCVision.

1. In measuring mode, press the $\oplus$ key for at least 5 seconds.
 - The function for entering the password is selected.
 - The special symbol »  « (for the "Enter password" function) is displayed.
 - The display shows » 000 «, with the first digit flashing.
2. Use the $\oplus$ key to set the flashing digit.
3. Press the  key, the second digit starts flashing.
4. Use the $\oplus$ key to set the flashing digit.
5. Press the  key, the third digit starts flashing.
6. Use the $\oplus$ key to set the flashing digit.
7. Press the  key to confirm the password once it has been set completely.



8. The adjustment menu functions can now be selected by pressing the $\oplus$ key.
 - Press the  key to call the selected function.
 - Press the $\oplus$ key to cancel the active function.
 - If no key is pressed for 10 minutes, the instrument reverts automatically to measuring mode.

5 Calibrating the instrument



WARNING

Always adjust the zero point first, before the sensitivity. Otherwise the adjustment will be incorrect!

- Adjustment may not be possible due to instrument and channel errors.
- Allow the sensor to warm up before the adjustment.
- Warm-up time: see Instructions for Use/data sheet for the installed DrägerSensor.

5.1 Adjustment interval:

- Observe the relevant specifications in the Instructions for Use/data sheet for the DrägerSensor installed.
- For critical applications according to EN 60079-29-2¹ or EN 45544-4² and national regulations.
- Improvement of zero point accuracy – perform a fresh air calibration, see "Performing a fresh air calibration" on page 14.

5.2 Performing a fresh air calibration

A fresh air calibration can be performed to improve the zero point accuracy.

- Calibrate the instrument to fresh air, free of measured gases or other interfering gases.
- The zero point of the sensor is set to 0 during the fresh air calibration.
- Sensors that are faulty or not warmed-up will prevent the calibration.
 - In the case of sensors which are in the warm-up phase, the message » 159 « is displayed with the special symbol »  « (for warning message).
 - In the case of a sensor or instrument error, the message » 109 « is displayed with the special symbol »  « (for a fault message).
 - The message is cleared after 5 seconds and the function is available again in the menu.

1. Switch on the instrument.
2. Depending on instrument configuration:
 - Call up the Quick Menu and select the fresh air calibration function »  «, see "Quick Menu" on page 13.

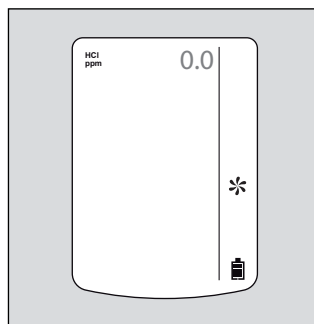
or

- Call up the Adjustment menu and select the fresh air calibration function »  «, see "Adjustment menu" on page 14.

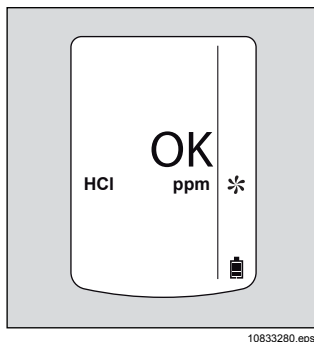
¹ EN 60079-29-2 – Guidelines for selection, installation, use and maintenance of instruments for the detection and measurement of flammable gases and oxygen.

² EN 45544-4 – Electrical instruments for the direct detection and direct concentration measurement of toxic gases and vapors – Part 4: Guidelines for selection, installation, use and maintenance.

- The measured values flash.
 - When the measured values have stabilized:
3. Press the **OK** key to carry out the fresh air calibration.

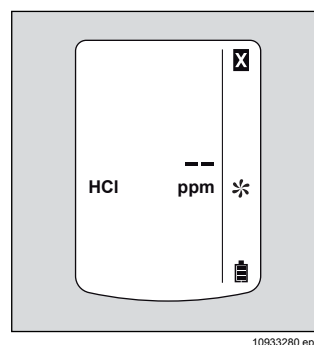


- The display containing the current gas concentration changes with the display » **OK** «.
4. Press the **OK** key to exit the calibration or wait for approx. 5 seconds.



If a fault has occurred during the fresh air calibration:

- The fault message » **✖** « appears and » **--** « is displayed for the respective sensor instead of the measured value.
- In this case, repeat the fresh air calibration.
- If necessary, replace the sensor, see "Replacing the Sensors" on page 17.



5.3 Performing a span calibration

The span calibration can optionally be performed by the standard or by the 1-button method.

5.3.1 Standard span calibration



CAUTION

Never inhale the test gas. Danger to health! Observe the hazard warnings of the relevant Safety Data Sheets.

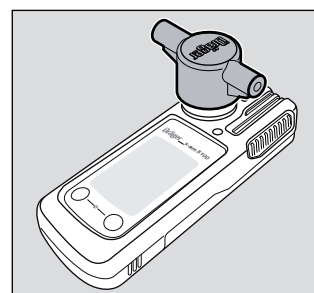


NOTICE

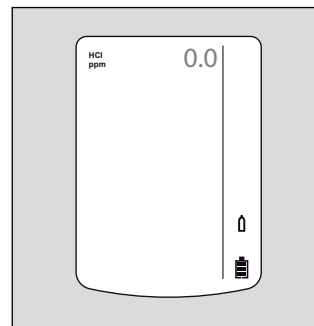
To minimise adsorption effects, keep the length of the hose as short as possible (maximum hose length: 1 m). Dräger recommends using PTFE hoses.

During the sensitivity calibration, the sensitivity of the sensor is set to the value of the test gas.

1. Fit the calibration adapter (68 06 291) to the sensor cap.
2. Connect the test gas source to the calibration adapter.
3. Vent the test gas into a fume cupboard or into the open air (with a hose connected to the second connector of the calibration adapter).



4. Switch on the instrument.
5. Call up the adjustment menu, enter the password and select the standard span calibration» **↑** «, see Chapter 4.4.2 on page 14.
6. Press the **OK** key to start the span calibration.
 - The name of the gas flashes.
7. Confirm with the **OK** key.
 - The calibration gas concentration is displayed.
8. 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 set calibration gas concentration flashes.
9. Press the **OK** key to confirm the set value.
10. Open the valve on the test gas source to let test gas flow over the sensor.
 - The currently displayed measured values start to flash.
 - The displayed measured values change to the values according to the gas supplied.

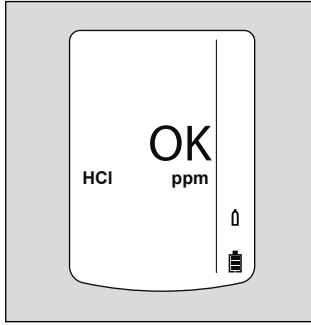


When the measured value is stabilized:

11. Press the **OK** key to carry out the calibration.

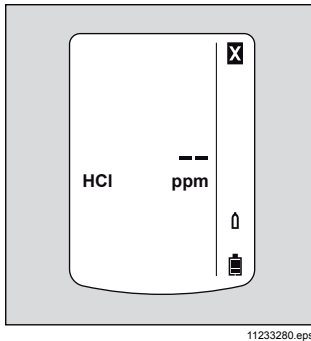
When the calibration is complete:

- The display of the current gas concentration alternates with the » OK « display.
- 12. Press the  key or wait for 5 seconds to quit the calibration.
 - The instrument changes to the measuring mode.
- 13. Close the valve on the test gas source.



If a fault has occurred during the sensitivity calibration:

- The fault message »  « appears and » -- « is displayed for the respective sensor instead of the measured value.
- In this case, repeat the span calibration.
- If necessary, change the sensor, see "Changing sensors" on page 18.



5.3.2 1-button span calibration



CAUTION

Never inhale the test gas. Danger to health!
Observe the hazard warnings of the relevant Safety Data Sheets.



NOTICE

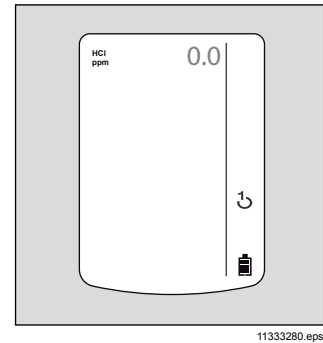
To minimise adsorption effects, keep the length of the hose as short as possible (maximum hose length: 1 m). Dräger recommends using PTFE hoses.

During the 1-button span calibration, the sensitivity of the sensor is set to the value of the test gas.

- Using the Dräger CC Vision PC software, the preset concentration values of the test gas cylinder used must be changed in the instrument to the target values of the mixed gas used.
- 1. Fit the calibration adapter (68 06 291) to the sensor cap.
- 2. Connect the test gas source to the calibration adapter.
- 3. Vent the test gas into a fume cupboard or into the open air (with a hose connected to the second connector of the calibration adapter).
- 4. Switch on the instrument.
- 5. Call the calibration menu, enter the password and select the 1-button span calibration function »  «, see Chapter 4.4.2 on page 14.



- 6. Press the  key to start the span calibration.
- 7. Open the valve on the test gas source to let test gas flow over the sensor.
 - The currently displayed measured values start to flash.
 - The flashing stops after a static measured value has been reached.
 - The calibration is now carried out automatically.
 - The displayed measured values change to the values according to the gas supplied.
 - The automatic stability monitoring can be terminated by pressing the  key. A calibration then takes place immediately.



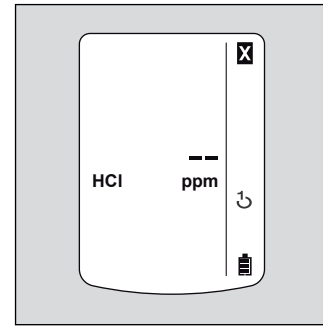
When the calibration is complete and the displayed measured values have stabilized:

- The display of the current gas concentration alternates with the » OK « display.
- 8. Press the  key or wait for 5 seconds to quit the calibration.
 - The instrument changes to the measuring mode.
- 9. Close the valve on the test gas source.



If a fault has occurred during the 1-button span calibration:

- The fault message »  « appears and » -- « is displayed for the respective sensor instead of the measured value.
- In this case, repeat the span calibration.
- If necessary, change the sensor, see "Changing sensors" on page 18.



6 Replacing the Sensors

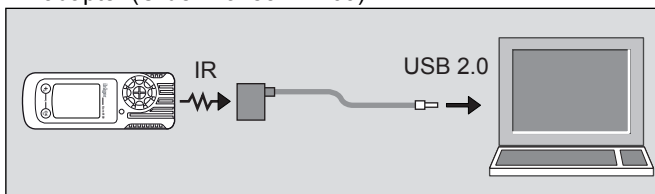


CAUTION

Damage to components!

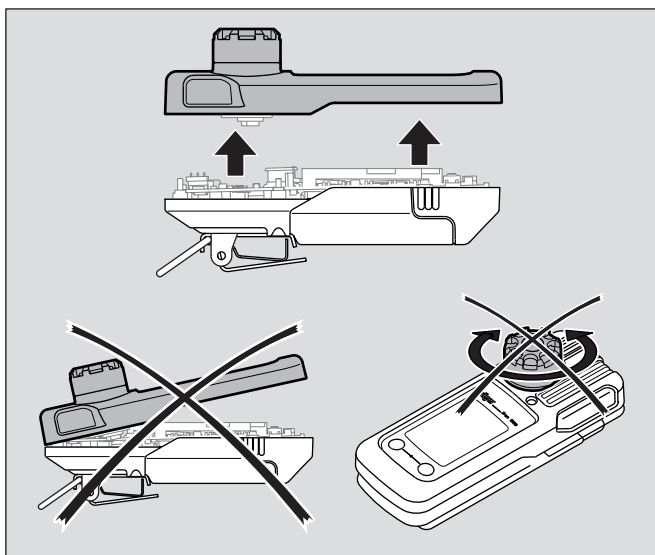
There are components in the instrument that are sensitive to electric charge. Before opening the instrument to replace the sensor, ensure that the person performing the work is earthed to avoid damage to the device. Earthing can be safely ensured, e. g. via an ESD workstation (electrostatic discharge).

1. Connect the instrument to the PC with the USB-DIRA adapter (Order No. 83 17 409).



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2. Deactivate the slot using the CC-Vision PC software.
3. 4 screws on the lower shell should now be unfastened.
4. Carefully release the upper shell upwards from the lower shell. Do not tilt the upper shell when doing this.



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NOTICE

When the upper shell is being released, it is possible that the DrägerSensor will be pulled out of its mount at the same time and remain in the upper shell.

5. Follow the remaining instructions in the CC Vision PC software.

7 Troubleshooting

Fault	Cause	Remedy
Not possible to switch on the instrument	Discharge the power pack	Charge the power pack, see "Charging the rechargeable batteries" on page 7.
	Discharge the alkaline batteries	Insert new alkaline batteries, see "Replacing the batteries / rechargeable batteries" on page 8.
Not possible to switch off the instrument	The instrument is not set to measuring mode	Select measuring mode.
	The instrument is configured to "Disable prohibited"	Configure the instrument to "Disable allowed" with Dräger CC Vision.
Display » – «	Measuring range calibrated incorrectly	Recalibrate the measuring range, see "Calibrating the instrument" on page 14.
	Electronics or sensors defective	Must be repaired by DrägerService.

To display the numerical codes of the warning and fault messages in the info mode, see "Calling the Info Mode" on page 13.

7.1 Warning messages

Special symbol » ⓘ « and displayed numerical code:	Cause	Remedy
152	Customer's service life counter about to elapse	Reset the service life counter using Dräger CC Vision.
153	Database 90 % full	Read the database soon and then clear the memory.
154	Database full	Read the database and clear memory.
155	Interval for the bump test has elapsed	Carry out the bump test, see "Performing the bump test" on page 11.
159	Adjustment not possible. The menu function cannot be carried out because of a message which is preventing the function (e.g., sensors in warm-up phase).	Identify the message code via the info menu and switch off, if necessary.

351	DrägerSensor XS EC1 in the warm-up phase	Wait until warm-up time is complete.
352	DrägerSensor XS EC1 in the warm-up phase	Wait until warm-up time is complete.
353	EC1 concentration has drifted into the negative range	Perform a fresh air calibration, see "Performing a fresh air calibration" on page 14.
354	The temperature is too high	Operate the instrument within the allowed temperature range.
355	The temperature is too low	Operate the instrument within the allowed temperature range.
356	The calibration interval for DrägerSensor XS EC1 has elapsed	Perform a span calibration for DrägerSensor XS EC1, see "Calibrating the instrument" on page 14.

7.2 Fault messages

Special symbol »  « and displayed numerical code:	Cause	Remedy
102	The customer's service life counter has elapsed	Reset the service life counter using Dräger CC Vision.
103	The instrument is defective	The instrument must be repaired by DrägerService.
104	Check sum error program code	The instrument must be repaired by DrägerService.
105	The bump test interval has elapsed	Carry out the bump test, see "Calibrating the instrument" on page 14.
106	The calibration interval has elapsed (at least 1 calibration interval has elapsed)	Perform a span calibration, see "Calibrating the instrument" on page 14.
107	Bump test error	Perform bump test, see "Performing the bump test" on page 11, or span calibration, see "Calibrating the instrument" on page 14.
108	The instrument is defective	The instrument must be repaired by DrägerService.
109	The menu function cannot be carried out because of an error.	Identify the error code via the info menu and switch off, if necessary.
301	No valid zero-point calibration of the Dräger Sensor XS EC1	Perform a fresh air calibration, see "Performing a fresh air calibration" on page 14.
302	No valid span calibration of the Dräger Sensor XS EC1	Perform span calibration or fresh air calibration, see "Calibrating the instrument" on page 14.
303	The measured value of DrägerSensor XS EC 1 is in the negative range	Perform a fresh air calibration, see "Performing a fresh air calibration" on page 14.
304	Dräger Sensor XS EC1 not inserted or defective	Check DrägerSensor XS EC1, see "Replacing the Sensors" on page 17.
305	Error during bump test of Dräger Sensor XS EC1	Repeat bump test. If necessary, adjust or replace the Dräger Sensor XS EC1, see "Replacing the Sensors" on page 17.
326	Error during accelerated warm-up of Dräger Sensor XS EC1	Remove the power pack and insert it again or replace the sensor. Sensor must not be exposed to gas during the first 5 minutes.

8 Maintenance

8.1 Maintenance intervals

The instrument should be inspected and maintained by suitably qualified persons annually (consult: 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).

Calibration intervals: see Instructions for Use for the respective DrägerSensors.

- Depending on instrument configuration:
 - Replace the alkaline batteries, see "Replacing the batteries / rechargeable batteries" on page 8 or charge the battery see "Charging the rechargeable batteries" on page 7 – after each use, at the latest after the battery alarm has been triggered or after 2 weeks.
- Calibrate the instrument – see "Calibrating the instrument" on page 14.
 - In regular intervals, according to the sensors used and the operating conditions. For sensor-specific calibration data, refer to the Instructions for Use/data sheets for the Dräger sensors used¹.
 - Before you carry out safety-related relevant measurements, the zero point and sensitivity of the instruments should be tested in accordance with national regulations.
- Inspection by suitably qualified persons – every year.
 - The inspection intervals must be established in each individual case and shortened if necessary, depending on safety related considerations, engineering conditions and the technical requirements of the equipment.
 - Dräger recommend that a service agreement be concluded with Dräger Service and that repairs also be carried out by them.
- Replace the sensors, see "Replacing the Sensors" on page 17 – if necessary, when it is no longer possible to adjust them.

8.2 Cleaning



CAUTION

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

- The instrument does not need any special care.
- If the instrument is very dirty, clean it with a cloth.

9 Storage

- Dräger recommends storing the instrument in the charger module (order no. 83 18 639).
- Dräger recommends checking the charge of the power supply at least every three weeks if the instrument is not stored in the charger module.

10 Disposal



This product must not be disposed of as municipal waste. This is indicated by the adjacent icon. You can return this product to Dräger free of charge. For information please contact the national sales organisations and Dräger.



Batteries and rechargeable batteries must not be disposed of as municipal waste. This is indicated by the adjacent icon. Collect and dispose of batteries and rechargeable batteries at battery collection centres, in accordance with applicable regulations.

Electrochemical sensors



WARNING

Acid burn risk!
Do not throw them into fires or use force to open them.



As for batteries, only dispose of as special waste in accordance with local waste disposal regulations. Further information can be obtained from the relevant local authority and from appropriate waste disposal companies.

¹ Instructions for Use/data sheets for the utilized sensors and the PC software CC-Vision for Dräger X-am 5100 can be downloaded on the product page of the X-am 5100 at the following Internet address: www.draeger.com. See also the enclosed Instructions for Use and data sheets for the sensors used.

11 Technical Data

Ambient conditions:

During operation and storage -20 to +50 °C
 (-20 to +40 °C for NiMH Type 180AAHC single cells and T3 alkaline batteries)
 700 to 1300 hPa
 10 to 90 % (short-term up to 95 %) relative humidity

Instrument data

Protection class IP 54 for instruments with sensors

Alarm volume Typically 90 dB (A) in 30 cm distance

Operation time (with 24 hours' use per day, 1 minute alarm per day)

 Alkaline battery Typically 180 hours
 (Order No. 83 20 240 / 83 22 239)

 NiMH rechargeable battery Typically 150 hours
 (Order No. 83 18 704)

 NiMH HC rechargeable battery Typically 180 hours
 (Order No. 83 22 244)

Dimensions approx. 130 mm x 48 mm x 61 mm (H x W x D)

Weight approx. 220 g to 250 g

CE markings See "Declaration of Conformity" on page 23.

Approvals: See "Description" on page 5.

Sensor data: See data sheets for the sensors used.

12 Ordering list

Name and Description	Order No.
Dräger X-am 5100	83 22 750
Power supply units:	
NiMH power pack T4	83 18 704
NiMH power pack HC T4	83 22 244
Alkaline power pack T3/T4 (without alkaline batteries) ¹	83 22 237
Alkaline batteries T4 (2 ea.) for alkaline power pack	83 20 240
Alkaline batteries T3 (2 ea.) for alkaline power pack	83 22 239
Rechargeable battery and charging set (includes NiMH T4 power pack, charging module for Dräger X-am 1/2/5000 and plug-in power pack)	83 18 785
Chargers:	
Charging adapter for Dräger X-am 1/2/5000	83 26 101
Charging module for Dräger X-am 1/2/5000	83 18 639
Power pack with connecting cord (worldwide) for a maximum of 20 Dräger X-am 1/2/5000 charging modules)	83 15 805
Plug-in power pack (worldwide) for a maximum of 5 Dräger X-am 1/2/5000 charging modules)	83 16 994
Plug-in power pack (worldwide) for a maximum of 2 Dräger X-am 1/2/5000 charging modules)	83 15 635
Vehicle connecting line 12 V/24 V for Dräger X-am 1/2/5000 charging module	45 30 057
Vehicle installation set for 1 Dräger X-am 1/2/5000 charging module	83 18 779
Additional strap for vehicle mounting bracket	83 18 788

¹ The T3/T4 alkaline power pack (Order No. 83 18 703) is not a subject of the BVS 08 ATEX G 002 X and PFG 08 G 001 certificates.

Name and Description	Order No.
Accessories for measured value acquisition and configuration:	
Dräger GasVision (trial version available at www.draeger.com/software)	
Dräger GasVision licence key (full version)	83 25 646
Dräger CC-Vision (full version available at www.draeger.com/software)	
USB DIRA with USB cable (USB infrared adaptor for communication Dräger X-am 1/2/5000 – PC)	83 17 409
Calibration/adjustment accessories:	
Test gas cylinder 10 ppm HCl	68 12 107
Test gas cylinder 10 ppm SO ₂	68 10 645
On demand controller	83 16 556
Standard controller	68 10 397
Calibration adapter	68 06 291
H ₂ O ₂ tester kit	68 13 216
Sensors:	
DrägerSensor XS EC HF/HCl	68 09 140
DrägerSensor XS EC H ₂ O ₂	68 09 170
DrägerSensor XS EC N ₂ H ₄	68 09 190

13 Declaration of Conformity



EU-Konformitätserklärung EU-Declaration of Conformity

Dokument Nr. / Document No. SE23110-03



Wir / we

Dräger Safety AG & Co. KGaA, Revalstraße 1, 23560 Lübeck, Germany

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product

Gasmessgerät Typ MQG 002* (X-am 5100)
Gas Detection Instrument type MQG 002* (X-am 5100)

mit der EG-Baumusterprüfbescheinigung
is in conformity with the EC-Type Examination Certificate

BVS 10 ATEX E 080 X

ausgestellt von der benannten
Stelle mit der Kenn-Nr.
issued by the Notified Body
with Identification No.

DEKRA EXAM GmbH
Dinnendahlstraße 9
D-44809 Bochum
0158

und mit den folgenden Richtlinien unter Anwendung der aufgeführten Normen übereinstimmt
and is in compliance with the following directives by application of the listed standards

Bestimmungen der Richtlinie provisions of directive		Nummer sowie Ausgabedatum der Norm Number and date of issue of standard
2014/34/EU ²⁾	ATEX-Richtlinie ATEX Directive	EN 60079-0:2012+A11:2013, EN 60079-11:2012
2004/108/EG(CE) ¹⁾ 2014/30/EU ²⁾	EMV-Richtlinie EMC Directive	EN 61326-1:2013 susceptibility: industrial environment emission: group 1, class B
2011/65/EU	RoHS-Richtlinie RoHS Directive	EN 50581:2012

Überwachung der Qualitäts-
sicherung Produktion durch
Surveillance of Quality Assurance
Production by

DEKRA EXAM GmbH
Dinnendahlstraße 9
D-44809 Bochum
0158

Lübeck, 2017-10-11

Ort und Datum (jjjj-mm-tt)
Place and date (yyyy-mm-dd)

Dr. Marcus Romba
Head of Electronic Engineering
Head of Product Qualification
Safety Products
Research & Develop

Erklärung
Declaration

Dokument Nr. / Document No. Anhang zu / Annex to SE23110-03

Wir / we Dräger Safety AG & Co. KGaA, Revalstraße 1, 23560 Lübeck, Germany

erklären in alleiniger Verantwortung, dass das Produkt
*declare under our sole responsibility that the product***Gasmessgerät Typ MQG 002* (X-am 5100)**
Gas Detection Instrument type MQG 002 (X-am 5100)***mit den folgenden Normen übereinstimmt**
is in compliance with the following the listed standards

Kategorie <i>Category</i>	Nummer sowie Ausgabe der Norm <i>Number and issue of standard</i>
IECEX	IEC 60079-0:2011, IEC 60079-11:2011
UL	UL 60079-0:Ed. 6, UL 60079-11:Ed. 6
CSA	CAN/CSA-C22.2 No. 0-M91 CAN/CSA-C22.2 No. 60079-0:2011, CAN/CSA-C22.2 No. 60079-11:2014

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