## INTRODUCTION

### Why the change?

### What changed?

## DEVICES AND MEASURING RANGES

### Which measuring ranges are covered by the Dräger CatEx 125 PR?

### Which measuring ranges are implemented in the X-am devices?

### How are the measuring ranges depicted in the display?

### How does the device depict the range > 100 % LEL?

### What value does the blocking alarm limit have with different LEL values?

### How is the range 0 to 100 vol. % methane depicted?

### Are our approvals or the metrological certificate affected by the change?

### What has changed on the sensors?

## FIRMWARE AND MISCELLANEOUS

### Which version of CC-Vision do I need to update the gas detectors to the new firmware?

### What documentation will now be enclosed with the devices and sensors?

### Is the update to the new firmware a mandatory update?

### What settings are applied with the firmware update?

### How to switch off a device again, which is in blocking alarm mode and also set to “Switch off impossible” / “Switch off impossible during A2 alarm occurance”?

### Is the oxygen deficiency evaluation function still available?

### What to remember when using the Save Energy Mode with the X-am 5000?

### Does the firmware update also apply to devices without a CatEx sensor, for example, the X-am 5100 or the X-am 5600?

### How can I use one gas detector to measure in both measuring ranges (vol % to LEL) as was previously possible with the automatic switching (fullrange) of the measuring ranges?

### What to consider when using mining sensors?

### Will the X-am 7000 with the Smart CatEx sensor also be converted to the new functionality?
INTRODUCTION

The new, innovative catalytic sensors CatEx 125 with the addition of „PR“ (Poison Resistant) are used in the Dräger gas detectors X-am 1700, X-am 2000, X-am 2500 and X-am 5000. Thanks to a new pellistor formulation, it was possible to dramatically increase the stability of the sensors against sensor poisons as well as retaining a low drift - the exceptional long-term stability thus ensures low operating costs.

The following FAQs provide you with information about the device firmware 6.6 prior to the actual update.

Why the change?

The pellistor formulation and the sensor design had to be adjusted to achieve the customer benefits mentioned above. This meant the associated previous technological advantage of the CatEx 125 series, the easy switch from LEL range to vol. %, were no longer possible in addition. However, we decided that customer benefits such as resistance to poisons, long-term stability and the associated low operating costs are more important. When gassing with high concentrations above 100 % LEL, the CatEx 125 PR series of devices could mistakenly report low readings despite the existence of an explosive atmosphere. For this reason we issued a recommendation in 2012 to check the zero-point and sensitivity and adjust if necessary before using the device in the concentration range 0 to 100 % LEL after gassing with > 100 % LEL. The picture shows an excerpt from the loose-leaf insert 9033356 (devices). It was sufficient to perform a bump test (T023 visual inspection and display test).

Our customers have reported that it has proved difficult in practice to test sensitivity and possibly adjust the device if measuring range values exceed >100 % LEL. Not all companies or workshops have bump test or calibration stations readily available (e.g. Dräger X-dock). In order not to delay operational processes, we have therefore worked intensively on another solution.
What changed?

Starting with software version 6.6, the Dräger sensor CatEx 125 PR (6912950) in the X-am 1700, X-am 2000, X-am 2500 and X-am 5000 functions in a new way. If the measuring range is exceeded and triggers a blocking alarm (the blocking alarm is usually triggered at 125 % LEL), the Dräger sensor CatEx 125 PR usually switches off when operated in heat-of-reaction principle mode, i.e. in the range of 0 to 100 % LEL. This eliminates the effect described above. The only requirement is that the device is switched off and on in fresh air after which it is again fully functional and ready for use without additional testing. This means: No time wasted, no testing costs, reduced operating costs.

Additional options of how to acknowledge the blocking alarm (How to switch off a device again, which is in lock alarm mode and also set to “Switch off impossible” / “Switch off impossible during A2 alarm occurrence”? ) are listed further down.

An acknowledgement of the lock alarm by the oxygen sensor is no longer possible.
Which measuring ranges are covered by the Dräger CatEx 125 PR?

The firmware upgrade equips the Dräger CatEx 125 PR now with two separate ranges:

- 0 to 100 % LEL or 0 to 100 vol. %

Automatic switching from the LEL range to the vol. % range is no longer available (X-am 5000).

Which measuring ranges are implemented in the X-am devices?

The X-am 1700, X-am 2000 and X-am 2500 can be used as before to monitor the LEL range. The only change is with the X-am 5000. Here, you must first select whether the LEL or vol. % methane range is to be monitored. (The 0 to 100 vol. % range is only approved for methane.) The measuring ranges of the devices are summarised in the table below.

This is easily configured with CC-Vision. Customers may modify the sensor configuration at any time with CC-Vision. (CC-Vision Basic is available for free from the Dräger website; please visit the corresponding X-am 1700/2000/2500/5000 product pages.)

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>X-am 1700</th>
<th>X-am 2000</th>
<th>X-am 2500</th>
<th>X-am 5000</th>
</tr>
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<tbody>
<tr>
<td>0 - 100 % LEL</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>0 - 100 Vol.%</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Firmware</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
</tr>
</tbody>
</table>

The accompanying documentation (CC-Vision, data sheets, instructions,...) in some parts only lists firmware 6.1 for the X-am 2000 and 6.5 for the X-am 5000. This firmware versions have not been published and only version 6.6 is the official firmware for all devices. However, the documents were already printed before the decision was made to publish firmware version 6.6, which is why the old version is mentioned. However, since the documentation uses the term “Firmware 6.5 or higher”, this statement remains true.
How are the measuring ranges depicted in the display?

X-am 2500 and X-am 5000:
The range 0 to 100 % LEL methane is represented by small letters: “ch₄”.
The range 0 to 100 % vol. % methane is represented by capital letters: “CH₄”.

This new way of indicating the LEL range (“ch₄”) will probably apply to most of our customers from here on out since the devices are usually utilised in the range 0 to 100 % LEL. This new notation was selected for methane,

1) since it is analogue with the IR sensors and

2) to avoid confusion with the 0 to 100 vol. % range for methane when the LEL range is set to the unit vol. %.

All other gas names in the LEL range remain the same. To avoid mix ups, the measuring range is also displayed in the CC-Vision when selecting the gas.

X-am 1700 and X-am 2000:
Combustible gases and vapours are shown with the label “Ex”. Since the devices only support the measuring range 0 to 100 % LEL, a subdivision is not necessary.
Excerpt from CC-Vision, gases with measuring range indication, example X-am 2500, depiction of „CH,”

Excerpt from CC-Vision, gases with measuring range indication, example X-am 5000, depiction of „CH,”
### How does the device depict the range > 100% LEL?

**X-am 1700, X-am 2000, X-am 2500 and X-am 5000:**

- Concentration 0 - 100 % LEL --> depiction in display: 0 - 99 % LEL
- Concentration 100 - 125 % LEL --> depiction in display Special character “measuring range exceeded”
- Concentration > 125 % LEL --> special character “lock alarm” - the sensor shuts off

Once the display depicts less than 125 % LEL and the gas concentration drops again, the sensor will return to normal measuring mode. Only the heat-of-reaction principle signal of the CatEx 125 PR is used for the LEL range.

**Exception: X-am 2500 and X-am 5000:** When set to “Ex”, the lock alarm is at 110 % LEL. The lower threshold was chosen because the setting “Ex” is used to detect rare or unknown substances and the customer is unable to optimally select the corresponding adjustable LEL factor.

### What value does the lock alarm limit have with different LEL values?

For safety reasons, the lowest effective LEL value (PTB/IEC/NIOSH) is selected with each gas setting. This means: The same physical limit is used as a lock alarm limit regardless of the locally valid LEL value.

**Example:**

With the “methane” setting, the PTB/IEC definition of 4.4 vol. % methane = 100 % LEL are the basis for calculating the lock alarm limit of 125 % LEL. This applies to all devices, including devices that use the NIOSH definition of the LEL: 5.0 vol. % methane = 100 % LEL. This means that devices with the NIOSH/IEC setting already switch to lock alarm at 110 % LEL.
How is the range 0 to 100 vol. % methane depicted?

This depiction applies only to the X-am 5000 and only for methane gas:
Concentration 0 - 100 vol. % --> Depiction in display: CH₄ 0 - 100 vol. %.

Important: There is no blocking alarm in this range.

Only the heat conduction signal is used for the vol. % range. This measuring range is not suitable for monitoring explosive mixtures in the range of 0 to 100 % LEL due to the decreased accuracy in the lower measuring range!

Are our approvals or the metrological certificate affected by the change?

No, these are still valid. The necessary supplements for the relevant approvals have been carried out.

What has changed on the sensors?

The sensor design has not been changed. The changes of the described response affect the sensor data set and the device firmware. The Dräger CatEx 125 PR sensors, however, are delivered with a new sensor code that makes it possible for the X-am 2500 and the X-am 5000 to recognise the new sensor when registering with the new Sensor Replacement Wizard in CC-Vision.
Which version of CC-Vision do I need to update the gas detectors to the new firmware?

Customers: CC-Vision Basic 6.8.4 (or higher)

What documentation will now be enclosed with the devices and sensors?

Since May 2012, the loose leaf insert 9033356 was enclosed with the devices and the loose leaf insert 9033266 with the sensor Dräger CatEx 125 PR (both printed on “orange” paper). This insert is now eliminated. The enclosed loose leaf insert was modified (see below). This means that the Dräger sensors CatEx PR 125 may be operated only with a firmware 6.6 or higher. Newly delivered devices are shipped with the latest firmware version 6.6.

The new device behaviour is also described in the sensor data sheets, user instructions and technical manuals of the devices. The current technical documentation is available from the Dräger website at www.draeger.com on the technical documentation pages.

The new loose leaf insert is shipped with both sensors as well as devices with installed sensors.

Excerpt from the new loose leaf insert: 90 33 266 (Sensor)
The data sheet of the sensor CatEx 125 PR (9033263) was also supplemented with the note of the loose leaf insert.

Excerpt from the data sheet of the Dräger sensor CatEx 125, PR: 90 33 263

Is the update to the new firmware a mandatory update?

No, the update is not mandatory. The respective applicable manuals and loose leaf inserts apply to devices with firmware < 6.6. This means that a function test must be performed after overgassing.

The update is voluntary so that our customers can decide for themselves which properties of the devices they want to use. The changeover to the current firmware yields the benefits described above. If all devices in a fleet are brought up to date, all devices in a fleet also have the same device behaviour and response characteristics.
The training time and costs are reduced. The firmware update is marked in (obvious) red in the menu tree in CC-Vision (Fig.). If you select the firmware update, a message pops up informing you about new features of the update (Fig.).

However, updating to the latest firmware also has the disadvantages explained here:

- X-am 5000: No longer able to switch automatically between the measuring ranges (LEL to vol. %).
- X-am 2000: No bump test printer support (as implemented since FW 6.0).

The bump test station (without printer) itself is of course still supported.

This means: Customers who do not want the described disadvantages have the option of not updating to the latest firmware, for example, when customers still have “non-PR replacement sensors”.

Excerpt from CC-Vision, reference to the firmware update, example X-am 2000 and X-am 2600
Only with the X-am 2500 and X-am 5000:

If a new sensor is registered (with the new data set), a forced update of the device to firmware 6.6 (or higher) is performed.

The devices X-am 1700 and X-am 2000 do not use the sensor replacement Wizard. Here, customers must decide for themselves whether to upgrade or not. (CC-Vision alerts the user with a reference to that fact.)

Image: Informational message for the firmware update, example of X-am 2500
What settings are applied with the firmware update?

With the firmware update to version 6.6, a new signalling is introduced for the period of warming up the sensors and in case a menu is invoked on the device: The alarm LEDs pulse in a slow rhythm in both cases.

Furthermore, the devices are set to the “Disable allowed” mode. This is necessary since the default “Switch off impossible” / “Switch off impossible during A2 alarm occurrence” requires special actions to switch off the devices again if the lock alarm is active.

Excerpt from CC-Vision, switching off mode „Disable allowed“ after installing the latest firmware, example of X-am 2500
How to switch off a device again, which is in lock alarm mode and also set to “Switch off impossible” / “Switch off impossible during A2 alarm occurrence”?

The following options are available to switch off devices with such a configuration in lock alarm mode:

- Inserting the device into a charging cradle
- Connecting to a PC and reading with CC-Vision
- Remove rechargeable battery/battery from device (note: requires tool!)

When pulling out the battery, all EC sensors are warming up again. In case of the standard sensors (O₂, H₂S and CO), this process takes a few minutes, some of the EC sensors, however, may take several hours (example: CO₂: 12 hours). If this setting is changed, the user is actively informed of this fact, see next fig.

Why has Dräger chosen these methods?

- If the problem occurs in a workshop environment, means to reset the lock alarm (with “Disable prohibited”) are available.
- If the problem occurs in the field (personal air monitoring), a high > 100 % LEL concentration existed, which is a rare but critical case. Because of these two circumstances, it is permitted to reset the lock alarm without any tools.
- If it should be the case that the lock alarm occurs frequently, we recommend not to use the “Disable prohibited” feature.
- We recommend using the “Disable prohibited” feature with devices that are used for clearance measurements or to find leaks
Is the oxygen deficiency evaluation function still available?

Yes, if an oxygen sensor is present and the oxygen concentration drops below 8 vol. %, a fault is indicated for the CatEx sensor. In this case, the CatEx 125 PR sensor is not switched off but simply switches to fault mode. If the oxygen content of the ambient air rises again, the CatEx sensor becomes operational again.

We recommend the use of gas detectors with an IR Ex sensor for measurements in inert atmospheres.

What to remember when using the Save Energy Mode with the X-am 5000?

The X-am 5000 has an energy saving mode, during which the CatEx sensor measures only at set intervals to save power and thus extend the battery life. These possible intervals are SE1 = 10 seconds and SE2 = 20 seconds. Using the energy saving mode extends the response times of the devices accordingly. Based on the tests of the Dräger development department, the lock alarm threshold during the energy saving mode is set at 50 % LEL.
Does the firmware update also apply to devices without CatEx sensor, for example, the X-am 5100 or the X-am 5600?

Devices without CatEx sensor are to receive the new firmware update as well. The firmware update also implements minor improvements, which do not affect the behaviour of the CatEx sensor.

How can I use one gas detector to measure in both measuring ranges as was previously possible with the automatic switching of the measuring ranges?

In this case, Dräger recommends using an X-am 7000 with 2 CatEx sensors, each one covering one measuring range.

What to consider when using mining sensors?

**X-am 2000**
The future CatEx 125 Mining PR sensor cannot be used in the X-am 2000.

**X-am 5000**
The behaviour and response characteristics of the CatEx 125 mining sensors is analogue to the CatEx 125 sensors. If updating the device to firmware version 6.6 (or later), the device will exhibit the behaviour described in this FAQ. The device is planned to be available with the CatEx 125 Mining PR in the future as well and is then shipped with firmware 6.6 or later and has the behaviour described here.

If the devices are employed for mining applications using the unit "vol. %" and the range 0 - 5 vol. %, this measuring range is identified with "ch4".
Will the X-am 7000 with the Smart CatEx PR sensor also be converted to the new functionality?

Yes, the new behaviour is to be implemented in the X-am 7000 as well. The changeover is planned for autumn 2013. A separate notification will be issued for the implementation.