

Dräger

**Konformitätserklärung
Declaration of Conformity**

Wir / We Dräger Safety AG & Co. KGaA
Revalstraße 1
D-23560 Lübeck
Deutschland / Germany

erklären, dass das Produkt / declare that the product
Gasmessgerät Typ Pac 3500 and 5500
Gas Detection Instrument type Pac 3500 and 5500

gemäß den Bestimmungen der Richtlinie 94/9/EG (Geräte und Schutzsysteme zur Bestimmungsmessung
Verwendung in explosionsgefährdeten Bereichen) übereinstimmt mit den Daumenraster der EG-Daumensiegel-
Bescheinigung

following the provisions of Directive 94/9/EC (Equipment and protective systems intended for use in potentially
explosive atmospheres) is in conformity with the type of the EC-type examination certificate

DEMKO 09 ATEX 0859347

ist / for Gerätegruppe und -kategorie / Equipment Group and Category: I M1 / II T4
Zündschutzart / Type of Protection: ia
Explosionsgruppe / Explosion Group: I / IIC
Temperaturklasse / Temperature Class: T4

ausgestellt von der benannten Stelle / issued by the notified body

UL International DEMKO A/S
Lyskaer B
DK-2730 Herlev
Kenn-Nr. / ident. no. 0539

Das Produkt stimmt mit den folgenden Normen überein / the product complies with the provisions of the following
standards:

EN 60070-11:2007, EN 60070-0:2006, EN 60079-26:2007

Das Produkt wurde unter einem Qualitätssicherungssystem hergestellt, endabgenommen und geprüft, das zugelassen
wurde von der benannten Stelle

The product has been manufactured, finally inspected and tested under a quality system which has been approved by
the notified body

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Ralf Bagrak

Ralf Bagrak
Vize Präsident
Dräger Safety AG & Co. KGaA

Lübeck, 12.07.2009

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Seite 1 von 1 / page 1 of 1

Approvals
CE₀₁₅₈ (89/336/EEC, 94/9/EC)
DEMKO 09 ATEX 0859347

I M1 / II T4 Ex ia I/II C T4
-30°C ≤ Ta ≤ +55°C (-22°F ≤ Ta ≤ +131°F)

UL Class I, II Div 1, Group A, B, C, D, E, F, G, Temp Code T4
-30°C ≤ Ta ≤ +55°C (-22°F ≤ Ta ≤ +131°F)

cUL Class I, II Div 1, Group A, B, C, D, E, F, G, Temp Code T4
-30°C ≤ Ta ≤ +55°C (-22°F ≤ Ta ≤ +131°F)

IECEX UL 09.0008: Ex ia IIC T4 Ga




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Dräger

Dräger Pac[®] 3500/5500 CO, H₂S, O₂

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WARNING
Strictly follow the Instructions for Use.
User must fully understand and strictly observe these
instructions. The product must only be used for
purposes specified here.



0357220-048

1 For your safety

Strictly follow the instructions for Use

Any use of the device requires full understanding and strict observation of these instructions. The device is only to be used for the purposes specified herein.

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 be used only 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. Substitution of components may impair intrinsic safety! Repair of the instrument may only be carried out by trained service personnel according to Dräger Service Procedure.

Safety symbols used in this manual

While reading this manual, you will come across a number of warnings concerning some of the risks and dangers you may face while using the device. These warnings contain "signal words" that will alert you to the degree of hazard you may encounter. These signal words and the hazard they describe are specified as follows.

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

⚠ WARNING
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
Indicates a potentially hazardous situation which, if not avoided, could result in physical injury, or damage to the product.
It may also be used to alert against unsafe practices.

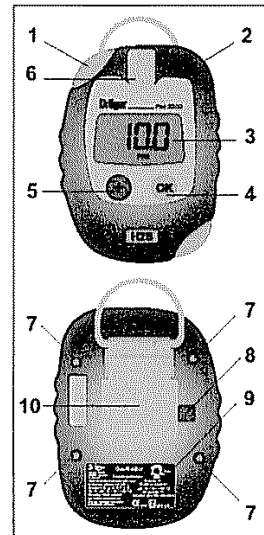
Notice
Additional information on how to use the device.

2 Intended use

- The Dräger Pac 3500/5500 measures the CO, H₂S and O₂ concentration in the ambient air and initiates alarms at preset thresholds.

3 What is what

- 1 Alarm LED
- 2 Horn
- 3 Concentration Display
- 4 [OK] Key On/Off/Alarm Acknowledge
- 5 [+] Key Off/Bump Test
- 6 Gas Opening
- 7 Screw
- 8 IR interface
- 9 Label
- 10 Clip



4 Standard configuration ¹⁾

	CO	H ₂ S	O ₂
Measuring Range	0 to 500 ppm	0 to 100 ppm	0 to 25 vol.-%
Vibrating alarm	Yes	Yes	Yes
Alarm Threshold A1	35 ppm	10 ppm	19,5 vol.-% ²⁾
acknowledgeable	Yes	Yes	No
latching	No	No	Yes

2

	CO	H ₂ S	O ₂
Alarm Threshold A2	50 ppm	20 ppm	23 vol.-%
acknowledgeable	No	No	No
latching	Yes	Yes	Yes
Fresh air calibration ³⁾	on	on	on
Bump Test Mode	off	off	off
Life Signal	off	off	off
Turning device off	always	always	always

- 1) Please be aware of special settings by customer request.
- 2) For O₂ A1 is the lower alarm threshold, used to indicate oxygen deficiency.
- 3) User can select to fresh air calibrate after startup.

5 Operation

⚠ WARNING
The device may only be used in areas subject to explosion hazards which are explicitly covered under the Ex Approvals which have been given to this device. Electrical operating safety (Ex protection) is not guaranteed in an oxygen-enriched atmosphere.

⚠ WARNING
Whenever the Pac 3500/5500 is opened, a bump test and/or a calibration must be performed afterwards. This includes each battery replacement as well as each sensor replacement in the Pac 3500/5500. Non-compliance will mean that the proper functioning of the device cannot be guaranteed which may impair the accuracy of the measurements.

⚠ 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.

Remaining life of the device (only valid for Pac 3500)

- Once activated check the remaining life by pressing [+] while device is turned off. The remaining time in days will be shown. After another press of [+] "d" will be shown. After another press of [+] the gas to be measured will be shown, e. g. "750", "d", "CO".

Activating a new device

- Press and hold [+] for approx. 3 seconds while "3, 2, 1" appears in the display. The device's usable life is now started. The gas to be measured will be shown. After 10 seconds the display will turn off or if [+] is pressed again, "d" will be shown. After 10 seconds the display will turn off or after another press of [+] the remaining time in days will be shown. After 10 seconds the display will turn off.

5.1 Turning the device on

- Press and hold [OK]. The display counts down until startup: "3, 2, 1".

Notice
All display segments are lit. Next, the LED, Alarm and Vibrating alarm are activated in sequence. Check these before each use.

- The device will perform a self test.
- The software version and the gas name are displayed.
- The number of days of remaining operation are shown, e. g. "750", "d" (only valid for Pac 3500).
- The A1 and A2 alarm limits are displayed.
- If the calibration interval function is activated the days remaining until the next calibration, e. g., » CAL « then » 20 « are displayed.
- If the bump test interval function is activated, the time until the bump test interval elapses is displayed in days, e. g., » bt « then » 123 «.
- The first warmup time in seconds is displayed alternating with the letters "SEC".
- A fresh air calibration can be performed at start up. The gas value will flash for approx. 5 seconds after indication of the alarm limits. Press [OK] during this period to perform the fresh air calibration. If during the flashing period no key or [+] is pressed then the fresh air calibration is skipped and the device will go into the measurement mode.

⚠ WARNING
For the O₂ sensor: after the first activation of the device, a sensor warm up time of up to approx. 15 minutes is needed; for all further activations the warm up time is approx. 1 minute. The gas value flashes and the [I] icon is lit until the warm up time has passed, and until the second warm up time has passed.

⚠ WARNING
The CO and H₂S have a 15 minute warm up after the first activation of the device. For all further activations, these sensors will be ready immediately after the activation sequence.

5.2 Before entering a working place

⚠ WARNING

The gas opening is equipped with a dust and water filter. This filter protects the sensor against dust and water. Do not destroy the filter. Replace destroyed or clogged filter immediately. Ensure that the gas opening is not covered and that the device is also near to your breathing area. Otherwise the device will not work properly.

⚠ WARNING

If the notice icon [!] is lit after turning the device on, it is recommended that you perform a bump test.

- Use the clip to attach the device to clothing before working in or near potential gas hazards.
- After turning the device on, the actual measurement value will normally be shown in the display.

5.3 Performing a "bump test" with gas

⚠ CAUTION

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

- Prepare a Dräger test gas cylinder with 0.5 l/min flow regulator and a gas concentration higher than the alarm threshold to be tested.
- Insert the Dräger Pac 3500/5500 and connect the test gas cylinder to the inlet (back most) nipple on the calibration adapter or to the Dräger Bump Test Station.
- To enter the bump test mode manually press the [+] 3 times within 3 seconds. The device beeps twice, quickly. The Display begins to flash slowly and the [!] icon appears.
- Open the regulator valve to let test gas flow over the sensor.
- If gas concentration exceeds the alarm thresholds A1 or A2 the corresponding alarm will occur.
- To finish the bump test press [OK], the [!] icon is removed from the display and the device returns to the measuring mode.
- If during the bump test no alarm occurs within 1 minute, the device alarm mode is entered to indicate failure. The error icon [X] and the notice icon [!] flash; error code 240 is shown upon acknowledgement. "--" is shown instead of the measured value, and the [X] and [!] icon are lit. In this case the bump test can be repeated or the device can be calibrated.
- The result of the bump test (passed or failed) will be stored in the event logger (see section 5.6).
- The bump test can also be finished automatically by the instrument without pushing the "OK" button. This function can be activated using the PC software Pac Vision or CC Vision (see section 5.7).

- If the bump test mode was entered by mistake, while the notice icon [!] is lit, press [+] to cancel the bump test mode and switch over to measurement screen.

5.4 During operation

- If the allowable measurement range is exceeded or a negative drift occurs, the following will appear in the display: "FFF" (too high concentration) or "LLL" (negative drift).
- Alarms are indicated as described in section 6.
- Continuous function of the device is indicated by the life signal, which is a beep every 60 seconds, if configured (see section 4).

5.5 Turning the device off

- Simultaneously hold both keys for approximately 2 seconds until "3" appears in the display. Continue to hold both keys until the countdown is finished. The alarm and LED will be activated momentarily.

5.6 Event logger

- Dräger Pac 3500/5500 is equipped with an event logger. The event logger stores 60 events. If event No. 61 occurs the logger overwrites the oldest stored event.
- For download of the stored data connect Dräger Pac 3500/5500 to a PC using the connecting cradle or the E-Cal System. The stored data can be downloaded with installed software Pac Vision or Gas Vision.

5.7 Calibration and configuration

- For full zero and span calibration or individual configuration connect the device to a PC using the connecting cradle or the E-Cal System. Calibration and configuration can be done with installed software Pac Vision or CC Vision. A calibration "due date" can be set using the operation timer (in days). Strictly follow the instructions for use of the modules and software in use.

5.8 Calibration Intervals

- Dräger recommends 2 year inspections. Yearly or 6 monthly calibrations if demanded, acc. EN 50073, OSHA or other country or company specific requirements.

5.9 Adjustable operation timer (in days)

- The device is equipped with an adjustable operation timer. The operation timer can be used to set an individual operation period e. g. to adjust a "calibration due date", an "inspection due date", an "out of order date" etc.
- To adjust the operation timer connect the device to a PC using the connecting cradle or the E-Cal System. The adjustment can be done with installed software Pac Vision or CC Vision.

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5.10 Information display mode

- During measuring mode, press [OK] once, will display any stored Error codes, twice will display any stored Notice codes, press [OK] again to return to the main screen.

6 Alarms

⚠ DANGER

If the main alarm activates, leave the area immediately, because there may be a danger to life. A main alarm is self-latching and cannot be acknowledged or cancelled.

6.1 Concentration pre/main alarms

- Optical and acoustical alarms are activated whenever alarm threshold A1 or A2 is exceeded. The device is equipped with a vibrating alarm. It vibrates in parallel to these alarms.
- During an A1, the LED will blink and the alarm will sound.
- During an A2, the LED and alarm tone will repeat in a double repeating pattern.
- The display will alternate between the measurement value and "A1" or "A2".
- The alarms may, according to the selected configuration, be acknowledged or turned off (see section 4). "Acknowledgeable": alarms and LED can be acknowledged by pressing [OK].
- "Latching": The alarm will only deactivate when the concentration falls under the alarm threshold and then [OK] is pressed.
- If the alarm is not latching, the alarm will deactivate as soon as the concentration falls under the alarm threshold.

6.2 Battery pre/main alarms

- When the battery pre-alarm is activated, the audible alarm sounds and the LED blinks, and the "low battery" icon » ⚡ « flashes.
- To acknowledge the pre-alarm, push [OK].
- After the first battery pre-alarm, the battery will last from 1 hour to 1 week depending on temperature:
 - ¹ > 10 °C = 1 week of run time
 - 0 °C to 10 °C = 1 day of runtime
 - < 0 °C = 2 hours of runtime
- When the battery main alarm is activated, the audible alarm sounds in a repeating pattern of 2 repeating tones and the LED blinks in the same pattern.
- The battery main alarm is not acknowledgeable; the device will automatically turn off after approx. 1 minute.
- In case of a very low battery, the internal voltage monitor could activate the LED's.

7 Changing the battery

⚠ WARNING

Danger of explosion! Do not change the battery in explosion-hazard areas. Substitution of components may impair intrinsic safety! To prevent ignition of flammable or combustible atmospheres, and to avoid compromising intrinsic safety of the equipment, read, understand, and adhere to the maintenance procedures below. Take care when changing the battery not to damage or short out components, and do not use sharp tools to remove the battery.

- The device contains a replaceable lithium battery.
- The battery is part of the Ex approval.
- Only the following battery types shall be used:
 - Duracell 123 Photo, Lithium, 3 V
 - Duracell 123 Ultra, Lithium, 3 V
 - Panasonic CR 123A, Lithium, 3 V
 - Energizer EL 123A, Lithium, 3 V
 - Powerone CR 123A, Lithium, 3 V
- Turn the device off.
- Unscrew the 4 screws from the back case.
- Open the front case and remove the depleted battery.
- Insert the new battery according to specified polarity (+/-).
- Place front case back and fasten it by tightening the 4 screws of the back case.
- After changing the battery a sensor warm up time of approx. 15 minutes is needed. The gas value flashes until the warm up time has passed.

7.1 Handling of exhausted batteries

⚠ WARNING

Danger of explosion! Do not throw used batteries into fire or try to open them by force. Dispose of the batteries in accordance with local regulations. Spent batteries may be returned to Dräger for disposal.

Usable life alarm (only valid for Pac 3500)

- Before the end of the device's usable life, a warning period begins. During this period the remaining life time flashes just after turning the device on, e. g. "30" / "d".
- To acknowledge this message [OK] must be pressed. After that, the device can be used normally.
- After the usable life has expired the text "0" / "d" will alternate in the display and cannot be acknowledged. Dräger Pac 3500 will not longer measure and may be returned to Dräger for recycling or disposal.

7.2 Device alarm

- The alarm and LED will be activated three times, periodically.
- The [X] icon is flashing, a 3 digit error code will be shown in the display.
- If an error appears in the display see section 9 and if necessary please contact Dräger.

8 Changing the sensor

WARNING
 Danger of explosion! Do not change the sensor in explosion-hazard areas. Substitution of components may impair intrinsic safety!
 To prevent ignition of flammable or combustible atmospheres, and to avoid compromising intrinsic safety of the equipment, read, understand, and adhere to the maintenance procedures below.
 Take care when changing the sensors not to damage or short out components, and do not use sharp tools to remove the sensors.

Notice

Replace sensor when instrument can no longer be calibrated!

Notice

Use only the DrägerSensor XXS of the same gas type!

- Turn the instrument off.
- Unscrew the 4 screws from the back case.
- Open the front case and remove the battery.
- Remove the sensor.
- Insert the new sensor.
- Insert the battery according to specified polarity (+/-).
- Place front case back and fasten it by tightening the 4 screws of the back case.
- After inserting the battery a sensor warm up time of around 15 minutes is needed.
- Countdown in seconds is shown until warmup time has passed.
- After changing the sensor and after the warm up time is finished the instrument must be calibrated.

9 Trouble shooting warnings/errors

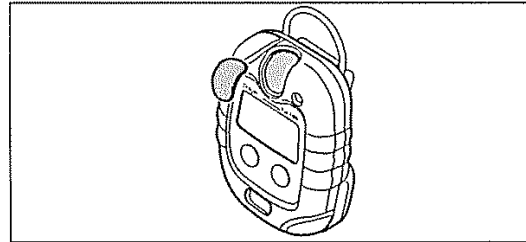
Warnings

Code	Cause	Remedies
225	Calibration interval has expired.	Perform span calibration.
235	Bump test interval has expired.	Perform bump test.

Errors

Code	Cause	Remedies
100	Flash / EEPROM write fail	Contact Service
102	AD system defect	Contact Service
104	Flash check sum wrong	Contact Service
106	Most recent settings restored	Recalibrate device
107	Self test failed	Contact Service
109	Configuration incomplete	Configure again
210	Fresh air calibration failed	Repeat operation
220	Span calibration failed/Calibration grace period expired	Perform span calibration.
240	Bump test failed	Repeat bump test or calibrate device

10 Changing dust and water filter



11 Technical specifications

Environmental Conditions

During operation	-30 to 50 °C / -22 to 122 °F 700 to 1300 hPa 10 to 90% relative humidity
Conditions for storage	0 to 40 °C / 32 to 104 °F 30 to 80% relative humidity
Ingress protection	IP 66
Pac 3500 Operating times	2 years (typical at 25 °C)
Pac 5500 Operating times	unlimited
Battery life (typical at 25 °C)	8 hours of use per day, 1 minute alarm per day; CO, H ₂ S: > 2 years typical O ₂ : > 12 month typical
Intensity of alarm	typical 90 dB (A) at a distance of 30 cm (11.8 in.)
Dimensions	64 x 84 x 20 (battery compartment 25) mm 2.5 x 3.3 x 0.8 (battery compartment 1) in.
Weight	106 g (3.8 oz.)
Approvals	(see "" on page 20)

12 Sensor specifications

	CO	H ₂ S	O ₂
Reproducibility			
Zero point:	≤ ±2 ppm	≤ ±0.1 ppm	≤ ±0.2 vol.-%
Sensitivity:	≤ ±2 % of measured value	≤ ±5 % of measured value	≤ ±1 % of measured value
Long-term drift (20 °C)			
Zero point:	≤ ±2 ppm/a	≤ ±0.2 ppm/a	≤ ±0.5 vol.-%/a
Sensitivity:	≤ ±1 % of measured value / month	≤ ±1 % of measured value / month	≤ ±1 % of measured value / month
Please be aware of possible sensor cross sensitivities (see Data Sheet CO: 9023816, H ₂ S: 9023970, O ₂ : 9023820).			

Date of production: see label at the back case.

13 Accessories

Description	Order-code
Connecting Cradle, complete with USB cable and Pac Vision software	83 18 587
Calibration Adapter	83 18 588
Lithium battery	45 43 808
Dust and water filter	45 43 836
Leather carrying case	45 43 822
Bump Test Station, complete with test gas cylinder 58 L (gas type by customer request)	83 18 586
E-Cal device module for connection of 4 Dräger Pac 1000 to 7000 to a E-Cal Master Station or to Module Adapter	83 18 589