

# D•TEX3F+

Gas detector



## INSTRUCTION MANUAL

**DALEMANS**  
GAS DETECTION

THE BELGIAN PIONEER IN GAS DETECTION

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*Please contact your distributor in case of doubt.*

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# WARNINGS



**BEFORE the installation, maintenance or repair of the detector, check that there is no explosive gas or explosive vapour in the atmosphere. Never open the detector when an explosion risk is present. To reduce the risk of electrostatic discharge, always use a damp cloth to clean the detector.**

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**The INSTALLATION, COMMISSIONING and MAINTENANCE must be performed exclusively by DALEMANS or by an approved service centre and in all cases by qualified personnel having received appropriate training. The gas detection equipment must be calibrated at least once a year to compensate for any loss of sensitivity of the sensors.**

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- The guarantee offered by DALEMANS will be void if this equipment is not installed, used and maintained in strict compliance with these instructions, warnings and limits of use.
- By following these instructions, you guarantee the proper functioning of the equipment. Please contact DALEMANS for any information on the installation, use or maintenance of this equipment.
- Always follow the following instructions to prevent premature wear to the sensor and guarantee its proper functioning. These recommendations are general guidelines.
- Always refer to current regulations and standards before proceeding with the installation (e.g. standards IEC 60079-14 and IEC 60079-29-2). These take precedence over the manufacturer's recommendations.
- Maintenance must be carried out according to the procedures given by DALEMANS or its local representative. Any repair or maintenance performed without respecting these instructions or without help from DALEMANS may prevent the equipment from working correctly and, as a result, prevent guaranteeing the safety of the occupants of the installations being monitored.
- The modification, disassembly and total or partial destruction of this equipment may lead to invalidity of the essential safety requirements of the installations as a whole.
- Only use original DALEMANS spare parts. Using unoriginal spare parts may invalidate the certification and the guarantee covering this equipment.

# LIMITATIONS

- The sensors may be sensitive to several gases. Consult DALEMANS for more information.
- The catalytic sensors can lose sensitivity in the presence of inhibitors and pollutants such as silicone, halogen and heavy metals. When these inhibitors are permanently present, DALEMANS recommends the use of gas detectors equipped with infra-red sensors immune to these pollutants and inhibitors.
- The catalytic sensors are not suitable for use in atmospheres with variable oxygen levels, at over 21% oxygen or less than 15% oxygen. Prolonged exposure to explosive gas concentrations greater than 100% of the Lower Explosive Limit (LEL) may significantly reduce its useful life.
- During construction, repackaging or maintenance works concerning the installations, gas detectors must be installed as late as possible but nevertheless before any risk of the presence of gas or gas vapours. This is to avoid any damage to the sensor resulting from works such as welding or painting. If they are already installed, the detectors must be protected using a sealed cover for the duration of the work and be clearly marked as being non-operational.
- The gas detectors must be protected against any direct exposure to solar rays, against vibrations and risks of mechanical impacts.

# SAFETY INSTRUCTIONS

## Explosive limit

The ratio between “percentage of the Lower Explosive Limit” (% LEL) and “percentage by volume” (% v/v) varies from one gas to another. Standard IEC 60079-20-1 setting out the method for determining explosive limits gives the following examples:

Gas	Formula	100% LEL
Methane	CH <sub>4</sub>	4.4 % v/v
Butane	C <sub>4</sub> H <sub>10</sub>	1.4 % v/v
Propane	C <sub>3</sub> H <sub>8</sub>	1.7 % v/v

## Alarm levels

In an explosive gas detection system, the alarm thresholds must be fixed relative to the Lower Explosive Limit (LEL) of the gas detector. The alarm thresholds for explosive gases are typically 20% LEL for the first alarm level (A1) and 40% LEL for the second level (A2).



**Never set an alarm level over 60% LEL**

The choice of alarm levels must consider the possible effects of local climatic conditions.

<b>Temperature</b>	The LEL of a gas is affected by temperature. When the temperature increases, the LEL decreases and explosion risk increases.
<b>Pressure</b>	The relationship between pressure and LEL is very complex. In general, if the pressure increases, the LEL decreases and thus the explosion risk increases.
<b>Humidity</b>	Fluctuations in humidity rates generally found in industrial environments do not significantly affect the LEL of a gas.

Climatic conditions	Effect on the LEL of a gas	Effect on the explosion risk
Temperature ↗	↘	↗
Pressure ↗	↘	↗
Humidity ↗	-	-

# DIRECTIVE 2014/34/EU (ATEX)

## Danger zones

Zone	Definition
0	Zone in which an explosive atmosphere of gas or gas vapours is permanently present for long periods or regularly.
1	Zone in which an explosive atmosphere of gas or gas vapours is likely to form occasionally under normal operation.
2	Zone in which an explosive atmosphere of gas or gas vapours is not likely to form under normal operation or, if this occurs nonetheless, only forms for a short period.

## Equipment categories

Category	Definition	Usage zone(s)
1	Equipment with a "very high" degree of safety	0
2	Equipment with a "high" degree of safety	1 and 2
3	Equipment with a "normal" degree of safety	2

## Gas groups

Group	Reference gas	Definition
I	Methane	Equipment intended for mines, on the surface or under the surface
IIA	Propane	Equipment intended for surface industries other than mines
IIB	Ethylene	
IIC	Hydrogen	

## Temperature class

The equipment must be chosen such that its surface temperature never reaches the self-ignition temperature of the gas present. Below are some examples of explosive gases classified according to their self-ignition temperature. This list is non-exhaustive.

Gas group	Temperature class and maximum surface temperature of the equipment					
	T1 450 °C	T2 300 °C	T3 200 °C	T4 135 °C	T5 100 °C	T6 85 °C
IIA	IIB	IIC	Methane	Butane	Kerosene	Acetaldehyde
			Propane	Ethanol	Nonane	
			Toluene	Methanol	Octane	
			Xylene	Propanol	Pentane	
			Town gas	Ethylene oxide	Ethyl ether	
			Hydrogen	Acetylene		Carbon bisulphide

## LIMIT OF LIABILITY

DALEMANS cannot be held responsible for any direct or indirect damage, as well as any direct and indirect monetary damages resulting from the failure to comply with these guidelines.

Every effort has been made to guarantee the accuracy of the information provided in this document. However, DALEMANS waives any liability in case of errors or omissions in this document.

## ENVIRONMENT

### Waste Electrical and Electronic Equipment Directive (WEEE Directive)



The presence of this symbol on the product and/or the accompanying documentation means that you are required to respect the regulations in force concerning the collection and recycling of Waste Electrical and Electronic Waste (WEEE).

These provisions aim to preserve the natural resources used to produce this product and to avoid the dispersal of substances which are potentially harmful to the environment and human health.

Therefore, once this product reaches the end of its life, you **MUST** discard it by taking it to an approved collection centre for the recycling of electrical and electronic equipment. For more information on collection and recycling centres in your region, please contact your local or regional administration.

## QUALITY ASSURANCE



This product has been designed, manufactured and inspected in the context of a Quality Assurance system certified according to ISO 9001 and evaluated by a notified body in accordance with annexes IV and VII of directive 2014/34/EU (ATEX).

# 1. INTRODUCTION

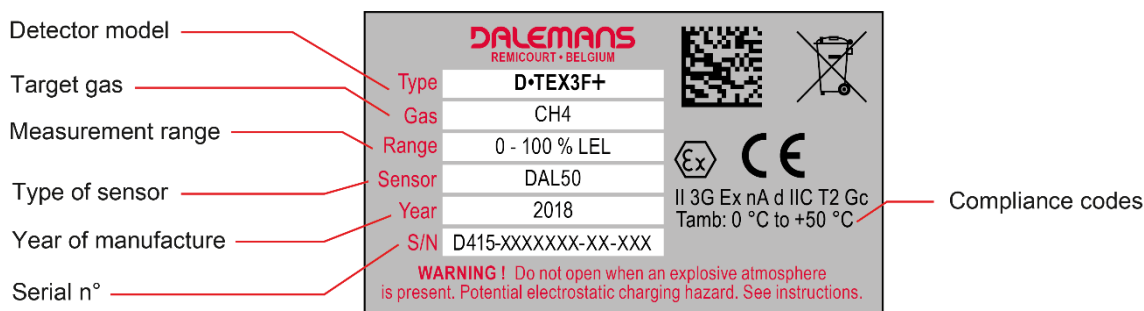
The explosive gas detector **D•TEX3F+** is intended to monitor confined spaces in the commercial and industrial sectors. The **D•TEX3F+** is suitable for use in explosive atmosphere danger zones. It is designed to operate in association with a compatible alarm panel in order to react before the explosive gas concentration reaches the Lower Explosive Limit (LEL). For more information on the list of detectable gases, please contact DALEMANS.

## 1.1. Certification

DALEMANS declares that the explosive gas detector **D•TEX3F+** is certified for use in zone 2 explosive atmospheres and that it meets the provisions of the European Directives and the following standards:

- Directive 2014/34/EU (ATEX)
- Standard EN 60079-0
- Standard EN 60079-1
- Standard EN 60079-15

The marking label represented below is affixed to one side of the detector and allows the user to identify the model of detector, the type of sensor installed and information relating to the certification concerning this equipment. In the absence of this marking label, the detector is not certified for use in danger zones.



**Figure 1: identification and certification label**

Compliance	Definition (see “Directive 2034/14/EU” for more information)
II	Electrical equipment group for explosive atmospheres other than mines.
3G	Category 3 equipment intended for zones in which an explosive gaseous atmosphere is not likely to form in normal operation or, if this occurs nevertheless, it only forms for a short period (zone 2).
Ex nA d	Equipment intended for explosive gaseous atmospheres and combining protection modes “nA” (no sparks) and “d” (flameproof enclosure).
IIC	Subdivision of equipment group II according to the nature of the explosive gaseous atmosphere (methane, propane, ethylene, hydrogen, acetylene).
T2	Temperature class indicating the maximum surface temperature of the material in an explosive gaseous atmosphere (T2=300 °C).
Gc	Material for explosive gaseous atmospheres, having “enhanced” protection, which is not a source of ignition under normal operation, and which may have additional protections to make sure that it remains inactive as a source of ignition in common and regular cases.
Tamb	Ambient temperature for which the temperature class (T2) has been established.



## 2. DESCRIPTION

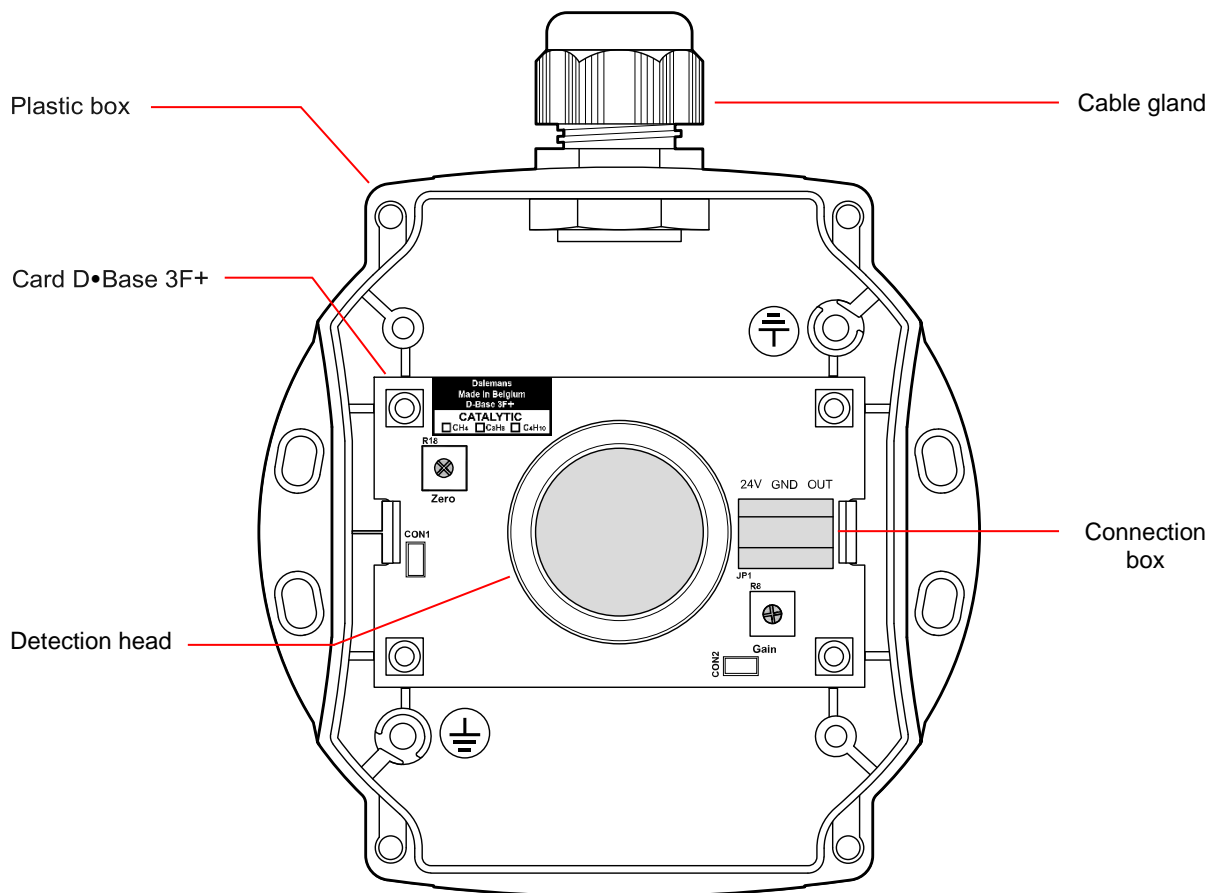
### 2.1. Overview

The **D•TEX3F+** is a gas detector designed to detect the presence of explosive gas in the ambient air at concentrations up to 100% of the Lower Explosive Limit (LEL). It uses a CATALYTIC sensor with the voltage signal connected to an alarm panel.

The **D•TEX3F+** comprises a plastic flame-retardant box, a certified cable gland, a detection head with a flameproof enclosure and a connection terminal mounted on a circuit board. The detection head and the D•BASE 3F+ card are designed to facilitate the possible replacement of the sensor.

The **D•TEX3F+** is designed for:

- Use in danger zones other than mines (group II – category 3);
- Use in zone 2 of explosive gaseous atmospheres;
- Operation at a temperature of 0 °C to +50 °C.



*Figure 2: view of the D•TEX3F+ detector*

## 2.2. Dimensions

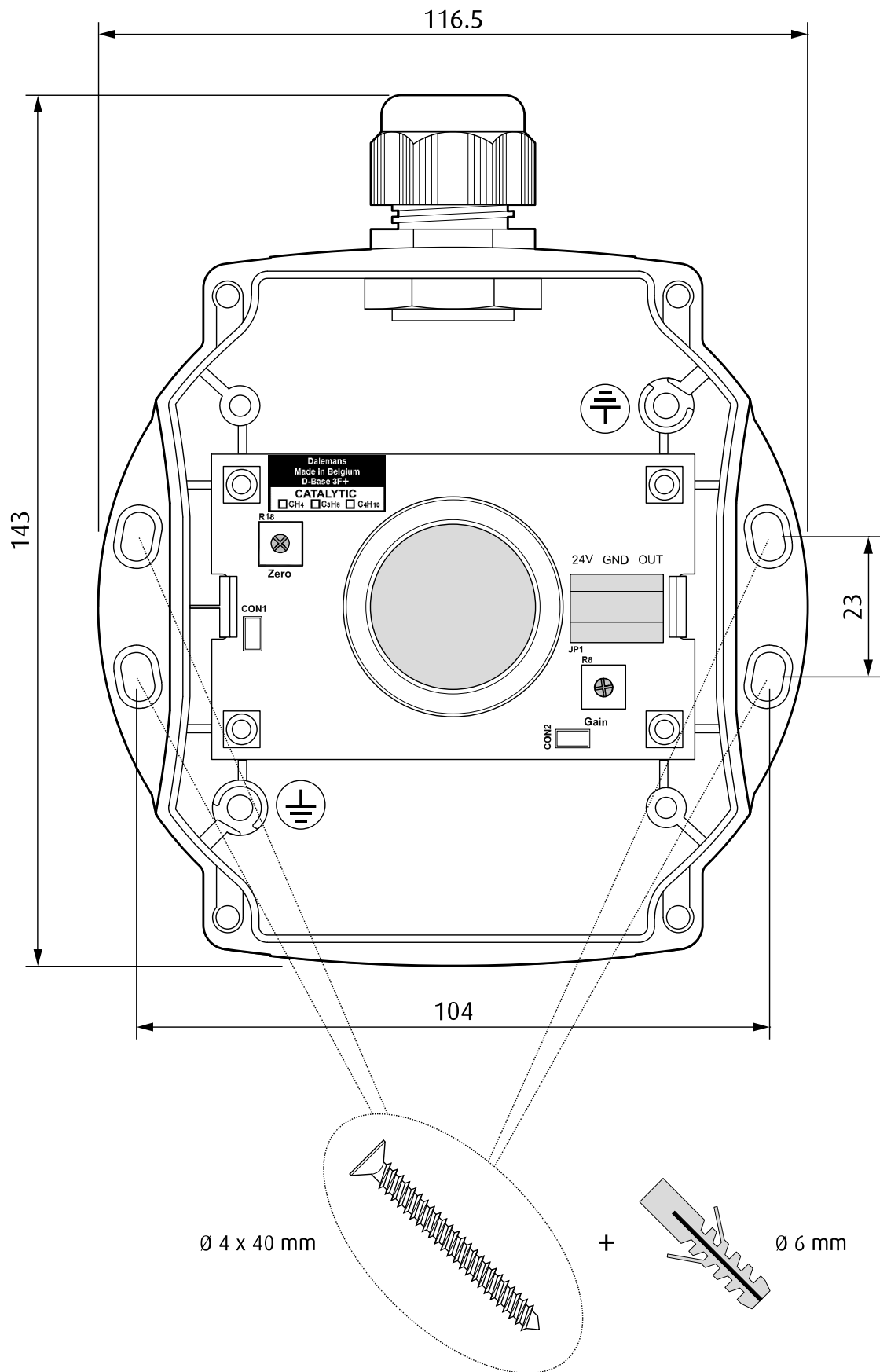


Figure 3: D•TEX3F dimensions in mm D•TEX3F+

## 3. INSTALLATION

### 3.1. Positioning of the detectors

The gas detectors must be positioned such that any gas accumulation will be detected before it creates a significant risk. The inappropriate positioning of a detector can cancel the effects and integrity of the gas detection system.

The choice of position of the detectors must be determined in collaboration with specialists having the required knowledge of gas dispersion, with people knowledgeable about the operation of the installations and equipment concerned and with technical personnel and personnel involved in the safety procedure. You can obtain more information or assistance by contacting DALEMANS or its local representative.

The position of the detectors must be recorded and made available to safety personnel.

Please consider the following observations concerning the positioning of the detector:

- Access to the detector must be easy for maintenance and inspection operations.
- Allow sufficient space for the use of accessories required for these operations.
- The level of risk and potential gas sources must be considered.
- Consider possible combinations of gas sources and dissemination effects.
- The detector must be protected against risks related to the operation of the installations.
- The detector must be protected against vibrations and the risks of mechanical impacts.
- Never place the detector directly above or below a water source.
- For external placement, use protection against rain and/or the sun.
- Do not install the detector in an air flow.
- The detector's usage temperature must always be respected (see "Specifications").
- To detect gas lighter than air, place the detector close to the ceiling.
- To detect gas heavier than air, place to detector close to the floor.
- If the density relative to the gas to be detected is close to that of the air (air density = 1), place a detector close to the ceiling and another one close to the floor.
- The density of a gas increases when the ambient temperature increases.
- For the installation of a detector at height, DALEMANS recommends the use of the "**Collector cover D•LINE**" (see "Spare parts and accessories").

Below are some examples of detector positions depending on the gas to be detected:

Gas*	Formula	Density (air = 1)	Position
Cracked gas	-	0.47	High
Natural gas	-	0.68	
<b>Methane</b>	CH <sub>4</sub>	0.55	
<b>Butane</b>	C <sub>4</sub> H <sub>10</sub>	2.05	Low
<b>Propane</b>	C <sub>3</sub> H <sub>8</sub>	1.56	

\* Non-exhaustive list

## 3.2. Assembly

The **D•TEX3F+** detector is mounted flat on a wall or a ceiling according to the dimensions given in Figure 3.

- Mount the detector using suitable screws and pins.
- Make sure that dust deposits do not obstruct the sensor and that water does not enter the detector.
- The **D•TEX3F+** may be mounted horizontally or vertically.
- For vertical assembly, the box's cable glands can be oriented upwards or downwards but the cover must always be in the position below.

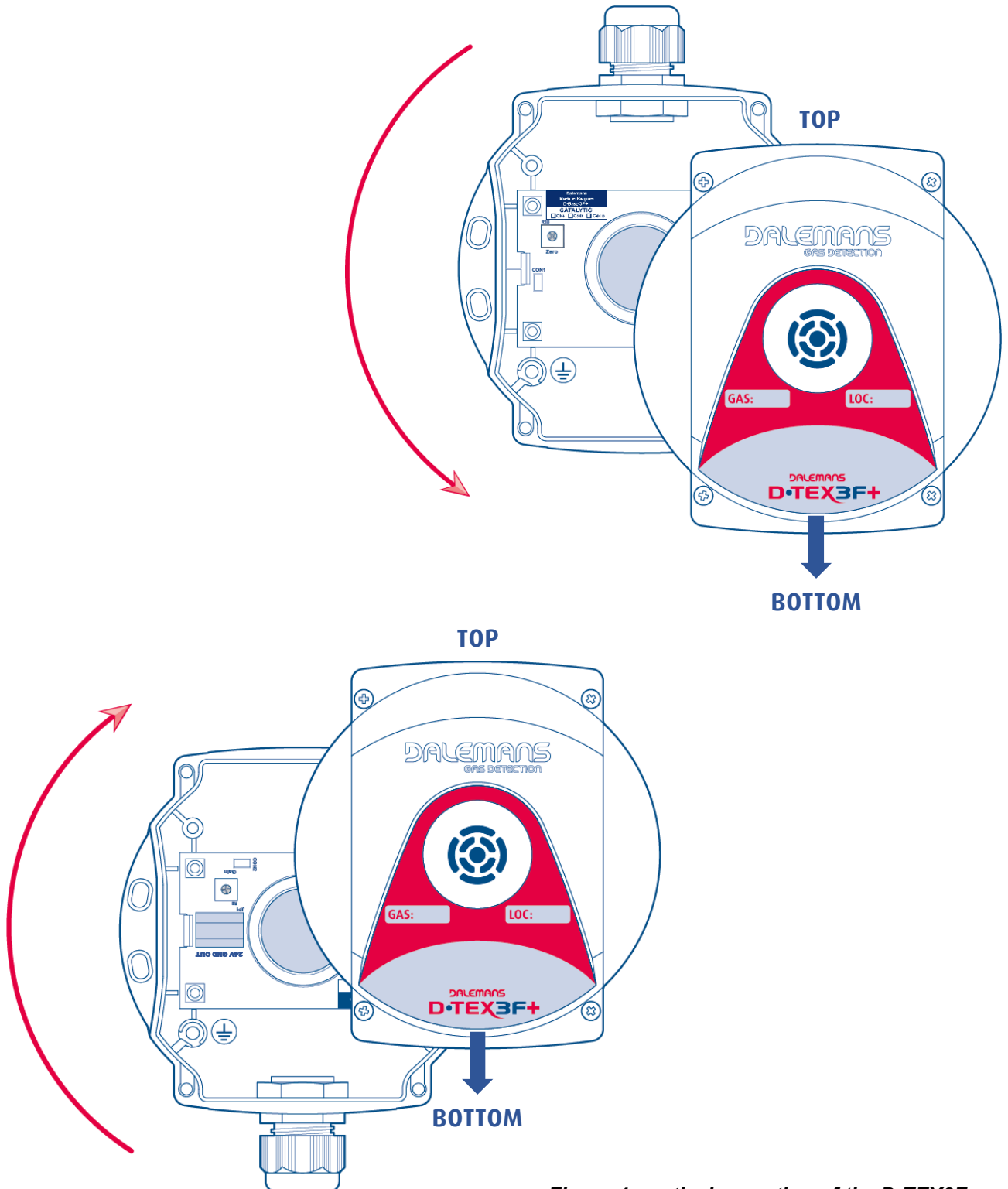


Figure 4: vertical mounting of the D•TEX3F+

### 3.3. Wiring

Wiring must comply with local standards and regulations. It must also meet the electrical requirements of the **D•TEX3F+** detector.

- DALEMANS recommends the use of a flexible conductor cable in different colours.
- The section of the conductors must be between 0.75 and 1.5 mm<sup>2</sup> and depends on the distance separating the detector from the alarm panel. For more information on this subject, refer to the alarm panel's instruction manual.
- The cable's external diameter cannot exceed the dimensions indicated below.

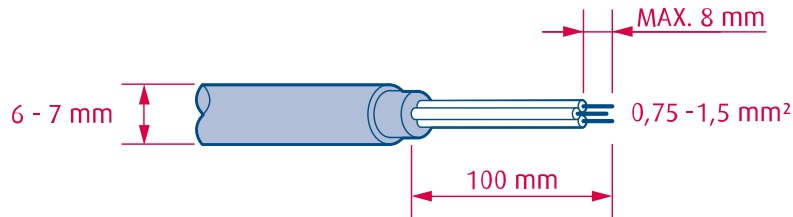


Figure 5: wiring D•TEX3F+

### 3.4. Electrical connection



Always check that the electrical requirements of the **D•TEX3F+** detector are compatible with the characteristics of the measurement panel (see “Specifications”).

Connections to the **D•TEX3F+** detector are via the “**24V GND OUT**” terminal present on the card D•BASE 3F+, inside the box. The conductors must be stripped and inserted such that the insulation is not more than 1mm from the metal edge of the connecting terminal U•H6.

To connect the **D•TEX3F+** detector:

- Unscrew the four screws from the detector's cover and remove the cover.
- Unscrew the cable gland's clamping ring.
- Insert the cable into the cable gland and tighten the ring to guarantee the sealing.
- Connect the three conductors to the “**24V GND OUT**” terminals according to the diagram below.
- Replace the cover on the box and tighten the cover's four metal screws.

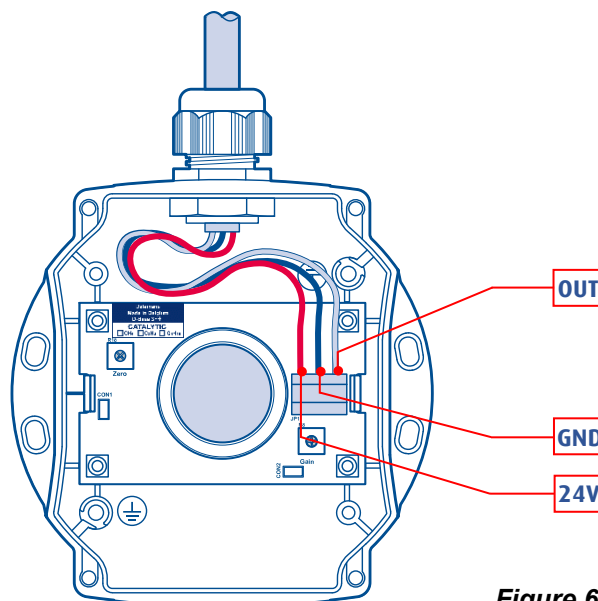


Figure 6: Connection of the D•TEX3F+

## 4. MAINTENANCE

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Before performing maintenance operations, please inhibit the safety function of the detector on the alarm panel and secure the servo controls connected to the system to prevent any untimely activation or any false alarm.

Never open the detector in the presence of explosive gas.

Regularly clean the dust deposits from the detector using a damp cloth **ONLY** to limit the risk of electrostatic discharge.

When the detection head's filter has been contaminated with solvents, gas or gas vapours, the detection head must be replaced and the inspection frequency must be doubled.

The gas detectors must be calibrated at least once a year to compensate for the loss of sensitivity of the sensors. This calibration must be carried out according to the procedure given by DALEMANS or by its local representative and, in any case, by qualified personnel having received appropriate training.

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### 4.1. Replacing the sensor

To facilitate its replacement, the sensor is supplied pre-mounted on the D•BASE 3F+ card.

- Unscrew the four screws from the detector's cover and remove the cover.
- Disconnect the cable from the "24V GND OUT" terminal block completely.
- Remove the D•BASE 3F+ card from the detector's box.
- Insert the new card into the box and reconnect the cable as indicated in Figure 6.
- Reclose the detector box's cover using its four screws.
- Power the detector back up and wait 15 minutes for its signal to stabilise.
- Calibrate the detector according to the DALEMANS procedure or the local representative.
- Re-establish the detector's safety function on the alarm panel.

## 4.2. Error diagnosis

Problem displayed on the alarm panel	Possible cause(s)
Non-zero measurement	<ul style="list-style-type: none"> <li>▪ Presence of gas possible.</li> </ul>
Non-zero measurement in the absence of gas.	<ul style="list-style-type: none"> <li>▪ Detector calibration fault.</li> </ul>
Measurement too high or too low	
Zero measurement in the presence of gas.	<ul style="list-style-type: none"> <li>▪ Wiring or connection defective.</li> <li>▪ Voltage in the detector (between the "24V" and "GND" terminals) outside of limits.</li> <li>▪ Sensor or filter obstructed (dust).</li> <li>▪ Sensor or filter contaminated. Replace the sensor AND the filter.</li> </ul>
"Fault" signal active on the panel	<ul style="list-style-type: none"> <li>▪ Wiring or connection defective.</li> <li>▪ Sensor disconnected or defective.</li> <li>▪ Voltage in the detector (between the "24V" and "GND" terminals) outside of limits.</li> </ul>

## 4.3. Spare parts and accessories

Spare parts	Reference
Card D•BASE 3F+ with catalytic sensor CH <sub>4</sub> 100% LEL	BASDLINE031
Card D•BASE 3F+ with catalytic sensor C <sub>3</sub> H <sub>8</sub> 100% LEL	BASDLINE032
Card D•BASE 3F+ with catalytic sensor C <sub>4</sub> H <sub>10</sub> 100% LEL	BASDLINE033
Cover without face for detector D•Tex3F & D•Can	BO100000237
Accessories	Reference
Remote gas injection kit D•LINE	ACCKIT00006
Airtight protection kit IP65 D•LINE	ACCKIT00007
Collector cover D•LINE	ACCKIT00008
Airtight remote gas measurement kit D•LINE	ACCKIT00009

## 5. SPECIFICATIONS

To guarantee safety and performance, any gas detection installation must be calibrated and maintained regularly according to the manufacturer's guidelines.



CHARACTERISTICS		
Brand	Design and manufacture	DALEMANS S.A.
Principle and gas concerned	Measurement principle	Catalytic
	Methane (CH <sub>4</sub> )	0 - 100 % LEL
	Propane (C <sub>3</sub> H <sub>8</sub> )	0 - 100 % LEL
	Butane (C <sub>4</sub> H <sub>10</sub> )	0 - 100 % LEL
Detection performance	Response time (T <sub>90</sub> )	< 30 s
	Accuracy	± 2 % range < 50 % LEL
Supply	Mains	24V
	Power	0.45 W ± 0.05
	Current	18 mA ± 2
	Secured	12V
Box	Material	Flame-retardant and UV-stable plastic (UL-94V0)
	Dimensions (H x W x D)	147 x 119 x 51 mm
	Weight	285 g
	IP protection index	IP 65
	Reversibility	YES
	Standard fixing	4 screws
Connection	Cable input	1 x M20
	Screwed terminal	3 x 0.75 - 2.5 mm <sup>2</sup>
Outputs	Type	1 x 3F+
	Output signal	3-wire analogue voltage
Conditions of use	Temperature	0 °C - +50 °C
	Humidity	10 - 90% RH (without condensation) 90 - 110KPa
Certifications	Licence	(ex) II 3G Ex nA d IIC T2 Gc Tamp: 0°C - +50°C
	Danger zones	Zone 2
	Standards	EN 60079-0, EN 60079-1, EN 60079-15
	Cell unit certificate	FTZU 15 ATEX 00032 U
	Marking	CE, RoHS

The information contained in this document is non-contractual and subject to change.





# D•TEX3F+

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