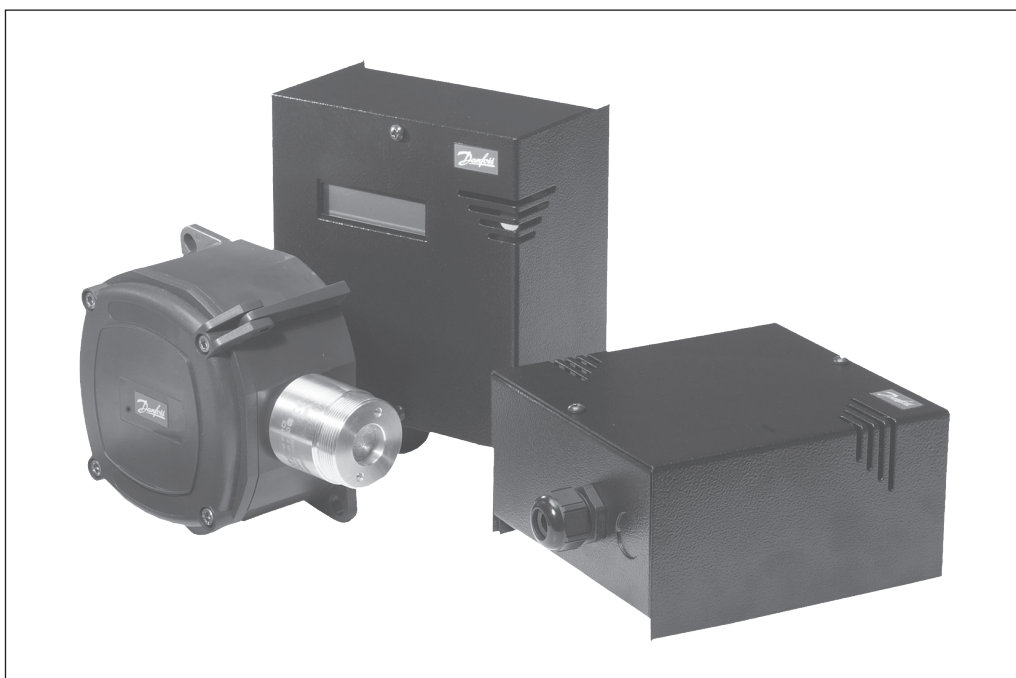


## **Gas Detection Sensor** type GDA, GDC, GDHC, GDHF, GDH

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## Introduction



Danfoss Gas Detection program, type GD is a range of products designed to meet all industrial refrigeration and air conditioning applications.

GD detects a wide range of commonly used refrigerants including Ammonia, Carbon Dioxide, Halocarbons and Hydrocarbons.

GD sensors incorporate an interchangeable precalibrated sensor board, which makes it very easy to replace the sensor when service or calibration is required.

The GD products feature reliable, real time continuous monitoring. No blocked filters, tubes or technical / maintenance problems experienced by air sampling/ aspirated systems.

## Features

- GD is specifically developed for refrigeration applications.
- Interchangeable precalibrated sensor board means reduced costs of recalibration and maintenance
- Optional models: LCD display, IP 56 enclosure, IP 56 Low temperature, EExd (Explosion Protected), EExd Low temperature, Models with remote sensor, Models with remote EExd sensor, Models with remote display
- Can operate as stand alone product.
- Linear analog outputs, current (mA) / volt (V) proportional to the gas concentration.
- Two digital outputs. Low Level and High Level Alarm
- Optional NO or NC and different delay setting for both Low and High Alarm Level.
- Manual or Auto reset optional.
- Low and High Alarm levels and delays setting, can be changed by the user.
- GD can be connected directly to a Danfoss m2, Micromon or AK-SM 350 monitoring unit.
- Available with a range of different sensor technologies to monitor industrial refrigeration gases:
  - Electro-Chemical (EC)
  - Semi-Conductor (SC)
  - Catalytic (CT)
  - Infra-Red (IR)
- Calibration Certificates available

## Technical data

## Refrigerants - [ppm] range:

## Ammonia (R 717)

Type GDA:

- 0-100 ppm
- 0-300 ppm
- 0-1,000 ppm
- 0-10,000 ppm
- 0-30,000 ppm

## Carbon Dioxide (R 744)

Type GDC

- 0-10,000 ppm
- 0-20000 ppm
- 0-40000 ppm

## Halo-Carbon - HCFC (R 22, R 123)

Type GDHC

- 0-1,000 ppm

## HFC (R 404A, R 507)

Type GDHF

- 0-1,000 ppm

## HFC (R134A)

Type GDHF-R3

- 0-1,000 ppm

## Hydro-carbon (R 290, R 600, R 600A, R 1270)

Type GDH

- 0-5,000 ppm

**Technical data**
*(Continued)*

| Models | Standard Basic | Standard Basic with LCD display | IP 65 for High RH and Fast response | IP 56 enclosure | IP 56 enclosure Low Temperature | EExd model | EExd model Low Temperature | IP 66 enclosure 5 m remote IP 65 sensor | IP 66 enclosure 5 m remote IP 65 EExd sensor | Remote LCD display IP 41 5 m cable <sup>3)</sup> |
|--------|----------------|---------------------------------|-------------------------------------|-----------------|---------------------------------|------------|----------------------------|---|--|--|
|--------|----------------|---------------------------------|-------------------------------------|-----------------|---------------------------------|------------|----------------------------|---|--|--|

**Temperature range**

|               |                             |                           |                             |                             |                                 |                             |                              |                             |                             |                           |
|---------------|-----------------------------|---------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|---------------------------|
| <b>EC</b>     | -20°C/+40°C<br>(-4°F/104°F) | 0°C/+40°C<br>(32°F/104°F) | -20°C/+40°C<br>(-4°F/104°F) | -20°C/+40°C<br>(-4°F/104°F) | -40°C/+40°C<br>(-40°F/104°F)    | -20°C/+40°C<br>(-4°F/104°F) | -40°C/+40°C<br>(-40°F/104°F) | -20°C/+40°C<br>(-4°F/104°F) | -20°C/+40°C<br>(-4°F/104°F) | 0°C/+40°C<br>(32°F/104°F) |
| <b>SC, CT</b> | -20°C/+50°C<br>(-4°F/122°F) | 0°C/+50°C<br>(32°F/122°F) | -20°C/+50°C<br>(-4°F/122°F) | -20°C/+50°C<br>(-4°F/122°F) | -40°C/+50°C<br>(-40°F/122°F)    | -20°C/+50°C<br>(-4°F/122°F) | -40°C/+50°C<br>(-40°F/122°F) | -20°C/+50°C<br>(-4°F/122°F) | -20°C/+50°C<br>(-4°F/122°F) | 0°C/+50°C<br>(32°F/122°F) |
| <b>IR</b>     | 0°C/+50°C<br>(32°F/122°F)   | 0°C/+50°C<br>(32°F/122°F) | -20°C/+50°C<br>(-4°F/122°F) | 0°C/+50°C<br>(32°F/122°F)   | 1) -50°C/+50°C<br>(-58°F/122°F) | -20°C/+50°C<br>(-4°F/122°F) | not available                | not available               | not available               | 0°C/+50°C<br>(32°F/122°F) |

**Weight (excluding packing)**

|               |                 |                 |                 |                 |                 |                  |                  |                  |                  |                 |
|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|-----------------|
| <b>EC</b>     | 912 g (2.01 lb) | 947 g (2.09 lb) | 903 g (1.99 lb) | 562 g (1.24 lb) | 562 g (1.24 lb) | 4408 g (9.72 lb) | 4408 g (9.72 lb) | 1199 g (2.64 lb) | 1199 g (2.64 lb) | 421 g (0.93 lb) |
| <b>SC, CT</b> |                 |                 |                 |                 | 661 g (1.46 lb) | 3600 g (7.94 lb) | not available    | not available    | not available    |                 |
| <b>IR</b>     |                 |                 |                 |                 |                 |                  |                  |                  |                  |                 |

**Electrical data**

|               |   |  |  |  |  |   |   |   |   |   |
|---------------|---|--|--|--|--|---|---|---|---|---|
| <b>EC</b>     | 12-24 V d.c., 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c. 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c. 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c. 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c. 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c., 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c., 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c., 0.23A<br>12-24 V a.c. 4 W | 12-24 V d.c., 0.23A<br>12-24 V a.c. 4 W | Supplied from connector on GD motherboard |
| <b>SC, CT</b> |   |  |  |  |  |   |   |   |   |   |
| <b>IR</b>     |   |  |  |  |  |   |   |   |   |   |

**Enclosure**

|               |                    |                    |                    |                     |                     |                    |                    |                                   |                                   |                    |
|---------------|--------------------|--------------------|--------------------|---------------------|---------------------|--------------------|--------------------|-----------------------------------|-----------------------------------|--------------------|
| <b>EC</b>     | IP 30<br>(~NEMA 1) | IP 30<br>(~NEMA 1) | IP 65<br>(~NEMA 4) | IP 56<br>(~NEMA 4x) | IP 56<br>(~NEMA 4x) | IP 65<br>(~NEMA 4) | IP 65<br>(~NEMA 4) | <sup>2)</sup> IP 66<br>(~NEMA 4x) | <sup>2)</sup> IP 66<br>(~NEMA 4x) | IP 41<br>(~NEMA 1) |
| <b>SC, CT</b> |                    |                    |                    |                     |                     |                    | not available      | not available                     | not available                     |                    |
| <b>IR</b>     |                    |                    |                    |                     |                     |                    |                    |                                   |                                   |                    |

<sup>1)</sup> With built-in heater.

<sup>2)</sup> Remote sensor: IP 65.

<sup>3)</sup> For all models except EExd and EExd Low Temp.

**Sensor head**

| Models | Standard Basic | Standard Basic with LCD display | IP 65 for High RH and Fast response | IP 56 enclosure | IP 56 enclosure Low Temperature | EExd model | EExd model Low Temperature | IP 66 enclosure 5 m remote IP 65 sensor | IP 66 enclosure 5 m remote IP 65 EExd sensor |
|--------|----------------|---------------------------------|-------------------------------------|-----------------|---------------------------------|------------|----------------------------|---|--|
|--------|----------------|---------------------------------|-------------------------------------|-----------------|---------------------------------|------------|----------------------------|---|--|

**Thread on external sensor**

|           |   |   |      |   |   |                  |                  |               |                  |
|-----------|---|---|------|---|---|------------------|------------------|---------------|------------------|
| <b>EC</b> | - | - | M 42 | - | - | M 42             | M 42             | M 42          | M 42             |
| <b>SC</b> |   |   | M 42 |   |   | 1" 5/16 x 20 UNF | 1" 5/16 x 20 UNF | M 42          | 1" 5/16 x 20 UNF |
| <b>CT</b> |   |   | M 35 |   |   | M 35             | M 35             | M 35          |                  |
| <b>IR</b> |   |   | M 46 |   |   | M 46             | not available    | not available | not available    |

**Material for external sensor**

|               |   |   |                 |   |   |                 |                 |                 |                 |
|---------------|---|---|-----------------|---|---|-----------------|-----------------|-----------------|-----------------|
| <b>EC</b>     | - | - | Stainless Steel | - | - | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel |
| <b>SC, CT</b> |   |   | Stainless Steel |   |   | Stainless Steel | Stainless Steel | Stainless Steel |                 |
| <b>IR</b>     |   |   | Stainless Steel |   |   | not available   | not available   | not available   |                 |

**Cable connection**

1 gland for 6-13 mm cable (0.2"-0.5")  
 1 Ø 20 mm (0.8") hole with blanking plug.  
 1 extra gland can be fitted (only Standard, LCD display, IP 65 and EExd).

**Approvals**

CE:  
 EN55011: 1998,  
 EN61326: 1996  
 Following the provisions of 89/336/EEC, EMC Directives and, Cenelec  
 EN61010-2 : 2001  
 Following the provisions of 73/23/EEC, Low

Voltage directive (LVD)

ATEX for EExd model:  
 Directive 94/9/EC Group 2, Category 2, G and D, Zones 1 and 2.

**Electrical connection**

All terminals will accept 0.5-1.5 mm<sup>2</sup> (20-15 AWG)

Digital output – volt free contacts  
 Load: 1 A, 24 V a.c./d.c

**Analog output**

4-20 mA Max. 400Ω  
 0-10 V Min. 10 kΩ  
 0-5 V Min. 10 kΩ

**RS 485 Communication**

To Danfoss Monitoring System:  
 Danfoss m2  
 Danfoss Micromon  
 Danfoss AK SM 350

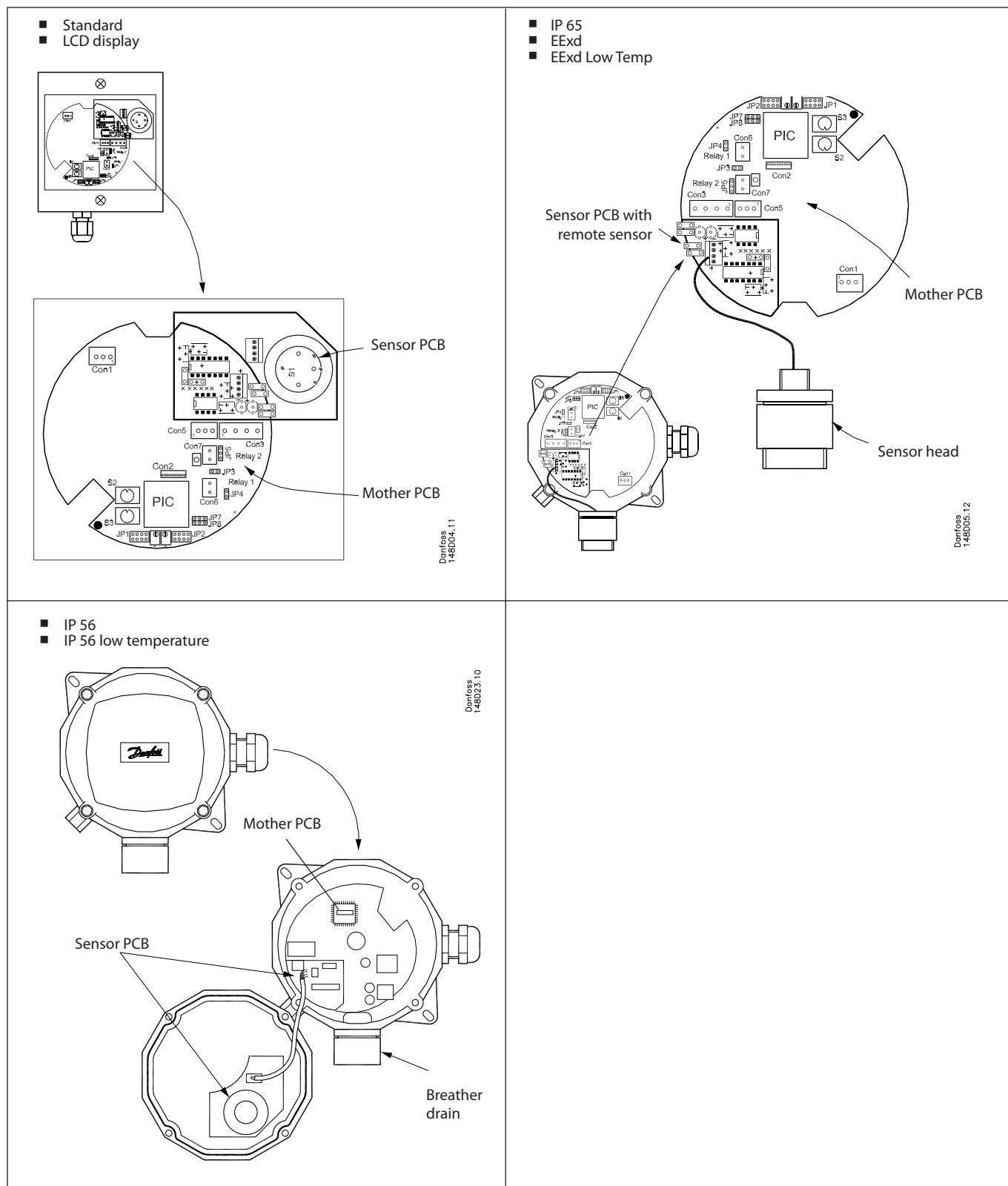
**Design**

The GD product range is designed in a very flexible way with a mother PCB (Print Circuit Board) and an interchangeable precalibrated sensor PCB.

**The mother PCB is the same for all GD models independent of the refrigerant or sensor technology.** On the mother PCB individual settings (Alarm levels, delays e.t.c) can be set to meet local legislation or application requirements.

The sensor PCB is always precalibrated and dedicated to the actual refrigerant and ppm range. Danfoss has in advance selected the most appropriate sensor making it easy to obtain safe detection and avoid false alarms from other gases present.

**Because of the interchangeable precalibrated sensor PCB, it is very easy to replace the sensor when service or a calibration procedure is required** (see the below drawings).



**Sensor technology**

Danfoss has, depending on actual ppm range and refrigerant, selected the most appropriate sensor for the target refrigerant gas. When the refrigerant and actual ppm range has been decided, the Danfoss

GD product range makes it easy to pick out the right product.

Below is a brief introduction to the GD sensor types. For further information - please contact Danfoss.

*Electrochemical Sensors - EC*

EC sensors are used mainly for toxic gases and are suitable for ammonia but not for the other refrigerants. They are very accurate and tend to be used principally for toxic gases which cannot be otherwise detected or where high levels of accuracy are needed. They are often considered to be relatively expensive with a short life span.

However sensors are now available to cover the key range of 0-5,000 ppm and with a longer lifetime of about 3 years in clean air. Exposure to large ammonia leaks or constant background ammonia will shorten the sensor life. They are subject only to rare cross interference. EC may react to sudden large humidity changes but quickly settle.

*Semi-conductor - SC*

SC sensors can be used for a wide range of gases including combustible, toxic and refrigerant gases. It is claimed that they perform better than the CT type in the detection of combustible gases at low concentrations, up to 2,000 ppm. The SC sensors are low-cost, long life, sensitive, stable, resistant to poisoning and can be used to detect a large range of gases including all the CFC, HCFC, HFC refrigerants, ammonia and hydrocarbons.

However, they are not selective and are not suited to detecting a single gas in a mixture or for use where high concentrations of interfering gases are likely to be present. Cross interference problems are minimized by using a special sensor version with a filter, calibrating for the specific gas and incorporating a delayed response.

*Catalytic - CT*

CT sensors have been mainly used for combustible gases including ammonia. CT are relatively low-cost, well established and understood and they have a good life span, up to 5 years. The response time is about 20-30 seconds. They can be subject to poisoning in certain applications but not generally in refrigeration and are more effective at gas levels of above 2,000 ppm.

*Infrared - IR*

IR sensors when first introduced were specific to a single gas and therefore not suitable for applications involving monitoring more than one gas. They were very selective and accurate - reading down to one part per million. IR was typically used where a high level of accuracy and specificity is required. This precision in performance means that they are relatively expensive.

However the specificity became a disadvantage in machinery rooms, as phase out resulted in mixed gas installations needing a different model for each gas, which was a very expensive solution.

New models were developed based on broad infrared wavelength monitoring that could detect a mixture of gases. This, however, reduced the specificity and accuracy.

If preferred, refrigerant specific units may be used if a possibility of cross interference exists.

**Calibration / test methods**

The calibration procedure consist of:

- Annual checks by qualified bump test
- Calibration by replacement of the sensor PCB with a Danfoss pre-calibrated certified sensor PCB

*Method 1  
Calibration / test by means of  
replacing Sensor PCB*

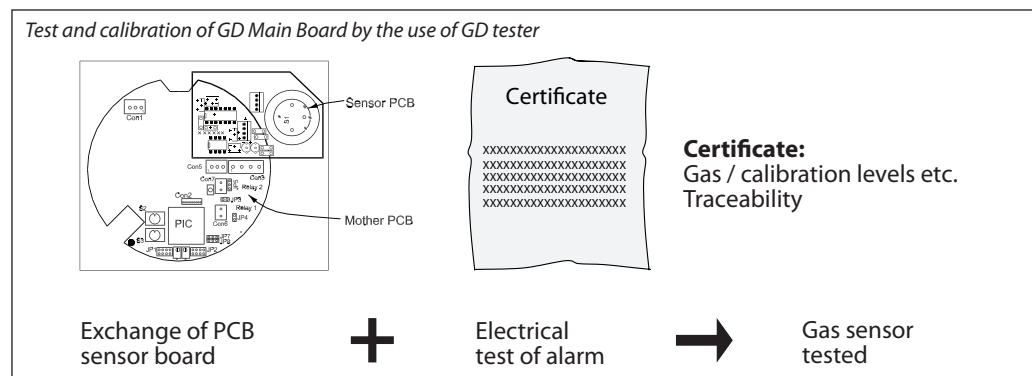
This method requires that Danfoss offers factory calibrated PCB sensor boards with calibration certificate and traceability codes. Additionally an electrically simulation is required to verify the output signals and alarm settings.

The PCB sensor board, which is the essential measuring element of the gas detector, is produced, calibrated, tested and certified by Danfoss.

After the main PCB of the gas detector has been tested with the GD tester, the new calibrated Sensor PCB can be installed.

Danfoss recommends that the calibration / test procedure is done by means of replacing the Sensor PCB, because:

- No need to purchase calibration gases in several different concentrations
- Simpler and quicker than gas calibration
- Danfoss guarantees the correct calibration and functioning of the new sensor PCB, which is supplied with a calibration certificate.
- No problems with sensor deterioration or end-of-life
- Price competitive, compared to the gas calibration carried out on site.



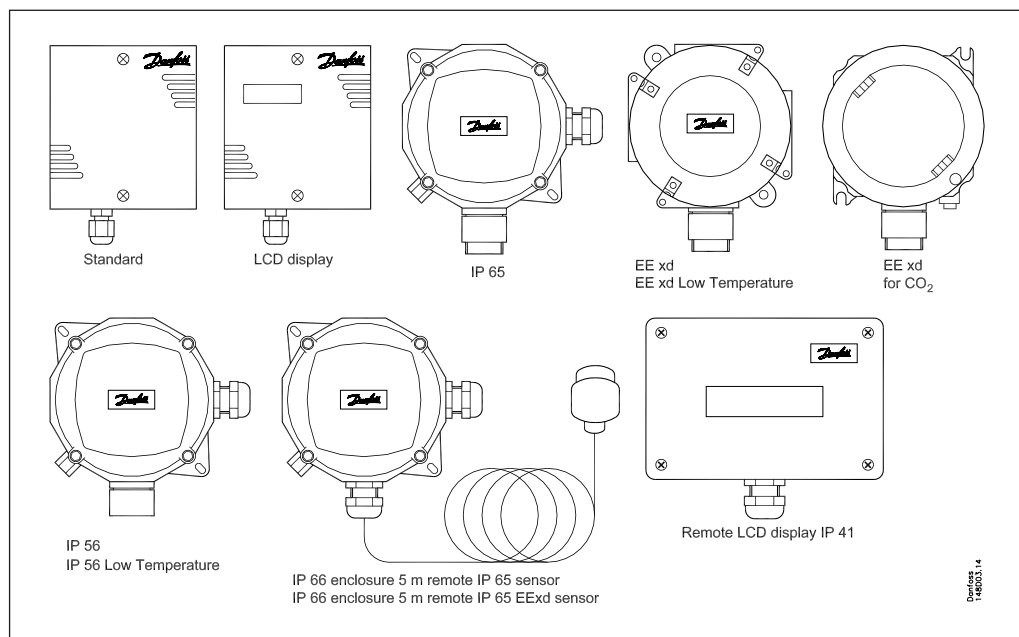
**Bump test**

A Bump Test consists of exposing the sensor to a gas. The objective is to establish if the sensor is reacting to the gas and all the sensor outputs are working correctly. A qualified bump test is a test carried out using ampoules or similar of known concentration.

*Bump test of gas sensors (this test is a function test - it is not a calibration)*

| Method                         | Refrigerant       | SC<br>Semi-conductor | EC<br>Electro-chemical | CT<br>Catalytic | IR<br>Infrared |
|--------------------------------|-------------------|----------------------|------------------------|-----------------|----------------|
| Ampoules                       | Ammonia           | ✓                    | ✓                      |                 |                |
| Lighter gas                    | HCFC, HCF         | ✓                    |                        |                 |                |
| Lighter gas                    | HC - Hydro Carbon | ✓                    |                        | ✓               |                |
| Ampoules or (Breath on sensor) | CO <sub>2</sub>   |                      |                        |                 | ✓              |
| Ammonia water                  | Ammonia           |                      |                        | ✓               |                |

**Product range**



- **Standard**  
Basic standard model for machine/engine rooms and cold rooms
  - **Standard with LCD display**  
Basic standard model for machine/engine rooms with the actual reading of present ppm level in the room and Alarm messages.
  - **IP 65**  
Like Standard but used in applications where water jets from any direction is possible. To be used in rooms with a high RH (RH>90%) and fast response (less than a minute) is needed.  
The sensor is mounted in an external Stainless Steel head.
  - **EExd**  
Like Standard but applicable in explosive areas Zone 1 and 2 and higher IP(NEMA).  
The sensor is mounted in an external Stainless Steel head.
  - **Low temperature**  
Low temperature models can be used in applications down to -40°C (-40°F)
  - **Remote LCD (accessory)**  
Remote LCD display with 5 m cable
  - **Remote sensor**  
Models with 5 m cable. Can be used in connection with safety valves/vent pipe applications. Also available with remote EExd sensor
  - **IP 56**  
High IP enclosure. Easy to replace Sensor PCB
- All the models listed have exactly the same function.

**Functions - all models**

All GD models shown on the previous page have the same basic functions. All settings are done by means of jumper settings on the mother PCB. See the section "Mother PCB" for more details. For detailed information on how to adjust Alarm setting - please see the instruction PI.S00.A.

**Alarm**

All GD models can detect 2 alarm levels and give alarm via 2 volt free contacts. When an alarm has been detected a yellow LED (Low Level Alarm) or a red LED (High Level Alarm) will go ON. All GD sensors have been preset by the factory, to realistic Low/High values related to the actual ppm range of the GD model. The actual Low and High Alarm ppm values can be read on the external GD label.

The 2 volt free contacts can be set individually to either Normally Open (NO) or Normally Closed (NC). *All GD models are factory set to NO*

Both Low and High Level Alarm can be delayed individually before the 2 volt free contacts are activated. This is useful when cross interference from other gasses may occur. The delayed response time can be set to 0, 1, 5 or 10 minutes.

*All GD models are factory set to 0 minutes.*

When the GD sensors have detected a Low or High Level Alarm an option for having these alarms with Manual reset or Auto Reset is possible. With the option Manual reset selected, a push button on the mother PCB must be activated to release the Low or High Level Alarm.

With the option Auto reset selected, the release of the Low or High Level Alarm is done automatically. *All GD models are factory set to Auto Reset.*

The factory preset values can be adjusted, with a voltmeter measuring a 0-5 V d.c output. 0V corresponds to the min. ppm range (e.g. 0 ppm) 5V corresponds to the max. ppm range (e.g. 1000)

*Example:*

If a setting of 350 ppm is required the voltage shall be set to 1.75 V (35 % of 5 V)

**Analog Output**

All GD will continuously generate a linear analog output, proportional to the gas concentration. The signal is available as 4-20 mA, 0-10 V and 0-5 V. All are available at the same time (see next page).

**LCD display**

The model with the LCD display will continuously display the actual present ppm level in the room and the Alarm messages.

*Upper Line:*

Actual present ppm level (e.g. "580 ppm").

*Lower Line:*

Alarm status.

4 text messages are possible - only one at a time:

|                  |  |
|------------------|--|
| "No Alarm"       | Neither Low Level Alarm nor High Level Alarm active. |
| "Lo Alarm on"    | Low Level Alarm active.                              |
| "Lo,Hi Alarm on" | Both Low Level Alarm and High Level Alarm active.    |
| "Hi Alarm on"    | High Level Alarm active.                             |

**Normalization Period**

Once the GD is powered up it takes some time to normalize. When GD is powered up it will give a higher analog output (4-20 mA/0-10 V/0-5 V<sup>1)</sup>) in the beginning and after some time it goes back to the actual concentration (in clean air and no leaks, the analog output will go back to: ~ 0V/4 mA / (~ 0 ppm)<sup>2)</sup>

Times below are only intended as a guide. They may vary due to temperature, humidity, cleanliness of the air, storage time<sup>3)</sup> etc.

**Model**

|                                   |           |
|-----------------------------------|-----------|
| GDA with EC sensor:               | 20-30 Sec |
| GDA with SC sensor:               | 15 min.   |
| GDA with CT sensor:               | 15 min.   |
| GDA with CT sensor, EExd model:   | 7 min.    |
| GDHC/GDHF/GDHF-R3 with SC sensor: | 1 min.    |
| GDC with IR sensor:               | 10 sec.   |
| GDC with IR sensor, EExd model:   | 20 sec.   |
| GDH with SC sensor:               | 3 min.    |

<sup>1)</sup>

*Always use the voltage 0-10 V to check the output for normalization check*

<sup>2)</sup>

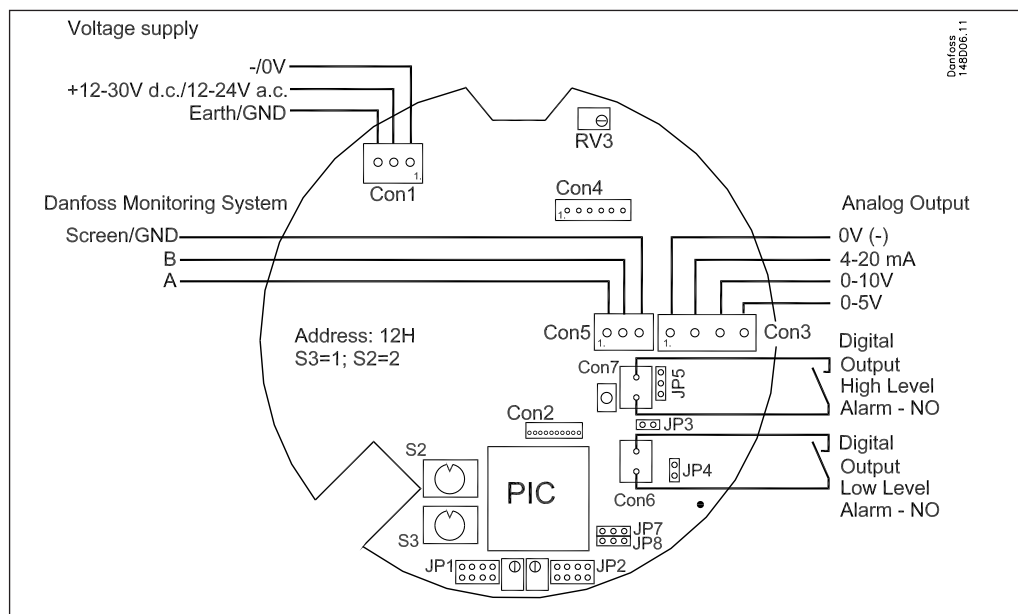
*GDC IR goes back to about 400 ppm as this is the normal level in air. (~4.6 mA/~0.4 V/ 0.2 V)*

<sup>3)</sup>

*If the GD has been in long-term storage or has been turned off for a long period, normalisation would be much slower. However within 1-2 hours the GD should have dropped below the low alarm level and be operational. The progress can be monitored exactly on the 0-10V output. When the output settles around zero (400 ppm in the case of IR CO<sub>2</sub> sensors) the GD is normalised. In exceptional circumstances particularly with CT sensors the process can take up to 30 hours.*

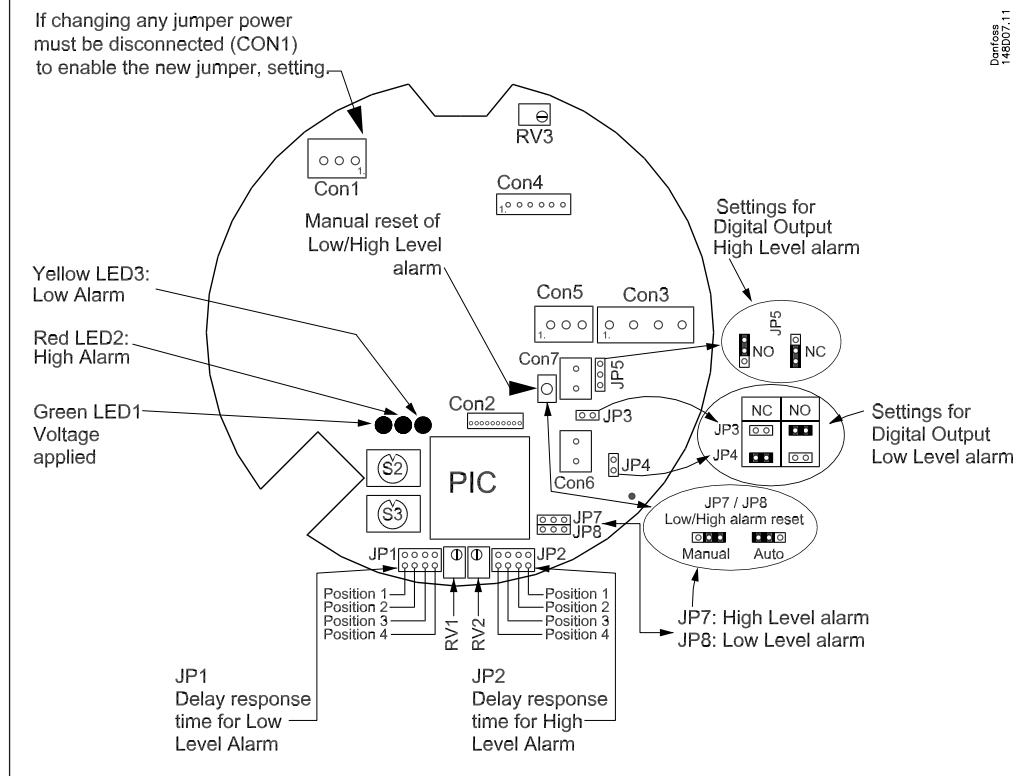


Mother PCB



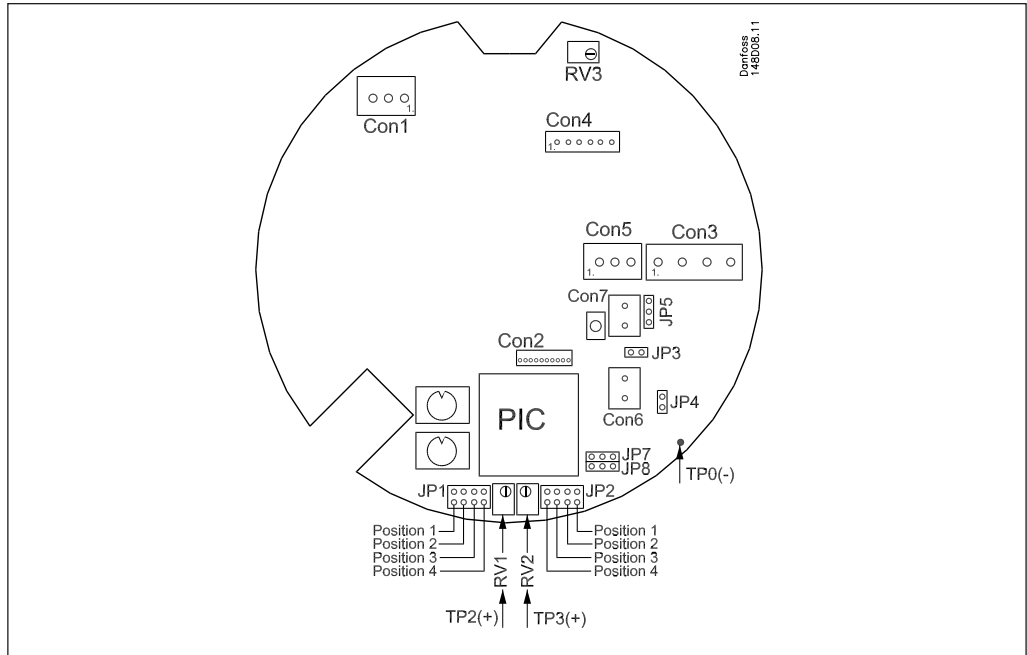
Danfoss  
146206.11

If changing any jumper power must be disconnected (CON1) to enable the new jumper, setting.



Danfoss  
146207.11

**Mother PCB**  
(Continued)



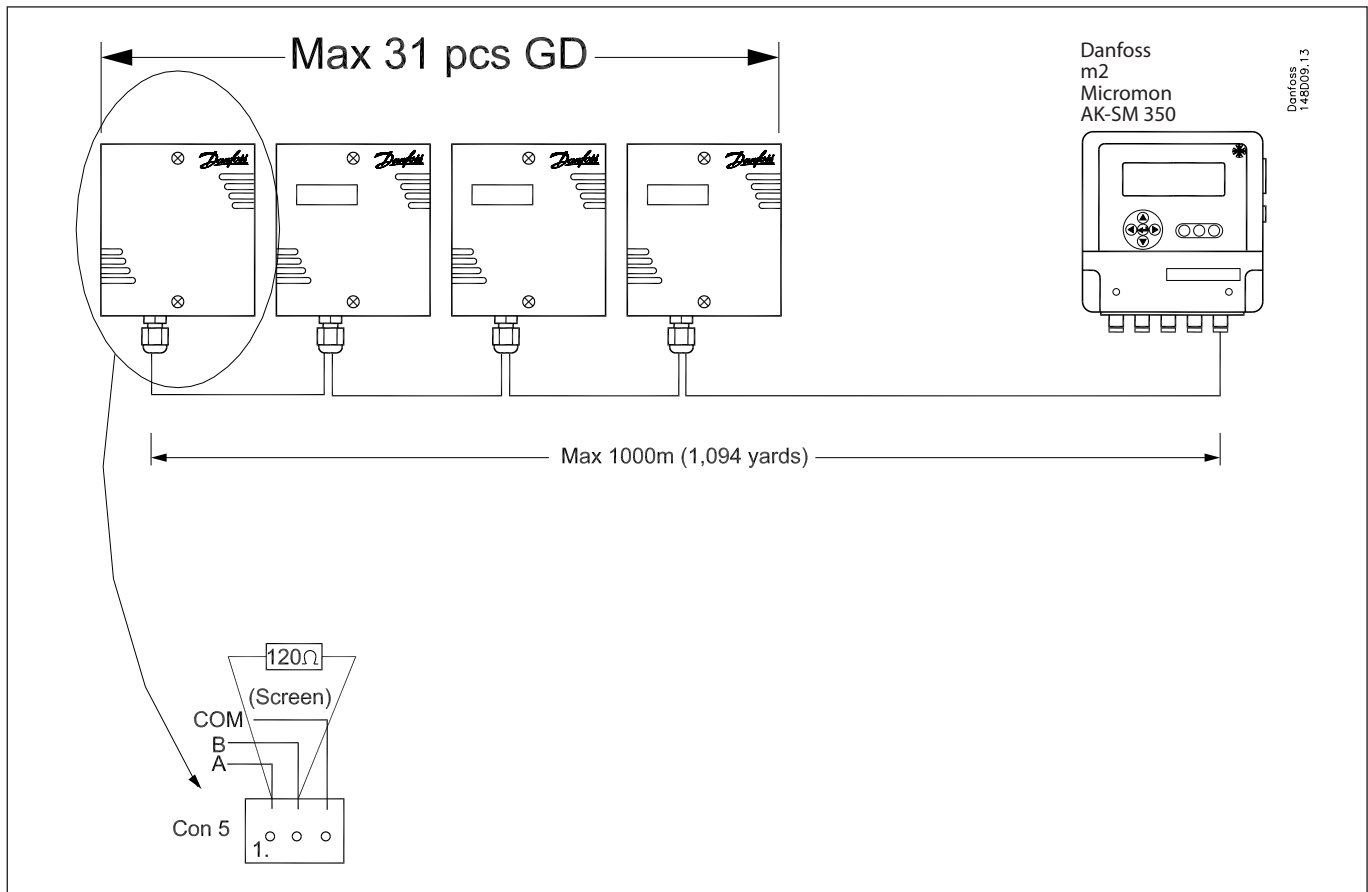
**GD connected to Danfoss monitoring**

Danfoss offers the possibility of connecting every GD, independent of model, via the built-in RS 485 Bus communication, directly to the Danfoss monitoring unit.

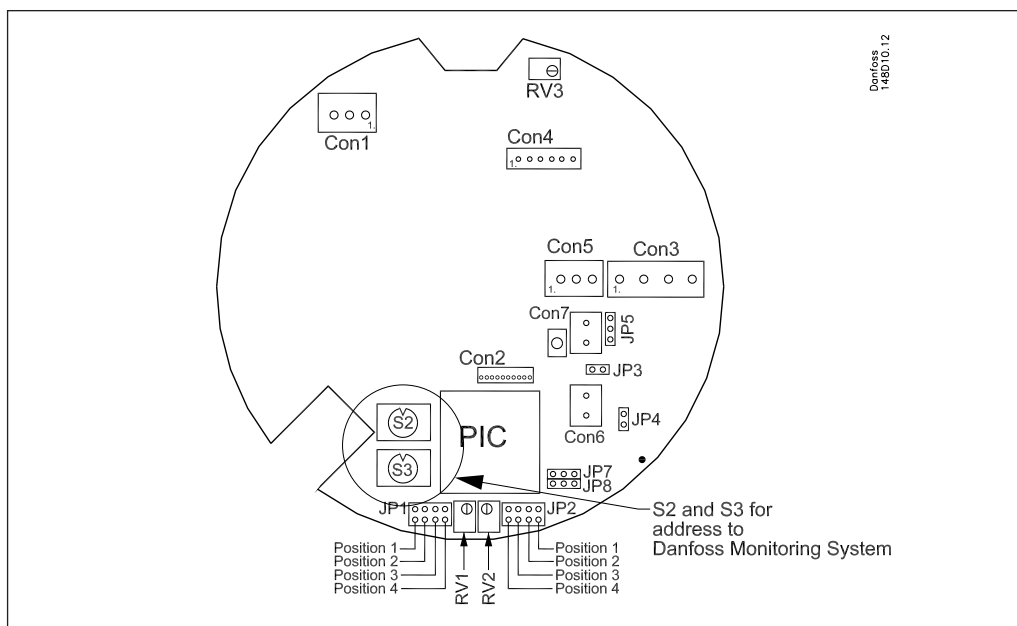
Up to 31 GD sensors can be connected via a two-core screened communication cable (see the below drawing). Every GD sensor needs a unique address number which must be selected. The address of GD is set by S2 and S3. By setting S2 and S3 between 0 and F, the GD will be

assigned an address. See next page. A conversion chart between channel number of the Danfoss monitoring system and the hexadecimal address of the GD is attached. Power must be removed when setting the addresses on the GD sensor. If more than 31 units are needed, a GD Repeater (amplifier) must be installed (see Accessories).

Contact Danfoss for further information.



**GD connected to Danfoss monitoring**  
(Continued)



| Channel on Danfoss Monitoring System | S3 | S2 | Channel on Danfoss Monitoring System | S3 | S2 | Channel on Danfoss Monitoring System | S3 | S2 |
|--------------------------------------|----|----|--------------------------------------|----|----|--------------------------------------|----|----|
| 1                                    | 0  | 1  | 34                                   | 2  | 2  | 67                                   | 4  | 3  |
| 2                                    | 0  | 2  | 35                                   | 2  | 3  | 68                                   | 4  | 4  |
| 3                                    | 0  | 3  | 36                                   | 2  | 4  | 69                                   | 4  | 5  |
| 4                                    | 0  | 4  | 37                                   | 2  | 5  | 70                                   | 4  | 6  |
| 5                                    | 0  | 5  | 38                                   | 2  | 6  | 71                                   | 4  | 7  |
| 6                                    | 0  | 6  | 39                                   | 2  | 7  | 72                                   | 4  | 8  |
| 7                                    | 0  | 7  | 40                                   | 2  | 8  | 73                                   | 4  | 9  |
| 8                                    | 0  | 8  | 41                                   | 2  | 9  | 74                                   | 4  | A  |
| 9                                    | 0  | 9  | 42                                   | 2  | A  | 75                                   | 4  | B  |
| 10                                   | 0  | A  | 43                                   | 2  | B  | 76                                   | 4  | C  |
| 11                                   | 0  | B  | 44                                   | 2  | C  | 77                                   | 4  | D  |
| 12                                   | 0  | C  | 45                                   | 2  | D  | 78                                   | 4  | E  |
| 13                                   | 0  | D  | 46                                   | 2  | E  | 79                                   | 4  | F  |
| 14                                   | 0  | E  | 47                                   | 2  | F  | 80                                   | 5  | 0  |
| 15                                   | 0  | F  | 48                                   | 3  | 0  | 81                                   | 5  | 1  |
| 16                                   | 1  | 0  | 49                                   | 3  | 1  | 82                                   | 5  | 2  |
| 17                                   | 1  | 1  | 50                                   | 3  | 2  | 83                                   | 5  | 3  |
| 18                                   | 1  | 2  | 51                                   | 3  | 3  | 84                                   | 5  | 4  |
| 19                                   | 1  | 3  | 52                                   | 3  | 4  | 85                                   | 5  | 5  |
| 20                                   | 1  | 4  | 53                                   | 3  | 5  | 86                                   | 5  | 6  |
| 21                                   | 1  | 5  | 54                                   | 3  | 6  | 87                                   | 5  | 7  |
| 22                                   | 1  | 6  | 55                                   | 3  | 7  | 88                                   | 5  | 8  |
| 23                                   | 1  | 7  | 56                                   | 3  | 8  | 89                                   | 5  | 9  |
| 24                                   | 1  | 8  | 57                                   | 3  | 9  | 90                                   | 5  | A  |
| 25                                   | 1  | 9  | 58                                   | 3  | A  | 91                                   | 5  | B  |
| 26                                   | 1  | A  | 59                                   | 3  | B  | 92                                   | 5  | C  |
| 27                                   | 1  | B  | 60                                   | 3  | C  | 93                                   | 5  | D  |
| 28                                   | 1  | C  | 61                                   | 3  | D  | 94                                   | 5  | E  |
| 29                                   | 1  | D  | 62                                   | 3  | E  | 95                                   | 5  | F  |
| 30                                   | 1  | E  | 63                                   | 3  | F  | 96                                   | 6  | 0  |
| 31                                   | 1  | F  | 64                                   | 4  | 0  | 97                                   | 6  | 1  |
| 32                                   | 2  | 0  | 65                                   | 4  | 1  | 98                                   | 6  | 2  |
| 33                                   | 2  | 1  | 66                                   | 4  | 2  | 99                                   | 6  | 3  |

**Reference material**

**Danfoss m2 literature:**

Technical Leaflet RB8BA  
Manual RS8AN  
Instruction RI8BM

**Danfoss AK-SM 350 literature:**

Manual RS8EF  
Instruction RI8LC

**Micromon:**

Technical leaflet RC8AU  
Instruction RI8HV (Micromon Expanable)  
Instruction RI8GA (Micromon)

**Danfoss GD application guide:**

PA.000.B

Ordering

| Standard GD models                     |                 |             |                             |                                  |                  |                |            |                                 |            |                                     |            |                                 |            |                             |            |   |            |   |            |          |            |          |
|--|-----------------|-------------|-----------------------------|----------------------------------|------------------|----------------|------------|---------------------------------|------------|-------------------------------------|------------|---------------------------------|------------|-----------------------------|------------|---|------------|---|------------|----------|------------|----------|
| All models                             |                 |             |                             |                                  |                  |                |            |                                 |            |                                     |            |                                 |            |                             |            |   |            |   |            |          |            |          |
| Type of gas                            | Danfoss Type    | Range [ppm] | Alarm limits Low/High [ppm] | Response Delay [s] <sup>1)</sup> | Sensor type      | Standard Basic |            | Standard Basic with LCD display |            | IP 65 for High RH and Fast response |            | IP 56 enclosure Low Temperature |            | EEExd model Low Temperature |            | IP 66 enclosure 5 m remote IP 65 sensor |            | IP 66 enclosure 5 m remote IP 65 EEExd sensor |            |          |            |          |
|  |                 |             |                             |                                  |                  | Complete       | Sensor PCB | Complete                        | Sensor PCB | Complete                            | Sensor PCB | Complete                        | Sensor PCB | Complete                    | Sensor PCB | Complete                                | Sensor PCB | Complete                                      | Sensor PCB | Complete | Sensor PCB | Complete |
| <b>Ammonia NH<sub>3</sub></b>          |                 |             |                             |                                  |                  |                |            |                                 |            |                                     |            |                                 |            | Code number                 |            |   |            |   |            |          |            |          |
| R 717                                  | GDA EC 100      | 0-100       | 25/35                       | 0                                | Electro-chemical | 148H5000       | 148H5200   | 148H5001                        | 148H5200   | 148H5002                            | 148H5208   | 148H5005                        | 148H5271   | 148H5003                    | 148H5208   | 148H5006                                | 148H5268   | 1)  | -          | 1)       |            |          |
|  | GDA EC 300      | 0-300       | 100/200                     | 0                                | Electro-chemical | 1)             | -          | 1)                              | -          | 1)                                  | -          | 1)                              | -          | 148H5063                    | 148H5240   | 1)                                      | -          | 1)  | -          | 1)       |            |          |
|  | GDA EC 1000     | 0-1000      | 500/1000                    | 0                                | Electro-chemical | 148H5010       | 148H5201   | 148H5011                        | 148H5201   | 148H5012                            | 148H5209   | 148H5015                        | 148H5272   | 148H5013                    | 148H5209   | 148H5016                                | 148H5269   | 1)  | -          | 1)       |            |          |
|  | GDA EC 1000     | 0-1000      | 25/500                      | 0                                | Electro-chemical | 148H5050       | 148H5201   | 148H5051                        | 148H5201   | 148H5052                            | 148H5209   | 148H5055                        | 148H5272   | 148H5053                    | 148H5209   | 1)                                      | -          | -   | -          | -        |            |          |
|  | GDA SC 1000     | 0-1000      | 80/250                      | 0                                | Semi-Conductor   | 148H5040       | 148H5249   | 1)                              | -          | 148H5042                            | 148H5254   | 148H5049                        | 148H5253   | 1)                          | -          | 1)                                      | -          | 1)  | -          | 1)       |            |          |
|  | GDA SC 10000    | 0-10000     | 5000/9000                   | 0                                | Semi-Conductor   | 148H5020       | 148H5202   | 148H5021                        | 148H5202   | 148H5022                            | 148H5210   | 148H5029                        | 148H5255   | 148H5255                    | 148H5023   | 148H5241                                | 148H5026   | 148H5241                                      | 148H5027   | 148H5261 | 148H5028   | 148H5265 |
| GDA CT 30000                           | 0-30000         | 3000/26000  | 0                           | Catalytic                        | 148H5030         | 148H5203       | 148H5031   | 148H5203                        | 148H5032   | 148H5211                            | 148H5039   | 148H5256                        | 148H5035   | 148H5256                    | 148H5033   | 148H5211                                | 1)         | -   | 1)         | -        | 1)         |          |
| <b>Carbon Dioxide - CO<sub>2</sub></b> |                 |             |                             |                                  |                  |                |            |                                 |            |                                     |            |                                 |            |                             |            |   |            |   |            |          |            |          |
| R 744                                  | GDC IR 10000    | 0-10000     | 5000/9000                   | 0                                | Infrared         | 148H5070       | 148H5204   | 148H5071                        | 148H5204   | -                                   | -          | 148H5072                        | 148H5204   | 148H5073                    | 148H5250   | 1)                                      | -          | 1)  | -          | 1)       |            |          |
|  | GDC IR 20000    | 0-20000     | 10000/18000                 | 0                                | Infrared         | 1)             | 148H5244   | 1)                              | 148H5244   | -                                   | -          | 148H5082                        | 148H5244   | 148H5085                    | 148H5244   | 1)                                      | -          | 1)  | -          | 1)       |            |          |
|  | GDC IR 40000    | 0-40000     | 20000/36000                 | 0                                | Infrared         | 1)             | 148H5245   | 1)                              | 148H5245   | -                                   | -          | 148H5092                        | 148H5245   | 1)                          | 148H5245   | 1)                                      | -          | 1)  | -          | 1)       |            |          |
| <b>Halo-Carbon</b>                     |                 |             |                             |                                  |                  |                |            |                                 |            |                                     |            |                                 |            |                             |            |   |            |   |            |          |            |          |
| HCFC R 22, R 123                       | GDHC SC 1000    | 0-1000      | 500/900                     | 0                                | Semi-Conductor   | 148H5100       | 148H5205   | 148H5101                        | 148H5205   | 148H5102                            | 148H5212   | 148H5109                        | 148H5257   | 148H5105                    | 148H5257   | 1)                                      | 148H5242   | 1)  | -          | 148H5107 | 148H5262   | 1)       |
|  | GDHF SC 1000    | 0-1000      | 500/900                     | 0                                | Semi-Conductor   | 148H5110       | 148H5206   | 148H5111                        | 148H5206   | 148H5112                            | 148H5213   | 148H5119                        | 148H5258   | 148H5115                    | 148H5258   | 1)                                      | 148H5243   | 1)  | -          | 148H5117 | 148H5263   | 1)       |
| HFC R 404A, R 507                      | GDHF-R3 SC 1000 | 0-1000      | 500/900                     | 0                                | Semi-Conductor   | 148H5120       | 148H5246   | 148H5121                        | 148H5246   | -                                   | -          | 148H5247                        | 148H5259   | 148H5125                    | 148H5259   | 1)                                      | -          | 1)  | -          | 148H5127 | 148H5264   | 1)       |
| <b>Hydro-Carbon</b>                    |                 |             |                             |                                  |                  |                |            |                                 |            |                                     |            |                                 |            |                             |            |   |            |   |            |          |            |          |
| R 290, R 600, R 600A, R 1270           | GDH SC 5000     | 0-5000      | 800/2500                    |                                  | Semi-Conductor   | 148H5190       | 148H5267   | 148H5191                        | 148H5267   | -                                   | -          | -                               | -          | -                           | -          | -                                       | 148H5193   | 148H5260                                      | -          | -        | -          | -        |

<sup>1)</sup> Contact Danfoss

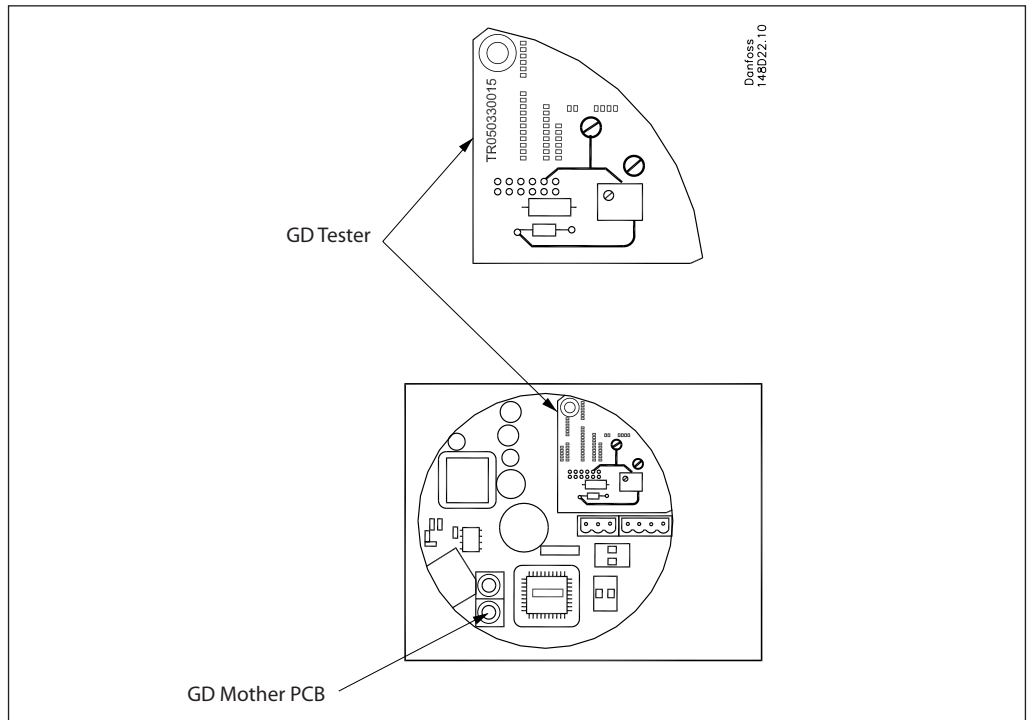
**Ordering - GD sensor PCB**

| <b>Description</b>   | <b>Code No.</b> |
|--|-----------------|
| GDA EC 100 sensor PCB  | 148H5200        |
| GDA EC 1000 sensor PCB   | 148H5201        |
| GDA SC 10000 sensor PCB  | 148H5202        |
| GDA CT 30000 sensor PCB  | 148H5203        |
| GDC IR 10000 sensor PCB all models except EExd                                 | 148H5204        |
| GDHC SC 1000 sensor PCB  | 148H5205        |
| GDHF SC 1000 sensor PCB  | 148H5206        |
| GDH CT 5000 sensor PCB   | 148H5207        |
| GDA EC 100 sensor PCB Ext for IP 65/EExd enclosure                             | 148H5208        |
| GDA EC 1000 sensor PCB Ext for IP 65/EExd enclosure                            | 148H5209        |
| GDA SC 10000 sensor PCB Ext for IP 65 enclosure                                | 148H5210        |
| GDA CT 30000 sensor PCB Ext for IP 65/EExd enclosure                           | 148H5211        |
| GDHC SC 1000 sensor PCB Ext for IP 65 enclosure                                | 148H5212        |
| GDHF SC 1000 sensor PCB Ext for IP 65 enclosure                                | 148H5213        |
| GDH CT 5000 sensor PCB Ext for EExd enclosure                                  | 148H5214        |
| GDA EC 300 sensor PCB Ext for IP 65/EExd enclosure                             | 148H5240        |
| GDA SC 10000 sensor PCB Ext for EExd enclosure/EExd Low Temp. enclosure        | 148H5241        |
| GDHC SC 1000 sensor PCB Ext for EExd enclosure                                 | 148H5242        |
| GDHF SC 1000 sensor PCB Ext for EExd enclosure                                 | 148H5243        |
| GDC IR 20000 sensor PCB all models except EExd                                 | 148H5244        |
| GDC IR 40000 sensor PCB all models except EExd                                 | 148H5245        |
| GDHF-R3 SC 1000 sensor PCB   | 148H5246        |
| GDHF-R3 SC 1000 sensor PCB Ext for IP 65 enclosure                             | 148H5247        |
| GDE EC 500 sensor PCB Ext for IP 65  | 148H5248        |
| GDA SC 1000 sensor PCB   | 148H5249        |
| GDC IR 10000 sensor PCB Ext for EExd enclosure                                 | 148H5250        |
| GDA EC 100 sensor PCB for IP 56 enclosure                                      | 148H5251        |
| GDA EC 1000 sensor PCB for IP 56 enclosure                                     | 148H5252        |
| GDA SC 1000 sensor PCB for IP 56 enclosure/IP 56 Low Temp                      | 148H5253        |
| GDA SC 1000 sensor PCB Ext for IP 65 enclosure                                 | 148H5254        |
| GDA SC 10000 sensor PCB for IP 56 enclosure/IP 56 Low Temp                     | 148H5255        |
| GDA CT 30000 sensor PCB for IP 56 enclosure/IP 56 Low Temp                     | 148H5256        |
| GDHC SC 1000 sensor PCB for IP 56 enclosure/IP 56 Low Temp                     | 148H5257        |
| GDHF SC 1000 sensor PCB for IP 56 enclosure/IP 56 Low Temp                     | 148H5258        |
| GDHF-R3 SC 1000 sensor PCB for IP 56 enclosure/IP 56 Low Temp                  | 148H5259        |
| GDH SC 5000 sensor PCB Ext for EExd enclosure                                  | 148H5260        |
| GDA SC 10000 sensor PCB with 5 m remote IP 65 sensor. For IP 66 enclosure      | 148H5261        |
| GDHC SC 1000 sensor PCB with 5 m remote IP 65 sensor. For IP 66 enclosure      | 148H5262        |
| GDHF SC 1000 sensor PCB with 5 m remote IP 65 sensor. For IP 66 enclosure      | 148H5263        |
| GDHF-R3 SC 1000 sensor PCB with 5 m remote IP 65 sensor. For IP 66 enclosure   | 148H5264        |
| GDA SC 10000 sensor PCB with 5 m remote IP 65 EExd sensor. For IP 66 enclosure | 148H5265        |
| GDH SC 5000 sensor PCB   | 148H5267        |
| GDA EC 100 sensor PCB Ext for EExd Low Temp. enclosure                         | 148H5268        |
| GDA EC 1000 sensor PCB Ext for EExd Low Temp. enclosure                        | 148H5269        |
| GDA EC 100 sensor PCB for IP 56 Low Temp. enclosure                            | 148H5271        |
| GDA EC 1000 sensor PCB for IP 56 Low Temp. enclosure                           | 148H5272        |

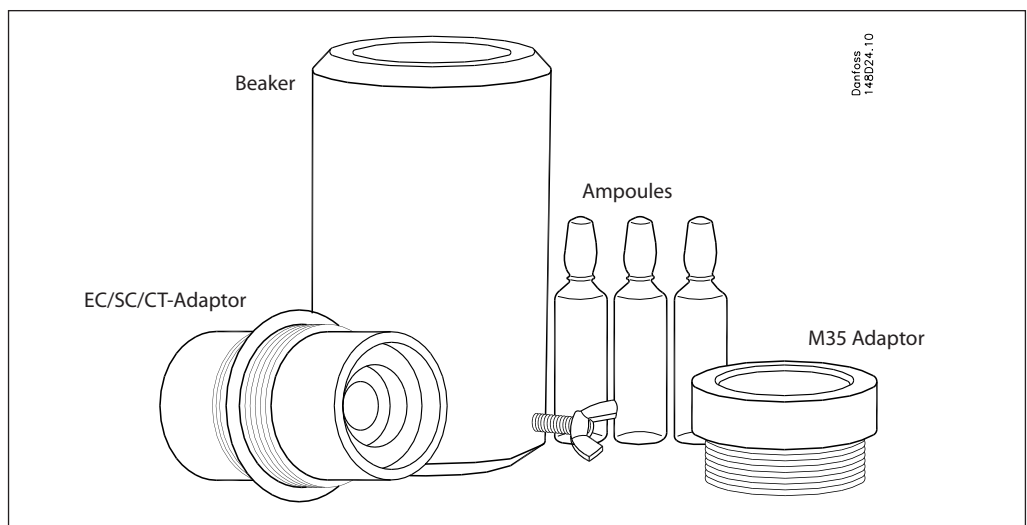
Ordering - Accessories

| Description   | Code No.        |
|---|-----------------|
| <b>GD Test Kit</b><br>- GD Tester all models. To test mother PCB at Sensor PCB replacement<br>- Beaker M42<br>- EC/SC/CT-Adapter. Fit Beaker M42<br>- M35 Adapter. Fit Beaker M42 | <b>148H5230</b> |
| GD Repeater all models. Between GD and Danfoss Monitoring System  | <b>148H5231</b> |
| GD mother PCB all models  | <b>148H5232</b> |
| GD Ampoules 10 pcs. 100 ppm ammonia.  | <b>148H5234</b> |
| GD Ampoules 10 pcs. 1000 ppm ammonia.   | <b>148H5235</b> |
| GD Ampoules 10 pcs 2000 ppm CO <sub>2</sub>   | <b>148H5236</b> |
| Remote LCD display IP 41  | <b>148H5238</b> |

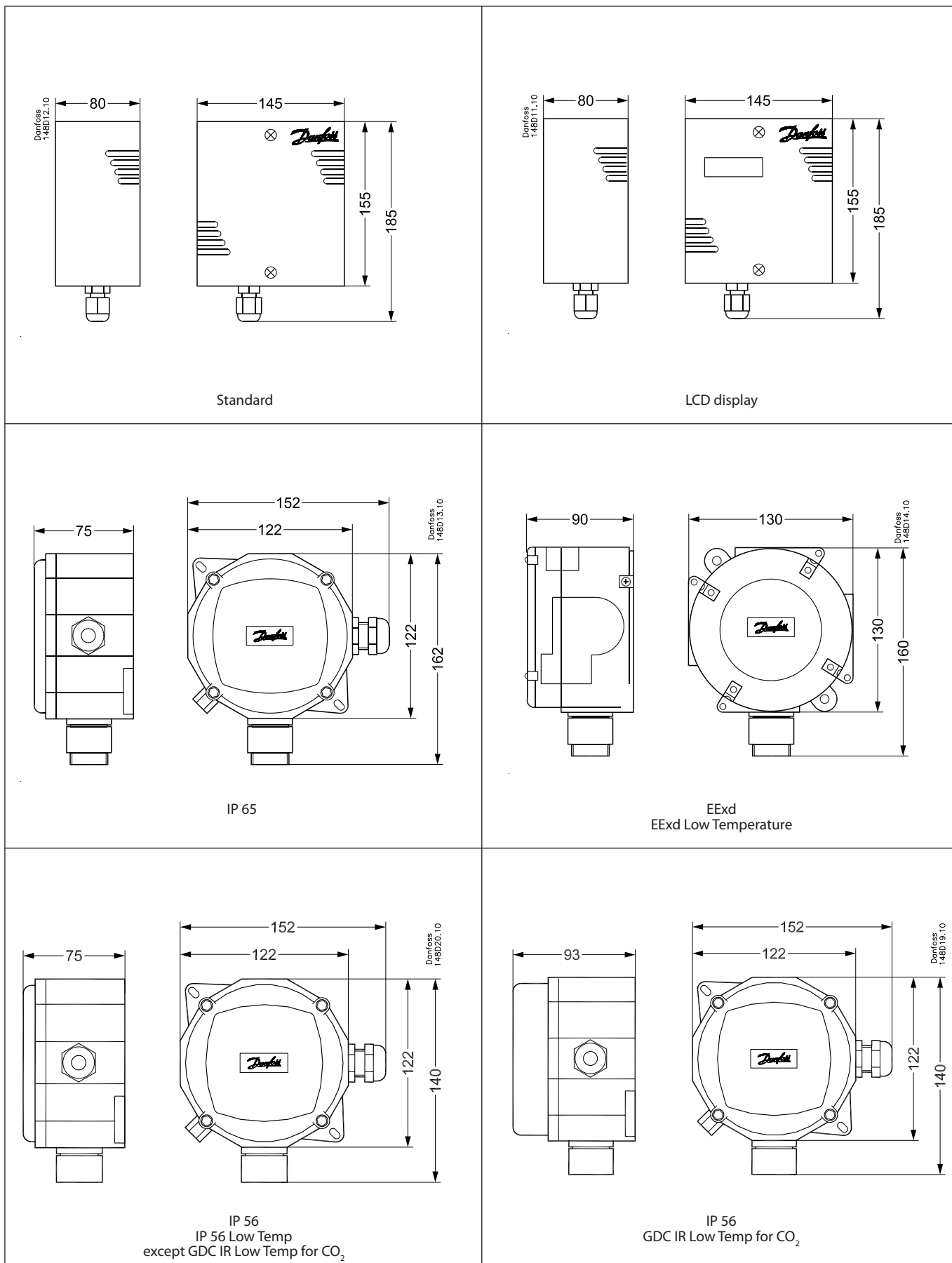
GD Tester and GD Mother PCB



Bump test equipment



Dimensions



Dimensions (Continued)

