

Data sheet

## Danfoss gas detection units

Types GD Premium, Premium+, Premium Duplex,  
Premium Remote, Premium Flex and Premium Uptime



The Premium line gas detection units are used for monitoring and warning of hazardous gas concentrations. They can be used for detecting most commonly used refrigerants. Depending on the application and model, each unit is available with one or two of 4 sensor types.

The Premium line gas detection units are intended as Stand-alone, or connected to a central system like Gas Detection Controller Unit, or a PLC.

As stand-alone the on-board relays can be used for activation of alarm devices, while the Analog or RS485 Modbus connection to a central system allows additional centralized monitoring and alarm activation.

4 out of the 6 Premium models have integrated Display/keypad for direct access to the user interface

The gas detection units come with a factory default, 2-step alarm set-up ready for use. The user interface enables the user to configure two individual alarm settings. Alarm 1, a pre-alarm indicating the gas level has passed a predefined threshold 1, and - if the gas level passes predefined threshold 2 - the final alarm 2.

### Features

- Digital, factory configured and pre-calibrated gas detectors for plug-and-play installation (no adjustment required)
- Easy configuration via Display/keypad (some models) and intuitive user-interface; helps simplify operator handling and minimize risk of operational, settings and calibration errors
- Stand-alone (integrated relays) and/or flexible connection to central controller - by either Analog or RS485 open Modbus communications
- Wide selection of refrigerants, sensor types and detection ranges
- 2 Sensor versions available
- Remote sensor location possible
- Fieldbus wiring - connect and power up to 96 sensors, wire length max. 900 meters (2953 ft) per segment; expansion modules permits additional segments
- Automatic self-diagnostics to ensure correct communication and operation
- Sensor seal cap to prevent premature exposure during installation
- Digital user interface ensures higher sensor accuracy
- Reduced risk of false alarms due to temperature compensated sensors
- Password protected alarm settings allowing authorized access only
- LED status signals and alarms
- Buzzer & Light option for local audio and visual alarms (Premium+, Premium Uptime)
- On-board acknowledge button to reset alarms and to verify that no gas leaks are present
- Service alerts on unit, controller or both, readable via service tool Display
- Quick and precise calibration procedures - either by Plug & Play replacement sensors or calibration with gas. No potentiometers or multi-meters required
- For improved safety and to optimize the lifetime of the sensor, degenerated sensors with too low sensitivity (<30%) are rejected during calibration process.
- Conformity to EN 50271, EN 61010-1, ANSI/UL 61010 1, CAN/CSA-C22.2 No. 61010-1
- Enables regulatory compliance with EN 378:2016, ISO 5149:2014, IIR 2-2017, and ASHRAE 15:2016

Contents	Page
Features .....	1
Working principle/Operation.....	3
Service & maintenance .....	3
Specifications .....	4
Electrical connection .....	5
Function .....	5
Fieldbus loop.....	6
General info .....	7
Gas types and thresholds .....	7
Alarm scheme .....	8
Ordering .....	9

**Working principle/Operation**

One (or two) sensor(s) are connected to the Premium sensor board via local bus. The Sensor board provides the power supply of the sensor(s) and prepares the measured data for digital communication.

The operation menu of the Premium software is accessed through the Display (if fitted), or the connected Gas Detection Controller, or via the dedicated GD Service tool (or PC tool). The Service tool (or PC tool) is plugged directly to the board of the unit. These interfaces with Display allow the unit configuration, setting of the unit alarm levels and calibration of the attached sensor(s).

The service tool (or PC tool) can be used on all units across the Basic, Premium and Heavy Duty platforms.

For Stand-alone units the alarm signals are handled by the unit software, which activates the integrated relays directly. For central controlled units the alarm signals are handled by the Gas Detection Controller (or a PLC) via the 4-20 mA (2-10V) analog output or the RS485 open Modbus communication.

For additional operational safety the changing of parameters is password protected allowing authorized access only. The factory default password can easily be customized.

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**Service & maintenance**

The Premium line gas detection units are calibrated either by replacing of sensor heads or by calibration with gas.

Plug & Play replacement sensors are pre-calibrated and factory certified for quick and easy calibration procedure. The sensor is connected to the local bus via a plug connection enabling easy and simple exchange of sensor instead of a calibration. The internal X-change routine recognizes the exchanged sensor during the exchange process and restarts the measurement mode automatically. An LED indicates the correct procedure of the exchange operation. To ensure the proper functioning of the units and to prevent human errors, the sensor head can only be replaced by the same type and ppm range (exact replacement) that match the configuration. If a different sensor head is installed, the GD unit will show a communication error.

As an alternative, calibration with gas can be performed via the service tool (or PC tool), calibration gas with correct concentration and the Danfoss calibration adapter. The Danfoss gas detection units have an integrated, digital calibration interface and procedure, which makes the calibration process easy, accurate, and time-saving. No potentiometers or multi-meters required for the calibration. The calibration procedure requires significantly less calibration gas per calibration compared to traditional routines.

**Specifications**
**Electrical**

Power supply	24 V DC $\pm$ 20 %, reverse-polarity protected
Power consumption (24 V DC)	Max. 210 mA (5.1 VA)
Alarm relays (3)	250 V AC, 5 A, potential-free, contacts (SPDT)
Transistor output (2) (connector X13)	24 V DC / 0.1 A (switching to plus) (only at 24 V DC power supply)
Analog output signal (1)	Proportional, overload and short-circuit proof, load $\leq$ 500 Ohm 4 - 20 mA = measuring range 3.0 < 4 mA = underrange > 20 - 21.2 mA = overrange 2.0 mA = fault
Output for local bus	5 V DC, 250 mA max. Overload, short-circuit and reverse-polarity protected

**Ambient conditions**

Temperature range	Sensor dependant. See ordering section.
Humidity range	15 - 95 % RH not-condensing
Storage temperature	+5 °C to +30 °C (+41 °F to +86 °F)
Storage time	12 months

**Serial interface**

Local bus	1-wire / 19200 Baud
Fieldbus	RS 485 / 19200 Baud
Tool bus	2-wire / 19200 Baud

**Physical**

Housing	Type C	Type E (Premium Uptime)
Material	Polycarbonate	
Combustion	UL 94 V2	
Housing colour	Black	
Dimensions (W x H x D in mm)	130 x 130 x 75	130 x 130 x 99
Weight (kg)	Approx. 0.6 kg	Approx. 0.7 kg
Protection class	IP 65	
Installation	Wall mounting	
Cable entry	Standard 6 x M20/25	
Wire connection: Local bus (SC2) Digital input, analog output Power supply, relays	3-pin connector Screw-type terminal min. 0.25 mm <sup>2</sup> , max. 1.3 mm <sup>2</sup> (min. 25 AWG, max. 17 AWG) Screw-type terminal min. 0.25 mm <sup>2</sup> , max. 2.5 mm <sup>2</sup> (min. 25 AWG, max. 14 AWG)	
Cable lengths local bus for Remote Sensor Board	Max. 5 m (16.4 ft.)	

**Directives**

EMC directives 2014/30/EU
Low voltage directive 2014/35/EU
CE
Conformity to EN 50271, EN 61010-1 ETL listed to UL 61010-1 and CSA C22.2 No.61010-1 Enables regulatory compliance with EN 378:2016, ISO 5149:2014, IAR 2-2017, and ASHRAE 15:2016

**Display (not Premium and Premium+)**

Temperature range	-20°C to +50°C (-4°F to 122°F)
LCD	Two lines, 16 characters each, background highlighted in two colours
Operation	Menu driven via six push-buttons
Power consumption	5 V, 60 mA, 0.3 VA

**Status LED**

Colour / Mode	Red / yellow / green (alarm – fault – operation - service)
Protection class	IP 65

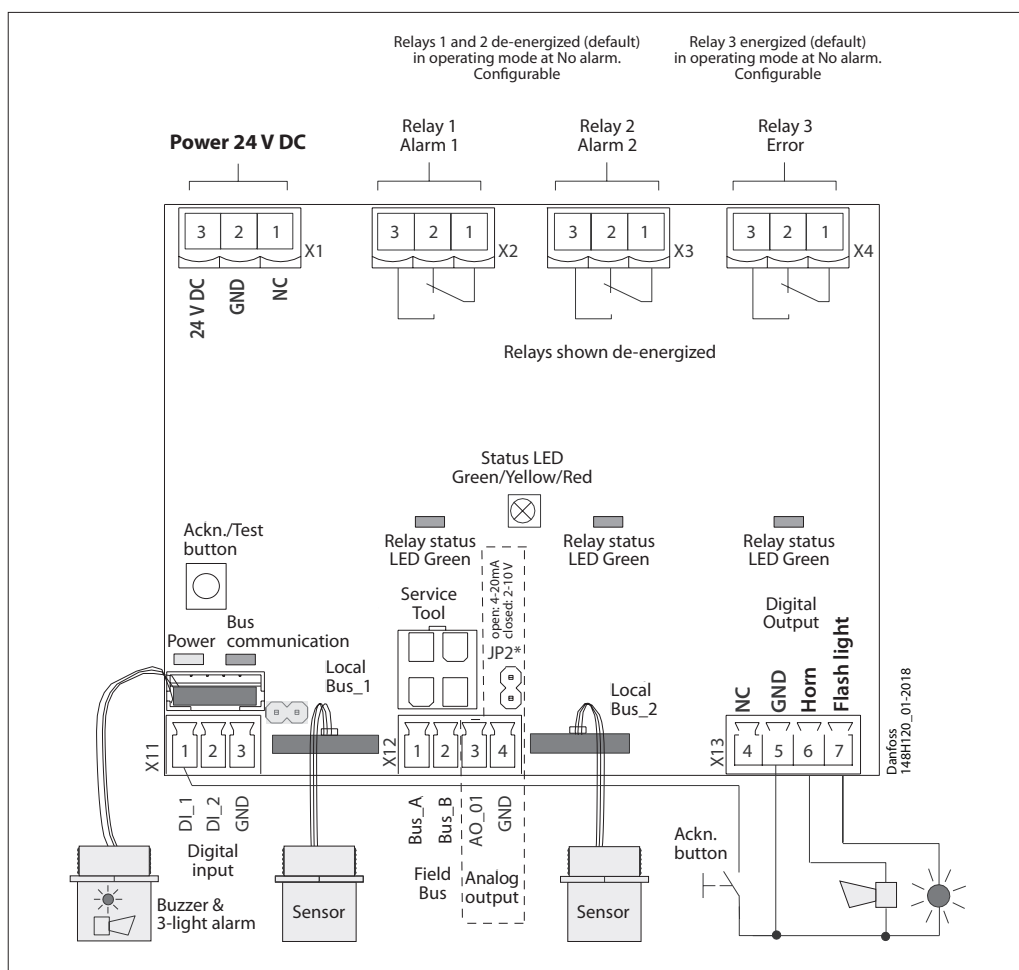
**Warning buzzer**

Acoustic pressure	> 85 dB (A) (0.1 m distance)
Frequency	2300 Hz
Protection class	IP 65

**UPS (only Premium Uptime)**

Power unit with wide range input	90 -240 V AC - 50/60 Hz
Output rating	15 VA
Rechargeable battery	12 V, 0.8 Ah
Operating time	> 60 min

Electrical connection



Status LED:

- GREEN is power on.
  - flashing if maintenance needed
- YELLOW is an indicator of Error.
  - when the sensor head is disconnected or not the expected type
  - AO is activated but nothing connected
- RED on alarm, similar to the Buzzer & light alarm.

Ackn. -/Test button:

- TEST** - The button must be pressed for 20 sec.
    - Alarm1 and Alarm2 is simulated, stop on release
  - ACKN.** - Pressed while Alarm2, the audible warning switches off and goes back on after 5 min. when the alarm situation is still active.
- \* JP2 open → AO 4-20 mA (Default)  
 JP2 closed → AO 2-10 Volt

Function

Digital outputs with 3 relays

Action	Reaction Relay 1 (Alarm1)	Reaction Relay 2 (Alarm2)	Reaction Flashlight X13-7	Reaction Horn X13-6	Reaction Relay 3 (Fault)	Reaction LED
Gas signal < alarm threshold 1	OFF	OFF	OFF	OFF	ON	GREEN
Gas signal > alarm threshold 1	ON	OFF	OFF	OFF	ON	RED Slow blinking
Gas signal > alarm threshold 2	ON	ON	ON	ON	ON	RED Fast blinking
Gas signal ≥ alarm threshold 2, but ackn. button pressed	ON	ON	ON	OFF after delay ON		RED Fast blinking
Gas signal < (alarm threshold 2 - hysteresis) but ≥ alarm threshold 1	ON	OFF	OFF	OFF	ON	RED Slow blinking
Gas signal < (alarm threshold 1 - hysteresis) but not acknowledged	OFF	OFF	OFF	OFF	ON	RED Very fast blinking
No alarm, no fault	OFF	OFF	OFF	OFF	ON	GREEN
No fault, but maintenance due	OFF	OFF	OFF	OFF	ON	GREEN Slow blinking
Communication error	OFF	OFF	OFF	OFF	OFF	YELLOW

**Fieldbus loop**

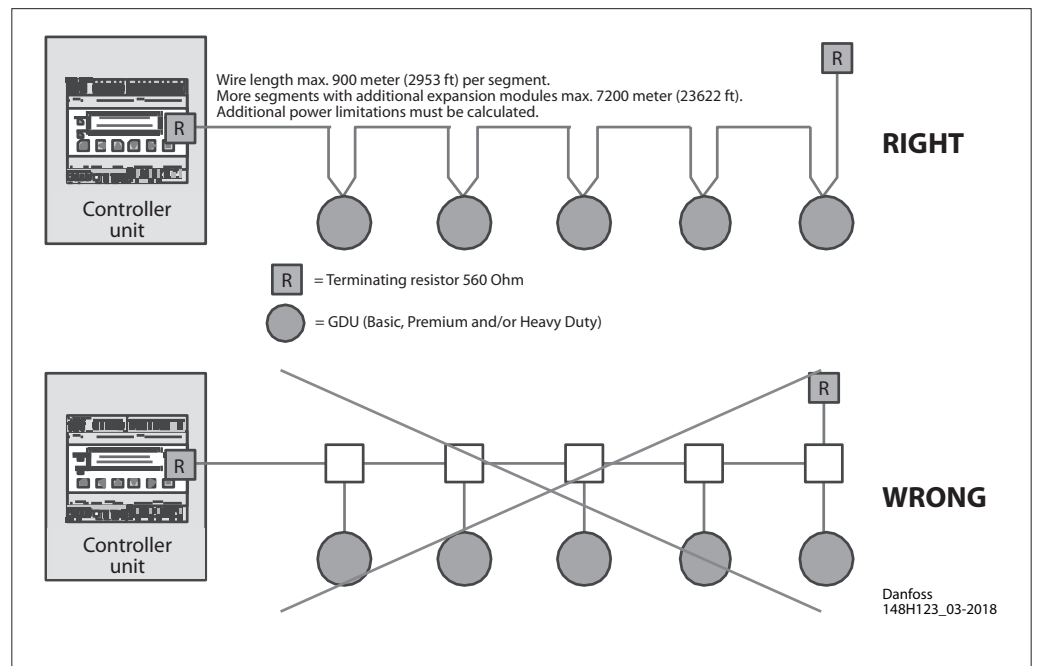
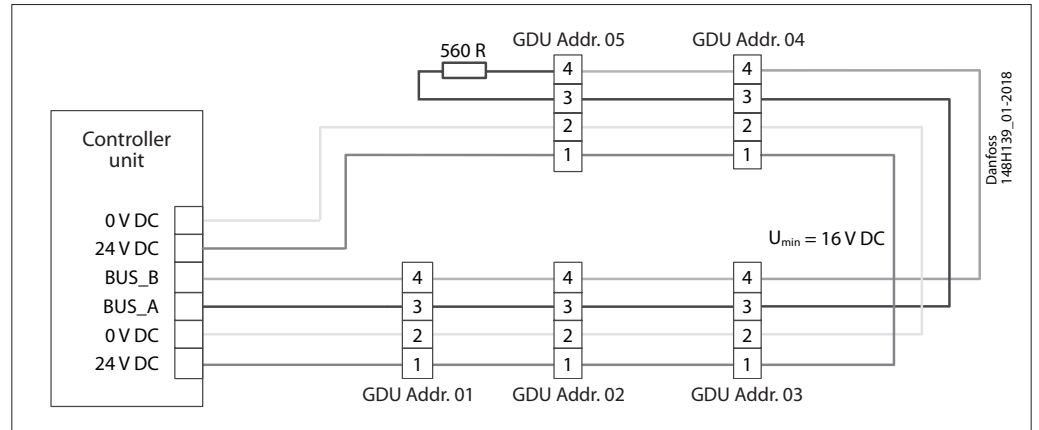
Each GD controller can handle up to 96 sensors and handle any mix of individual Gas detection units of the types Basic, Premium and Heavy Duty.

The controller and the last GDU in each segment must be provided with a resistor of 560 Ohm. A  $U_{min}$  of 16 V DC must be secured at any spot in the loop.

The max. recommended loop wire length is 900 meter (2953 ft) per segment.

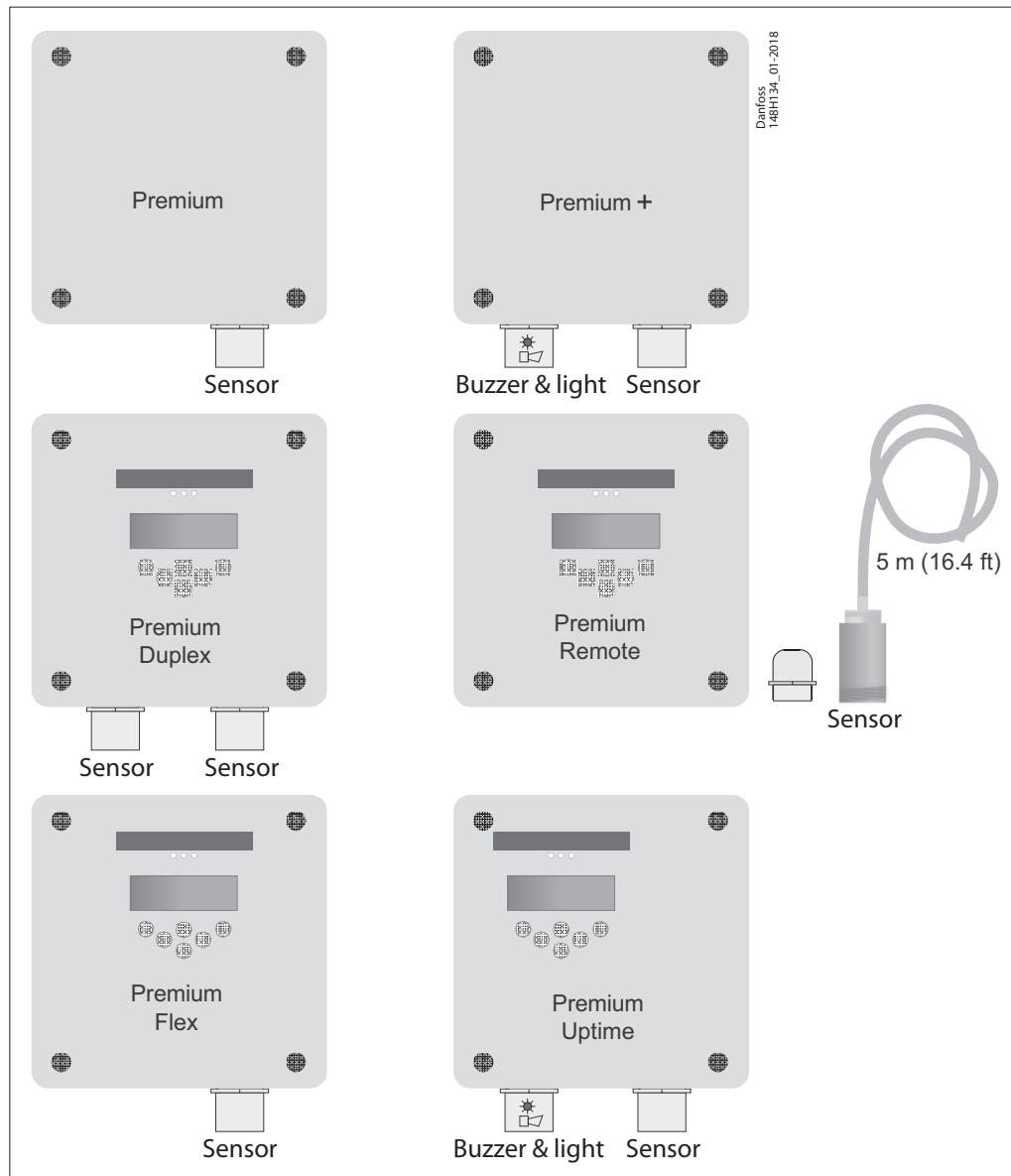
Below figure shows how to make proper connections between the controller and each GDU.

With additional segments (and additional controller expansion modules) the max recommended loop wire length is 7200 meter (23622 ft).



**General info**

- Cable gland not mounted but enclosed
- 4 mounting ears included
- Sensor head mounted bottom right (not Premium Remote)
- Alarm device (buzzer & 3 light alarm) mounted bottom left (only Premium +, Premium Uptime)

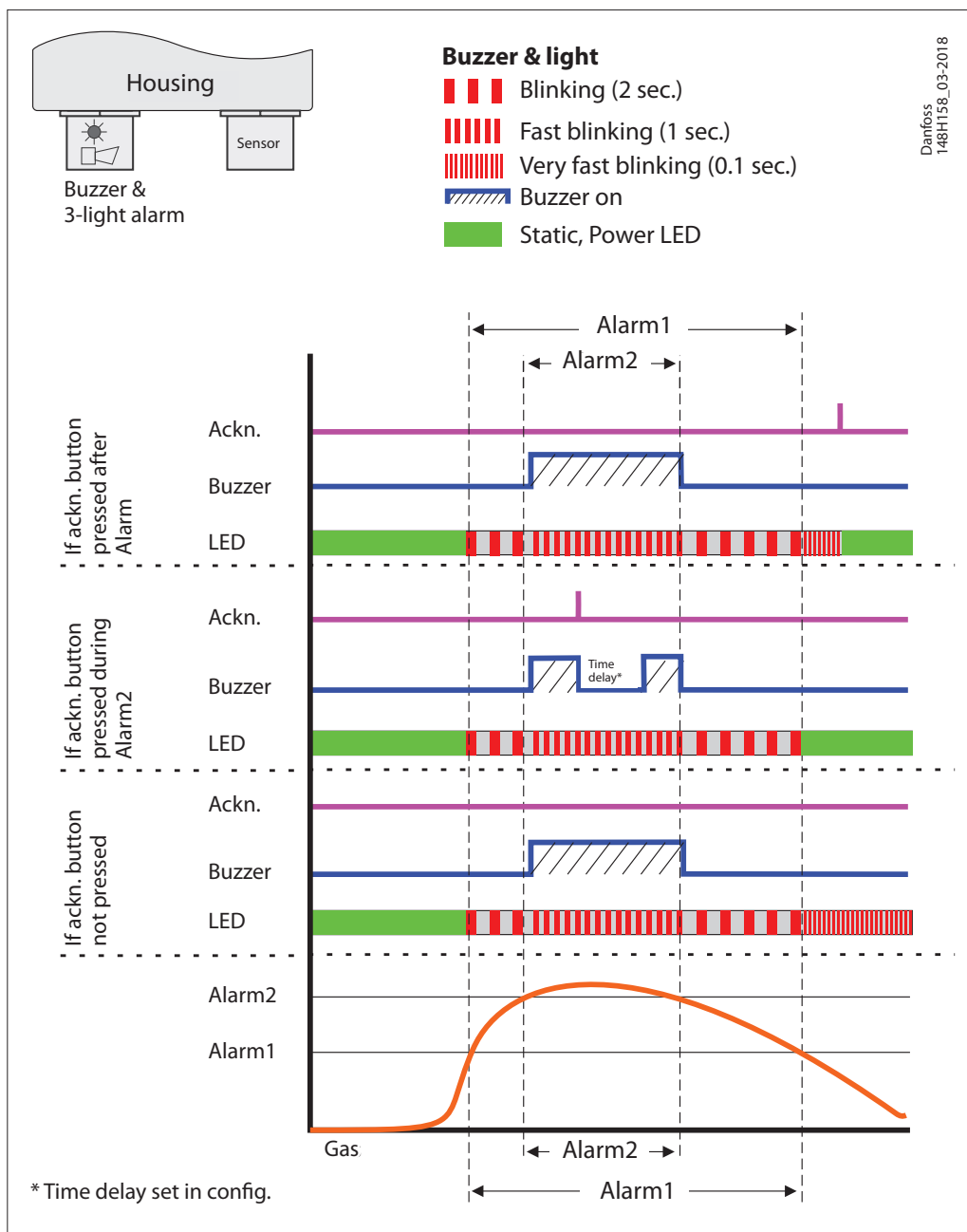


**Gas types and thresholds**

Sensor	Sensor Type	ppm range	Alarm 1	Alarm 2	Hysteresis
Ammonia EC 100	Electrochemical	0-100	25 ppm	35 ppm	2 ppm
Ammonia EC 300	Electrochemical	0-300	25 ppm	150 ppm	2 ppm
Ammonia EC 1000	Electrochemical	0-1000	500 ppm	900 ppm	25 ppm
Ammonia EC 5000	Electrochemical	0-5000	1000 ppm	4500 ppm	50 ppm
Ammonia SC 1000	Semiconductor	0-1000	500 ppm	900 ppm	25 ppm
Ammonia SC 10000	Semiconductor	0-10000	5000 ppm	9000 ppm	250 ppm
Ammonia P LEL	Pellistor	0-140000	21% LEL (30000 ppm)	21% LEL (30000 ppm)	1%
CO2 IR 20000 (2% Vol)	Infrared	0-20000	5000 ppm	9000 ppm	250 ppm
CO2 IR 50000 (5% Vol)	Infrared	0-50000	10000 ppm	18000 ppm	500 ppm
HFC R123 SC 2000	Semiconductor	0-2000	500 ppm	900 ppm	25 ppm
HFC R404A, R507 SC 2000	Semiconductor	0-2000	500 ppm	900 ppm	25 ppm
HFC R134A SC 2000	Semiconductor	0-2000	500 ppm	900 ppm	25 ppm
HC R290/Propane P 5000	Pellistor	0-5000	800 ppm	2500 ppm	40 ppm

Hysteresis = 5% of Alarm1 (rounded up to the next higher integer)  
 Alarm thresholds can have the same value, therefore the relays and/or the buzzer and LED can be triggered together.

Alarm scheme





**Data sheet | Danfoss gas detection units, types GD Premium, +, Duplex, Remote, Flex and Uptime**
**Ordering**

- Premium = Standard
- Premium + = Standard + Buzzer & light warning device
- Premium Duplex = Standard + 2<sup>nd</sup> sensor + Display and keyboard
- Premium Remote = Remote sensor (stainless steel) with 5m cable (2<sup>nd</sup> cable gland needed) not mounted but enclosed + Display and keyboard
- Premium Flex = Standard + Display and keyboard
- Premium Uptime = Standard + Buzzer & light warning device + Display and keyboard + UPS

Type	Model	Refrigerant	Sensor	ppm range	Alarm ppm	2 <sup>nd</sup> Sensor ppm (Alarm ppm)	Remote sensor ppm (Alarm ppm)	Buzzer & Light	Display	UPS	Temp. Range °C	Temp. Range °F	Code number	
GDA	Premium	Ammonia	Electrochemical	0-100	25/35						-30 to +50	-22 to 122	148H6002	
	Premium+	Ammonia	Electrochemical	0-100	25/35			x			-30 to +50	-22 to 122	148H6003	
	Premium Duplex	Ammonia	Electrochemical Pellistor	0-100	25/35	0-140000 (30000)			x		-20 to +50	-4 to 122	148H6004	
	Premium Remote	Ammonia	Electrochemical				0-100 (25/35)		x		-20 to +50	-4 to 122	148H6005	
	Premium Flex	Ammonia	Electrochemical	0-100	25/35				x		-20 to +50	-4 to 122	148H6006	
	Premium Uptime	Ammonia	Electrochemical	0-100	25/35			x	x	x	0 to +40	32 to 104	148H6007	
	Premium	Ammonia	Electrochemical	0-300	25/150							-30 to +50	-22 to 122	148H6010
	Premium+	Ammonia	Electrochemical	0-300	25/150				x			-30 to +50	-22 to 122	148H6011
	Premium Duplex	Ammonia	Electrochemical Pellistor	0-300	25/150	0-140000 (30000)				x		-20 to +50	-4 to 122	148H6012
	Premium Flex	Ammonia	Electrochemical	0-300	25/150					x		-20 to +50	-4 to 122	148H6013
	Premium	Ammonia	Electrochemical	0-1000	500/900							-30 to +50	-22 to 122	148H6016
	Premium+	Ammonia	Electrochemical	0-1000	500/900				x			-30 to +50	-22 to 122	148H6017
	Premium Duplex	Ammonia	Electrochemical Pellistor	0-1000	500/900	0-140000 (30000)				x		-20 to +50	-4 to 122	148H6018
	Premium Remote	Ammonia	Electrochemical				0-1000 (500/900)			x		-20 to +50	-4 to 122	148H6019
	Premium Flex	Ammonia	Electrochemical	0-1000	500/900					x		-20 to +50	-4 to 122	148H6020
	Premium Uptime	Ammonia	Electrochemical	0-1000	500/900				x	x	x	0 to +40	32 to 104	148H6021
	Premium	Ammonia	Semiconductor	0-1000	500/900							-10 to +50	14 to 122	148H6025
	Premium+	Ammonia	Semiconductor	0-1000	500/900				x			-10 to +50	14 to 122	148H6026
	Premium Flex	Ammonia	Semiconductor	0-1000	500/900					x		-10 to +50	14 to 122	148H6027
	Premium+	Ammonia	Electrochemical	0-5000	1000/4500				x			-30 to +50	-22 to 122	148H6028
	Premium Remote	Ammonia	Electrochemical				0-5000 (1000/4500)			x		-20 to +50	-4 to 122	148H6029
	Premium Uptime	Ammonia	Electrochemical	0-5000	1000/4500				x	x	x	0 to +40	32 to 104	148H6030
	Premium	Ammonia	Semiconductor	0-10000	5000/9000							-10 to +50	14 to 122	148H6032
	Premium+	Ammonia	Semiconductor	0-10000	5000/9000				x			-10 to +50	14 to 122	148H6033
Premium Remote	Ammonia	Semiconductor				0-10000 (5000/9000)			x		-10 to +50	14 to 122	148H6034	
Premium+	Ammonia	Pellistor	0-140000	30000				x			-25 to +50	-13 to 122	148H6036	
Premium Duplex	Ammonia	Semiconductor Pellistor	0-1000	500/900	0-140000 (30000)				x		-10 to +50	14 to 122	148H6037	
Premium Flex	Ammonia	Pellistor	0-140000	30000					x		-20 to +50	-4 to 122	148H6038	
GDC	Premium Flex	CO <sub>2</sub>	Infrared	0-20000	5000/9000				x		-20 to +50	-4 to 122	148H6040	
	Premium Flex	CO <sub>2</sub>	Infrared	0-50000	10000/18000				x		-20 to +50	-4 to 122	148H6041	
GDHC	Premium	R123	Semiconductor	0-2000	500/900						-30 to +50	-22 to 122	148H6042	
	Premium+	R123	Semiconductor	0-2000	500/900			x	x		-30 to +50	-22 to 122	148H6043	
	Premium Flex	R123	Semiconductor	0-2000	500/900				x		-20 to +50	-4 to 122	148H6044	
GDHF	Premium	R404a, R507a, R32, R125, R407c, R434a, R488a, R125	Semiconductor	0-2000	500/900						-30 to +50	-22 to 122	148H6047	
	Premium+	R404a, R507a, R32, R125, R407c, R434a, R488a, R125	Semiconductor	0-2000	500/900			x			-30 to +50	-22 to 122	148H6048	
	Premium Flex	R404a, R507a, R32, R125, R407c, R434a, R488a, R125	Semiconductor	0-2000	500/900				x		-20 to +50	-4 to 122	148H6049	
	Premium	R134a, R407a, R416a, R417a, R422a, R422d, R427a, R437a, R438a, R449a, R407f, R450a	Semiconductor	0-2000	500/900						-30 to +50	-22 to 122	148H6050	
	Premium+	R134a, R407a, R416a, R417a, R422a, R422d, R427a, R437a, R438a, R449a, R407f, R450a	Semiconductor	0-2000	500/900				x			-30 to +50	-22 to 122	148H6051
	Premium Flex	R134a, R407a, R416a, R417a, R422a, R422d, R427a, R437a, R438a, R449a, R407f, R450a	Semiconductor	0-2000	500/900					x		-20 to +50	-4 to 122	148H6052
GDH	Premium	R290/Propane	Pellistor	0-5000	800/2500						-30 to +50	-22 to 122	148H6053	
	Premium+	R290/Propane	Pellistor	0-5000	800/2500			x			-30 to +50	-22 to 122	148H6054	
	Premium Flex	R290/Propane	Pellistor	0-5000	800/2500				x		-20 to +50	-4 to 122	148H6055	

**Data sheet | Danfoss gas detection units, types GD Premium, +, Duplex, Remote, Flex and Uptime**
*Spare parts and accessories*

Description	Code number
Replacement sensor - Ammonia EC 100	148H6200
Replacement sensor - Ammonia EC 300	148H6201
Replacement sensor - Ammonia EC 1000	148H6202
Replacement sensor - Ammonia SC 1000	148H6203
Replacement sensor - Ammonia EC 5000	148H6204
Replacement sensor - Ammonia SC 10000	148H6205
Replacement sensor - Ammonia P LEL	148H6206
Replacement sensor - CO2 IR 20000	148H6207
Replacement sensor - CO2 IR 50000	148H6208
Replacement sensor - HCFC R123 SC 2000	148H6209
Replacement sensor - HFC R404A, R507 SC 2000	148H6210
Replacement sensor - HFC R134a SC 2000	148H6211
Replacement sensor - HC R290/Propane P 5000	148H6212
Remote sensor - Ammonia EC 100 (length: 5m (16.4 ft.) - External thread M30 x 1.5)	148H6213
Remote sensor - Ammonia EC 1000 (length: 5m (16.4 ft.) - External thread M30 x 1.5)	148H6214
Remote sensor - Ammonia EC 5000 (length: 5m (16.4 ft.) - External thread M30 x 1.5)	148H6215
Remote sensor - Ammonia SC 10000 (length: 5m (16.4 ft.) - External thread M30 x 1.5)	148H6216
Controller unit	148H6231
Controller solution (controller + enclosure)	148H6221
Controller solution Uptime	148H6237
Warning module (wire break monitoring module)	148H6223
Controller expansion module	148H6222
Service tool	148H6224
PC Tool	148H6235
Calibration adapter	148H6232
Calibration adapter for remote sensors	148H6233
Buzzer & light - acoustic buzzer and optic led	148H6225
Air duct set	148H6236
Seal cap	148H6227
Remote kit	148H6238
Splash guard	148H6226
NPT adapter for remote sensor (M30 x 1.5 to NPT ¾ in.)	148H6234
Gateway for controller	148H6228

*Accessories overview**Controller unit*

Used for a centralized monitoring and warning. The input signals for the controller are collected via RS485 Modbus or analog communication. The controller can handle up to 96 digital sensors via Fieldbus and four (4) analog input. An additional 28 analog input is possible using seven (7) expansion modules (4-20 mA signal interface). The total number of connected sensors should not exceed 128 sensors. The controller unit can be employed as pure analog controller, as analog/digital, or as digital controller. Configuration is menu-driven via the keypad. For fast and easy configuration, the PC Tool is recommended.

*Controller solution*

Controller unit placed in an enclosure ready to be connected to a power source. A separate UPS for the controller is available.

*Warning module (wire break monitoring module)*

The warning module is used for monitoring the circuiting to the warning/alarm devices on a centrally controlled gas detection system. Wire breaks or wire interruptions in the alarm device loop will be reported to the central control.

*Controller expansion module*

The gas detection Controller Expansion module is used for expansion of the cable coverage in terms of number of loops and the total wire length. Each Controller Unit can handle up to 7 Expansion modules allowing additional 7 segments with a total of 7200 meters (23622 ft.) wiring and a total of 32 relays for alarm device circuits.

*Service tool*

For interface with units with no display (Basic, Basic+, Premium, Premium+). Acts as a portable display and can be connected to all Danfoss gas detection units. (Heavy Duty w. adapter).

*PC tool*

The PC tool is a menu-driven and standalone software used for easy addressing, parameter setting, calibration, and data logging of the Basic, Premium and Heavy Duty gas detection units, and the controller unit.

*Calibration adapter*

The calibration adapter is required for connecting the calibration gas container, via the flow regulator, to the sensor head on the gas detection units. (Two variants, One for Basic and Premium plastic head sensors; one for heavy duty and Premium remote metal head sensors.).

*Buzzer & light - acoustic buzzer and optic led*

Can be installed in Basic or Premium units providing a local alarm.

*Air duct set*

The air duct set is specially designed to capture the airflow in air ducts. It can be connected to the standard sensor heads, except from Heavy Duty gas detection units.

*Seal cap*

Airtight seal cap to protect the sensor head against premature exposure during installation. The seal cap is mounted on new sensors (complete units and replacement sensors) but is also available as an accessory.

*Remote kit*

Enabling installation of a sensor head in plastic housing 5m (16.4 ft.) from the unit. This means that the gas detection unit can be placed outside the room where the sensor is placed to detect hazardous gases, allowing reading of and interfacing with the unit without entering the dedicated space. Basic and Premium gas detection units.

*Splash guard*

To protect the sensor head against water exposure during wash-down cleaning and rinsing operations.

*NPT adapter*

The NPT adapter is a steel fitting for installation of remote sensors into NPT threads; it converts the standards M30 X 1.5 thread of the Stainless Steel remote sensor head into an External NPT 3/4" thread for more convenient installation.

*Gateway for controller*

The gateway is an addition to the controller and used for communicating via Modbus TCP/IP.

