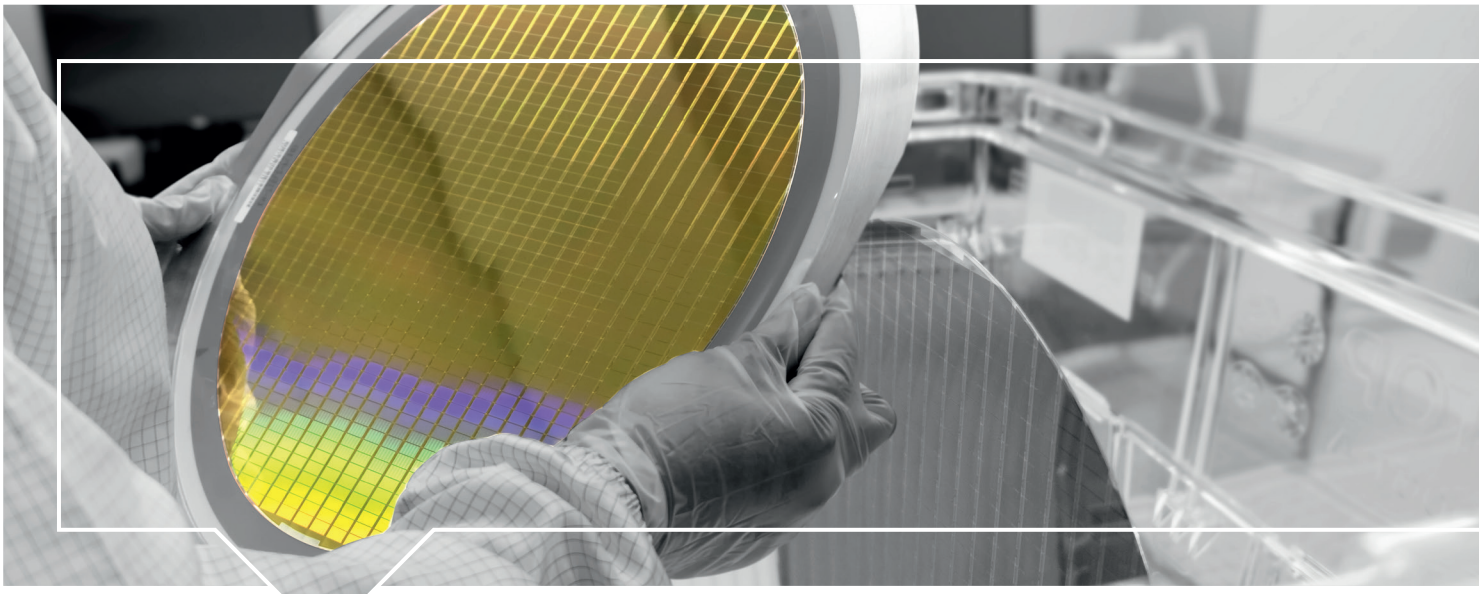
smart GasDetection Technologies

D-ReX Gas Monitoring Series

Discover a New Level of Versatility in Gas Detection



D-ReX

Designed to be Versatile

Use diffusion mode for ambient air monitoring at the Point-of-Use (PoU). Use remote sensors and be able to detect more than 30 gases up to 30 meters away from the Point-of-Installation (PoI) or use a state-of-the-art extraction module to monitor gases at the Point-of-Sampling (PoS).

The requirements for industrial grade gas monitoring solutions, with or without extraction capability, are numerous. That makes it even more important not to be forced to use a different system each time a new requirement arises. The D-ReX gas monitor has been designed to meet them all, by offering unique versatility and some features new to this class of devices.

New Level of Versatility - A New Level of Safety

Depending on the requirements on site, you can choose the ideal monitoring method. The D-ReX can either operate

» in **D**iffusion mode
» with **R**emote sensors
» or using an **eX**traction module

On top, it is the first industrial grade gas monitor featuring:

» Bluetooth® to be managed with a portable device and an app
» a high-resolution, full-color display
» displaying plain text information instead of cryptic code
» option: line integrity monitoring for the sampling system

It also offers an unmatched versatility when it comes to communication, including Power over Ethernet (PoE) communication, the option to use LonWorks and as mentioned before, Bluetooth. Smart, high-quality and long-life sensors are available for more than 30 gases and new sensors for additional gases are under development.

A Future-proof Device Designed to Meet SIL 2 Requirements

The D-ReX is a state-of-the-art gas detection system developed with current and foreseeable future standards and requirements in mind. One requirement that is becoming increasingly important in terms of plant safety and is being demanded more and more frequently by plant operators is SIL.

Safety Integrity Level (SIL) verification is a demonstration that for each Safety Instrumented Function (SIF), the target SIL, as derived from SIL determination, has been met in accordance with the requirements of of IEC 61508 / IEC 61511.

These criteria were taken into account during development with regard to the hardware as well as the software components used and the D-ReX will be tested by a certified body.

SIL 2

The D-ReX gas monitoring series allows you to detect gases in exactly the way that is best for plant safety.

Diffusion Mode
In its most basic operating mode, the D-ReX operates in diffusion mode, for example when monitoring ambient air at the point of use for toxic and corrosive gases at TLV levels (Threshold Limit Value) or for combustible gases.

Remote Sensor
A remote sensor also operates in diffusion mode. However, it is connected to the connector cartridge of the D-ReX by a flexible, up to 30 meters (100 feet) long cable. Thus, it is possible to remotely monitor otherwise hard to reach locations.

A world first in this device class is the possibility to also monitor measuring points in hazardous areas. An intrincically safe connector cartridge is used to limit the voltage and current of non-intrinsically safe circuits to intrinsically safe values. A sensor cartridge is than supplied intrinsically safe and can thus monitor measuring points in Ex zone 2.

1. **Ethernet Cable with PoE (option)**
2. **IP-Protection Sticker (option)**
3. **KySS Connector Cartridge for Satellite XT sensors**
4. **Intrinsically safe Connector Cartridge for remote sensors**
5. **Connector Cartridge for remote sensors**
6. **Sensor Cartridge with removable diffusion mode adapter**
7. **Integrated Pump**
   (up to 30 meters / 100 feet)
8. **Sensor Cartridge with removable pipe flange adapter**
   (up to 30 meters / 100 feet)
9. **Pipe flange saddle**

Moreover, with the appropriate pipe flange saddle, it will allow for in-situ duct detection. Go with a state state-of-the-art GfG sensor cartridge for distances of up to 30 meters (100 feet) or continue to use the up to 3 meter Satellite XT Sensor Extension installed while starting to benefit from the D-ReX. The KySS Connector Cartridge (Keep Your Satellite Sensor) enables you to utilize the solution already installed. For further information, please refer to page 4.

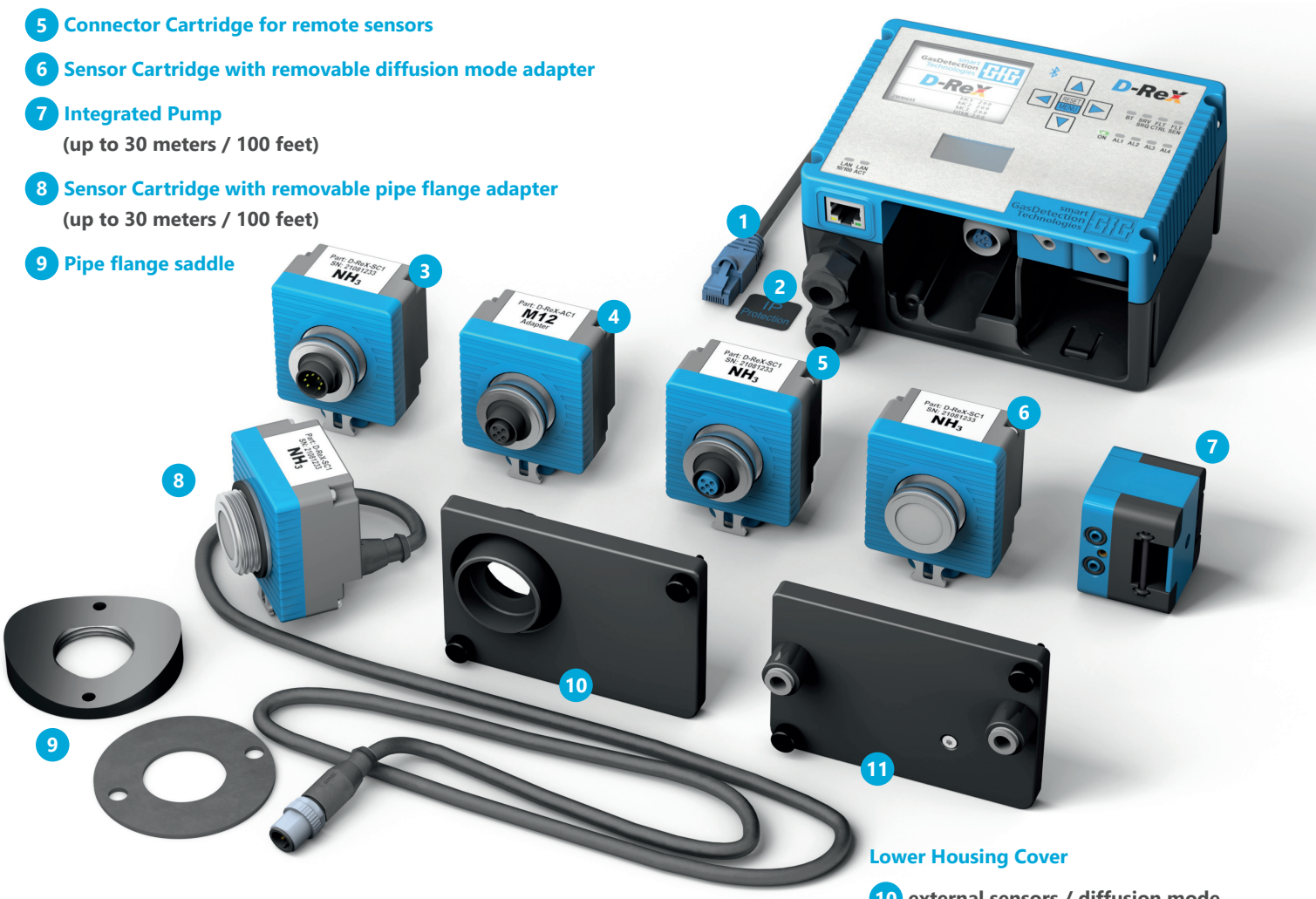
eXtraction Module
Equipped with an integrated pump and the respective cover plate, the D-ReX will operate in extraction mode, allowing you to monitor gases up to a distance of 30 meters (100 feet).

If the pump reaches the end of its service life, only the module containing the mechanical components needs to be replaced. No need to replace the electronic components, thus reducing maintenance time and minimizing waste.

If desired, the line integrity can be monitored. More on this on page 9.

D-ReX Pyro (option, Q4 2022)
Add the pyrolyzer module D-ReX Pyro for an even wider range of detectable gases. More information on the pyrolyzer module will be available soon.

Easily manage the D-ReX by accessing all relevant information by connecting to the device via Bluetooth® and App (iOS and Android).



Lower Housing Cover

10. **external sensors / diffusion mode**
11. **extraction module**

KySS Connector Cartridge

Keep your Satellite Sensors

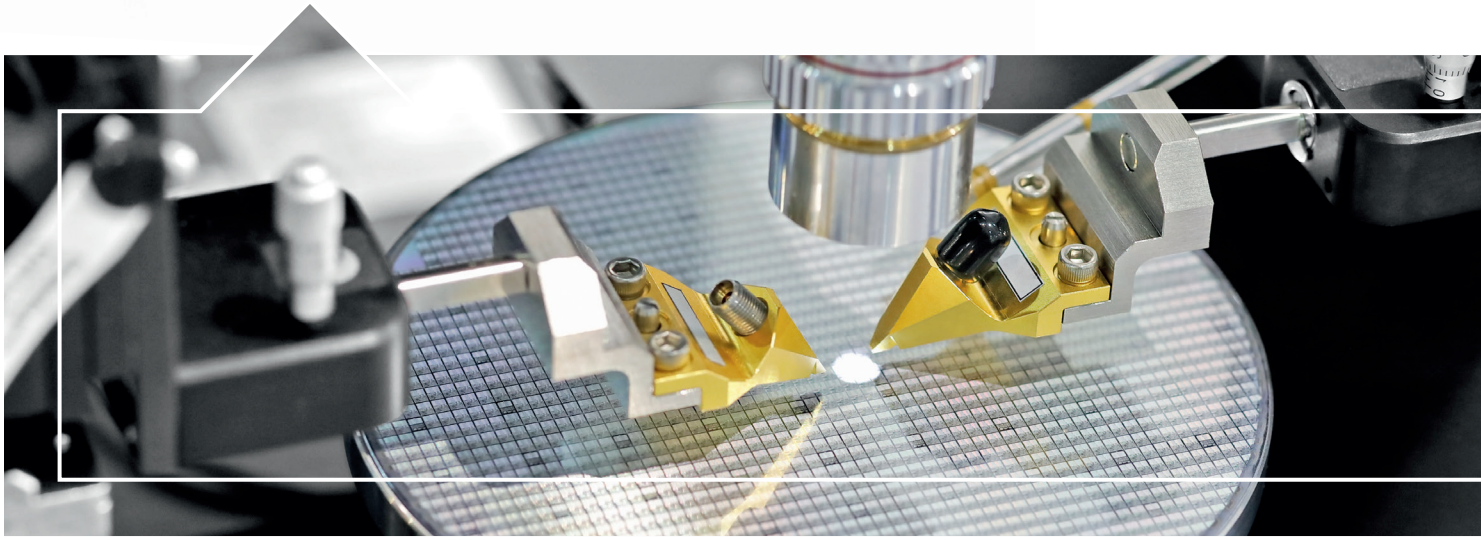
NEW

Rip-and-Replace is rarely a good strategy when it comes to modernizing safety-relevant equipment. It is neither economical nor environmentally friendly. The **KySS** Connector Cartridge (Keep Your Satellite Sensor) allows for a smooth hassle-free migration to your new gas detection device.

You might even continue to use the Satellite XT Sensor Extension installed while starting to benefit from the D-ReX monitor. Connector cartridges will be available in 2022 for standard Sensor Extensions as well as for Combustibles.

This way you can use installed or stocked sensors before switching over to the advanced smart sensors for D-ReX. For example, if you would like to install the controller later at an easier to monitor location, unreachable with a mere 3-meter cable.

Alternatively, GfG will provide you fitting sensors for your Sensor Extension system and you can continue to operate as you are used to.



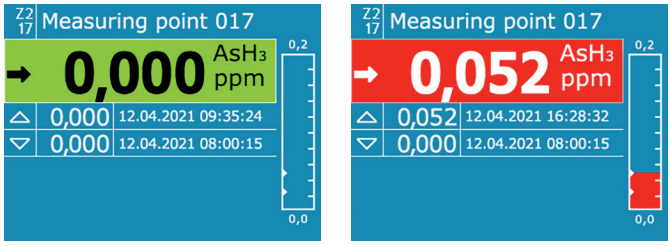
Ease of Use and Cost Efficiency

The D-ReX is a reliable, easy to use gas detection device that enhances the user experience.

High-resolution, full-color display

The 2.4", 320 x 240 pixel full-color TFT display sets new standards for gas detectors. It provides clear and concise information on the gas reading, LTEL or STEL exposure and the status of any issues. Information can be displayed in a variety of languages, including English, German and Simplified Chinese.

Get the information you need, in the way you want. No more cryptic error codes to decipher, but information on any issues in plain language. Status LEDs provide an additional instant overview on vital components of the system.



Display in monitoring and alarm mode

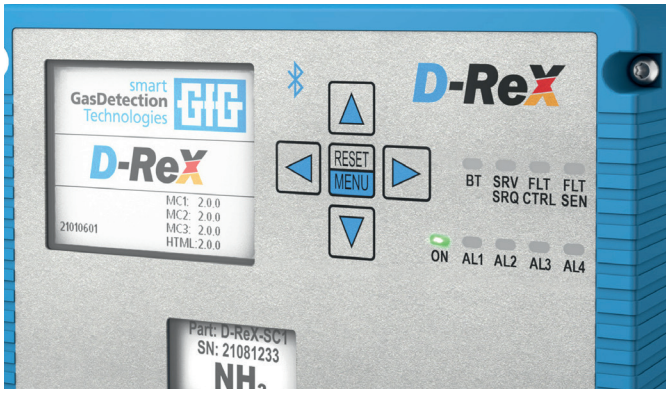
Intuitive device management with Bluetooth® and app

Easily manage the D-ReX by accessing all relevant information as well as the menu by connecting through Bluetooth® with your mobile device. The app (iOS and Android) offers the same functionality as if you were using the push-button interface of the device – but remote.

Advanced connectivity

The D-ReX comes with a wide variety of interfaces. Choose between analog 4–20 mA, digital RS-485 (Modbus/RTU), Ethernet (Modbus/ TCP) and LonWorks® (option) for communications. It also comes with Bluetooth® for wireless connectivity.

In addition, it features 5 internal programmable changeover relays (option). 16 additional relays can be addressed by connecting the D-ReX to a GMA200-RT/D relay module.



User interface with display, control keys and status LEDs

Periodic sensor self-tests

The plug-and-play smart sensor cartridges are pre-configured and pre-calibrated for easy installation or replacement. Automated sensor self-tests every 24 h increase safety and minimize maintenance costs even further.

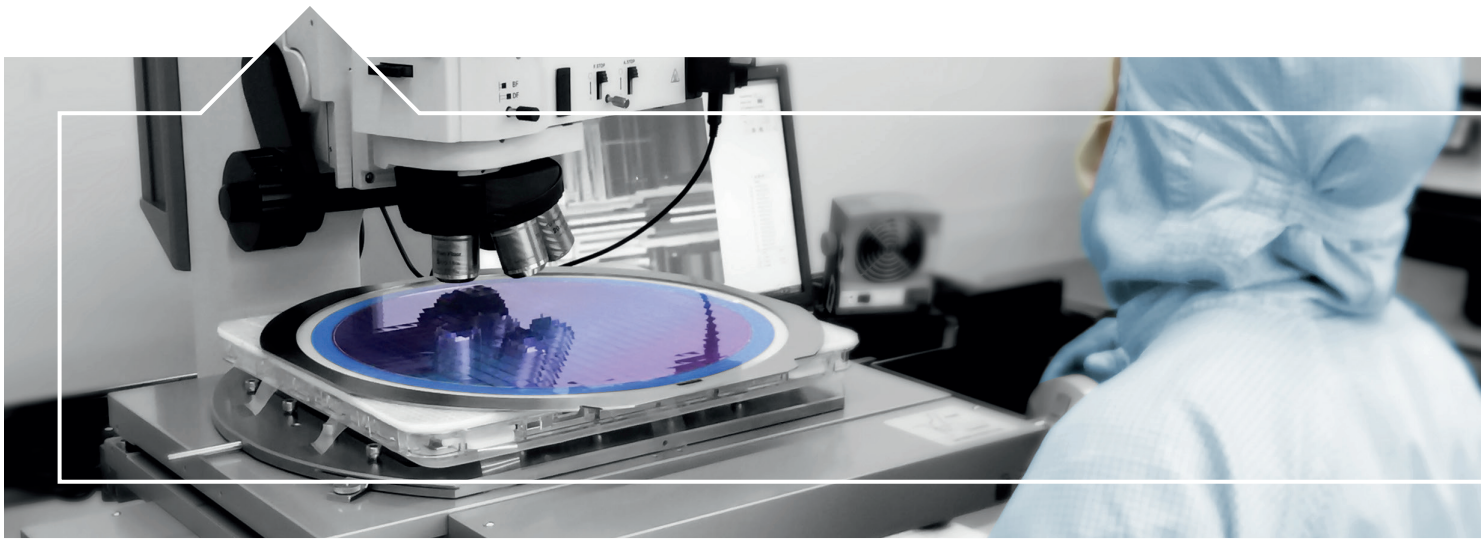
The new Standard for Versatile: D-ReX

Thus, GfG's D-ReX qualifies for numerous application in virtually all industries. It comes with some unique features that make it particularly suitable for use in the semiconductor industry, photovoltaic industry and industrial manufacturing as well as laboratories. When you are looking for a gas detector that suits your needs best, the D-ReX will be your first choice for many applications.

Application possibilities in areas such as:

- VMBs (valve manifold boxes)
- Process tools
- Vacuum pumps
- Scrubbers
- Gas cabinets
- Ambient breathing zones
- Storage areas
- Cleanroom environments
- Sub fab

and many more.



Versatility means having options

No two facilities are the same and even within a facility, the requirements for a gas detector can varry from department to department and from one gas being monitored to another. Thus, it's good if the monitor can be configured accordingly.

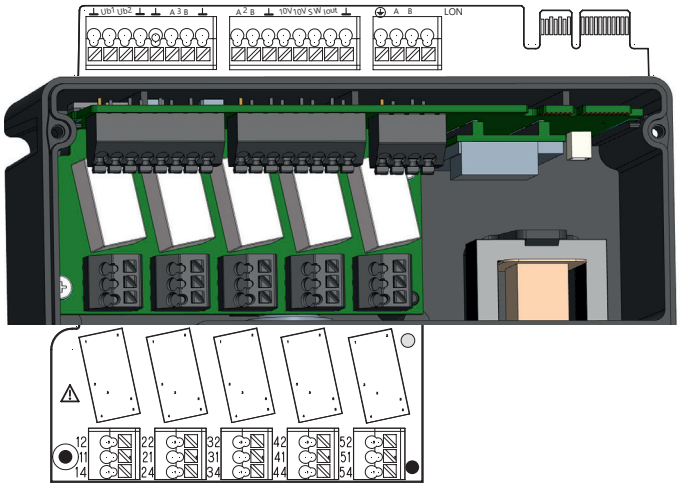
LonWorks®

LonWorks is an open and interoperable system for building automation and is characterized by its flexible topology and cross-trade functions.

If your previous gas detection system was integrated into your infrastructure via LonWorks or if your new system should be integrated using the LonTalk® protocol, all D-ReX versions are available with an optional LonWorks module. Keep the advantages of LonWorks, while benefitting from a state-of-the-art gas detection solution.

Internal Relays

Depending on the application, it may be beneficial for the gas detector to have its own relays. All versions of the D-ReX are optionally available with 5 internal, freely programmable form C relays. The terminal allocation is as follows:



Regardless of this, there is also the option of connecting an external relay module GMA200-RT/D for further 16 relays to the D-ReX.

D-ReX versions and options

Version	Diffusion mode	Remote Sensor standard	Remote Sensor intrinsically*	Remote Sensor KySS*	eXtraction Module	D-ReX Pyro*	Internal Relays	LonWorks®
D-ReX (PoU) Point-of-Use	yes						5 (option)	(option)
D-ReX (PoI) Point-of-Installation		yes	yes	yes			5 (option)	(option)
D-ReX (PoS) Point-of-Sampling					yes	yes	5 (option)	(option)
D-ReX (AiO) All-in-One	yes	yes	yes	yes	yes	yes	5 (option)	(option)

* Under development

D-ReX PoU

Diffusion Mode Gas Detection at the Point-of-Use (PoU)

The D-ReX PoU is the new reference class for monitoring toxic, combustible and corrosive gases at the Point-of-Use. Reliable alarming, clearly understandable information and a wide range of communication options, including Bluetooth®, are its hallmark.

Easily manage the D-ReX by accessing all relevant information by connecting through Bluetooth® and App (iOS and Android). The app gives you the same options as if you were using the 5-push-button interface on the device – but touchless.

USPs:

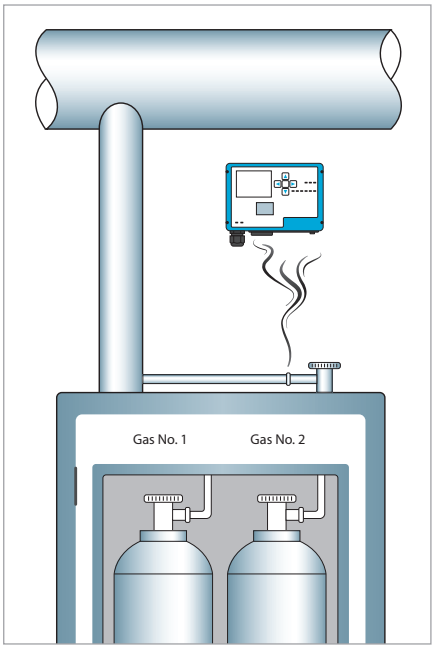
- High-resolution, full-color 2.4" TFT display
- Plain text information
- Bluetooth®

Options:

- 5x internal relays (form C, programmable)
- 16x external relays (GMA200-RT/D)
- LonWorks®

Features:

- Sensors for more than 30 gases
- Hot-swappable smart sensor cartridge
- Tool-free maintenance
- Power over Ethernet (PoE) communication
- Addressable over a web portal
- Password protected menu
- Interface:
  - analog 4–20 mA output
  - RS-485 (Modbus/RTU)
  - 10/100 Mbit Ethernet (Modbus/TCP)
- Bright status and alarm LEDs
- Data logger to review sensor history and alarms
- CE marked and UL certification



D-ReX PoI

Remote Diffusion Mode Gas Detection at the Point-of-Installation (PoI)

The D-ReX PoI allows the external sensor to be mounted up to 30 meters / 100 feet away to monitor toxic, combustible and corrosive gases. Reliable alarming, clearly understandable information and a wide range of communication options, including Bluetooth®, are its hallmark.

There will also be an intrinsically safe version in 2022 that will allow the sensor cartridge to be installed in Ex Zone 2.

Third option is the use of the KySS Connector Box (Keep Your Satellite Sensor) to utilize the benefits of the D-ReX while continuing to use the Satellite Sensor Extensions installed on site. It will be available in 2022 for standard Sensor Extensions as well as für Senor Extensions Combustible.

Easily manage the D-ReX by accessing all relevant information by connecting through Bluetooth® and App (iOS and Android).

USPs:

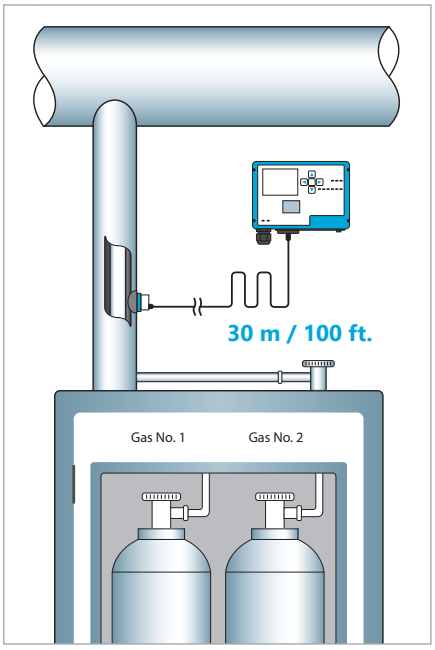
- High-resolution, full-color 2.4" TFT display
- Intrinsically safe and KySS Connector Cartridges
- Bluetooth®

Options:

- 5x internal relays (form C, programmable)
- 16x external relays (GMA200-RT/D)
- LonWorks®

Features:

- Sensors for more than 30 gases
- Sensors for Satellite Sensor Extensions and Satellite Sensor Extensions Combustible
- Hot-swappable smart sensor cartridge
- Tool-free maintenance
- Power over Ethernet (PoE) communication
- Addressable over a web portal
- Password protected menu
- Interface:
  - analog 4–20 mA output
  - RS-485 (Modbus/RTU)
  - 10/100 Mbit Ethernet (Modbus/TCP)
- Data logger to review sensor history and alarms
- CE marked and UL certification



D-ReX PoS

eXtraction Mode Gas Detection at the Point-of-Sampling (PoS)

Thanks to the built-in pump of the D-ReX PoS, toxic, flammable and corrosive gases can be monitored up to 30 meters / 100 feet away. Reliable alarming, clearly understandable information and a wide range of communication options, including Bluetooth®, are its hallmark.

Line integrity monitoring

As an option, it is also possible to monitor the line integrity. Depending on the conditions on site and your requirements, there are three methods to choose from.

» Active, timed control
The line is then closed by means of a solenoid valve at the suction point and the tightness of the line is determined by means of the flow sensor. A requirement is that a D-ReX with internal relay modules is used, as the solenoid valve is controlled by the D-ReX.

» Continuous line monitoring
Not quite as accurate, but sufficient for many cases is the continuous monitoring of the negative pressure in the line. It can be created by means of a check valve or a capillary piece. An additional pressure sensor provides the ambient pressure as a reference. If the ratio changes, the line draws air.

D-ReX Pyro

Add the pyrolyzer module D-ReX Pyro for an even wider range of detectable gases. More information on the pyrolyzer module will be available soon.

USPs:

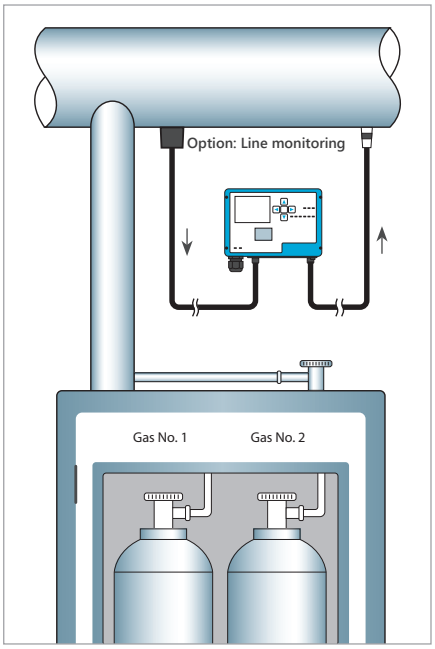
» Tube length up to 30 m / 100 ft.
» Easy to replace internal pump (only mechanical component)
» Bluetooth®

Options:

» 5x internal relays (form C, programmable)
» 16x external relays (GMA200-RT/D)
» LonWorks®

Features:

» Sensors for more than 30 gases
» Hot-swappable smart sensor cartridge
» High-resolution, full-color 2.4" TFT display
» Plain text information
» Tool-free maintenance
» Power over Ethernet (PoE) communication
» Addressable over a web portal
» Password protected menu
» Interface:
  - analog 4–20 mA output
  - RS-485 (Modbus/RTU)
  - 10/100 Mbit Ethernet (Modbus/TCP)
» Bright status and alarm LEDs
» Data logger to review sensor history and alarms
» CE marked and UL certification



D-ReX AiO

All-in-One – The most versatile Gas Detection Device available (AiO)

Not sure what the best approach is or faced with a situation where requirements may change? Choose the D-ReX All-in-One (AIO) for freedom of choice in measurement method.
The D-ReX All-in-One (AiO) combines all the capabilities of the D-ReX series in one device. Replace the sensor cartridge with one of the connector cartridges to switch to remote mode.

Add the pump module and associated base plate to the sensor cartridge to monitor gas in extraction mode.
The D-ReX AiO is the perfect solution for all applications where gas monitoring requirements can vary sporadically, such as for temporary experimental setups or in laboratories.

USPs:

- Free choide of detection mode and sensor typ
- Detect gases either at the PoU or up to 30 m / 100 ft. away
- Same gas sensor cartridge for all measurement methods
- Bluetooth®

Options:

- 5x internal relays (form C, programmable)
- 16x external relays (GMA200-RT/D)
- LonWorks®

Features:

- Sensors for more than 30 gases
- Hot-swappable smart sensor cartridge
- Cable length up to 30 m / 100 ft.
- Tube length up to 30 m / 100 ft.
- Easy to replace internal pump (only mechanical component)
- High-resolution, full-color 2.4" TFT display
- Plain text information
- Power over Ethernet (PoE) communication
- Tool-free maintenance
- Addressable over a web portal
- Password protected menu
- Interface:
  - analog 4–20 mA output
  - RS-485 (Modbus/RTU)
  - 10/100 Mbit Ethernet (Modbus/TCP)
- Bright status and alarm LEDs
- Data logger to review sensor history and alarms
- CE marked and UL certification

Smart Cartridge Technology with a Small Environmental Footprint

Smart devices are by now state-of-the-art, but GfG goes a step further and offers you Smart Design. One of the most efficient ways to optimize your company's environmental footprint is to minimize waste. For this reason, the D-ReX was developed in order to ensure that only components that are actually subject to wear need to be replaced.

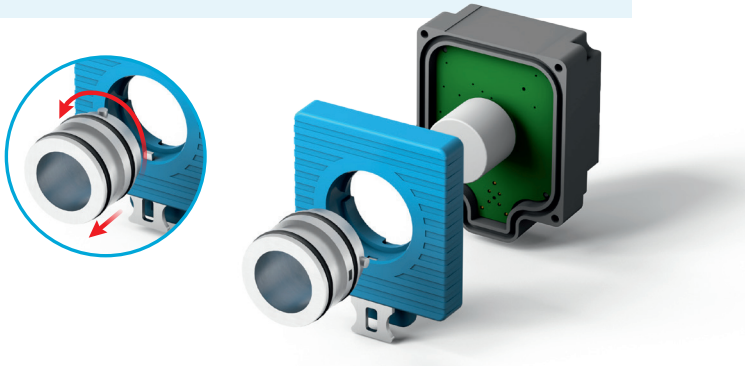
USPs:

» Only one type of sensor cartridge for all applications
» Suitable for all available sensors
» Hot-swappable within seconds in all operation modes
» Exchangeable joint with bayonet lock
  - With O-ring, for use with Lower Housing Cover
  - Threaded, for use with Duct Mounting Saddle
» M12 connector system

Available Accessory:

» Duct Mounting Saddle
» Silicon Sealing for all saddle types
» M12 Remote Sensor Cable, various sizes from 1 to 30 meters
» Calibration Cap for PoU
» Calibration Cap for PoI

Gases and Measuring Ranges:	Refer to gas list
Interface:	M12
Response Time:	Sensor dependent (Refer to sensor data sheet)
Expected Average Life of the Sensor:	Sensor dependent (Refer to sensor data sheet)
Detection Principle:	Sensor dependent, available: EC = electrochemical CC = catalytic combustion (LEL) IR = infrared (CO_2, N_2O, LEL)



GfG gas sensors are designed to be highly specific to the gas they are intended to detect. While the cross sensitivities of GfG sensors are in accordance with the typical values of sensors for the respective gases in industrial applications, GfG sensors offer the highest level of stability, performance and relative response documentation of any available sensors. For detailed information, please refer to the respective data sheet.

List of detectable gases

Formular	Gas Name	Nominal Range	Available
AsH_3	arsine	0 ... 1.00 ppm	yes
B_2H_6	diborane	0 ... 1.00 ppm	yes
Br_2	bromine	0 ... 5.00 ppm	yes
Cl_2	chlorine	0 ... 5.00 ppm	yes
ClF_3	chlorine trifluoride	0 ... 1.00 ppm	yes
ClO_2	chlorine dioxide	0 ... 1.00 ppm	yes
CO	carbon monoxide	0 ... 500 ppm	yes
CO_2	carbon dioxide	0 ... 5 vol%	yes
$COCl_2$	phosgene	0 ... 1.00 ppm	yes
ETO	ethylene oxide		tbd
F_2	fluorine	0 ... 5.00 ppm	yes
GeH_4	germane	0 ... 5.0 ppm	yes
H_2	hydrogen	0 ... 1.000 vol%	yes
		0 ... 4.000 vol%	yes
H_2S	hydrogene sulfide	0 ... 100 ppm	yes
HBr	hydrogen bromide		tbd
HCl	hydrogen chloride	0 ... 30.0 ppm	yes
HCN	hydrogene cyanide	0 ... 30.0 ppm	yes
HF	hydrogen fluoride	0 ... 10.0 ppm*	yes
HMDS	hexamethyldisilazane	0 ... 0.500 vol%	yes
LEL	combustible gases		yes
N_2H_4	hydrazine	0 ... 1.00 ppm	yes

* Above > 0.3 mg/m³

Formular	Gas Name	Nominal Range	Available
N_2O	nitrous oxide	0 ... 1000 ppm	yes
		0 ... 1.0 vol%	yes
NH_3	ammonia	0 ... 100 ppm	yes
		0 ... 1000 ppm	yes
NO	nitrogen monoxide	0 ... 250 ppm	yes
		0 ... 25 ppm	yes
NO_2	nitrogen dioxide	0 ... 30 ppm	yes
O_2	oxygen	0 ... 25 vol%	yes
O_3	ozone	0 ... 1.00 ppm	yes
PH_3	phosphine	0 ... 1.00 ppm	yes
SeH_2	hydrogen selenide	0 ... 5.00 ppm	yes
SiH_4	silane	0 ... 50 ppm	yes
SO_2	sulfur dioxide	0 ... 20 ppm	yes
TEOS	tetraethyl orthosilicate	0 ... 100 ppm	yes
TMB	trimethyl borate	0 ... 200 ppm	yes

Gases requiring D-ReX Pyro (Q4 2022):

C_4F_6	hexafluorobutadiene	0 ... 40 ppm	yes
C_5F_8	octafluorocyclopentene	0 ... 40 ppm	yes
CH_3F	methyl fluoride	0 ... 120 ppm	yes
DCE	1,2-Dichlorethene		tbd
NF_3	nitrogen trifluoride	0 ... 40 ppm	yes
SF_6	sulfur hexafluoride	0 ... 0.5 vol%	yes

Technical Specification: D-ReX

Gases and Measuring Ranges:	Refer to gas list
Detection Principle:	Sensor dependent, available: EC = electrochemical CC = catalytic combustion IR = infrared
Sampling Method:	Depending on Configuration » diffusion » remote sensor, standard, intrinsically or KySS » extraction with pump
Display and Interface:	Display: 2.4" full color TFT (320 x 240 pixel) Interface: 5 push buttons
Communication:	» analog 4–20 mA output » digital RS-485 (Modbus/RTU) » 10/100 Mbit Ethernet (Modbus/TCP) » Bluetooth® » Interface for external pyrolyzer » LonWorks® (option) Relays: 5x internal (programmable) form C relays (option) 16x external relays (option) Max. 2 A / 30 V DC Min. 10 mA / 5 V
Response Time:	Sensor dependent (refer to sensor data sheet)
Expected Average Life of the Sensor:	Sensor dependent (refer to sensor data sheet)
Operating Temperature:	-10 to +40 °C 14 to 104 °F
Operating Humidity:	5 to 90 % RH*
Operating Pressure:	70 to 130 kPa
Power Supply:	12 to 30 V DC SELV/PELV PoE = 48 V DC
Housing:	Plastic
Protection Class:	IP54 (IP20 with Ethernet)
Mounting:	(DIN) rail IEC/EN
Weight:	650 g up to 850 g
Dimensions: (W x H x D)	145 x 105 x 78 mm 5.7 x 4.1 x 3.0 in
Labelling:	CE and UL certification II 3G Ex ic II C T4 Gc**
Approvals / Certifications:	
Functional Safety (SIL):	DIN EN 61508-2 (pending)
ATEX**:	DIN EN 60079-0 DIN EN 60079-11

*sensor dependent
**only intrinsically safe connector cartridge

GfG Gas Detection UK Ltd

Unit 8 | Griggs Business Centre
West Street | Coggeshall
CO6 1NT | Essex | UK

Tel.: +44 (0) 1376 561463
Fax: +44 (0) 1376 561704

www.gfggasdetection.co.uk
sales@gfggas.co.uk