Fixed Gas Detection Systems

smart GasDetection Technologies

D-ReX® PoS²

Compact design. Quick service. Built for semiconductor gas monitoring.

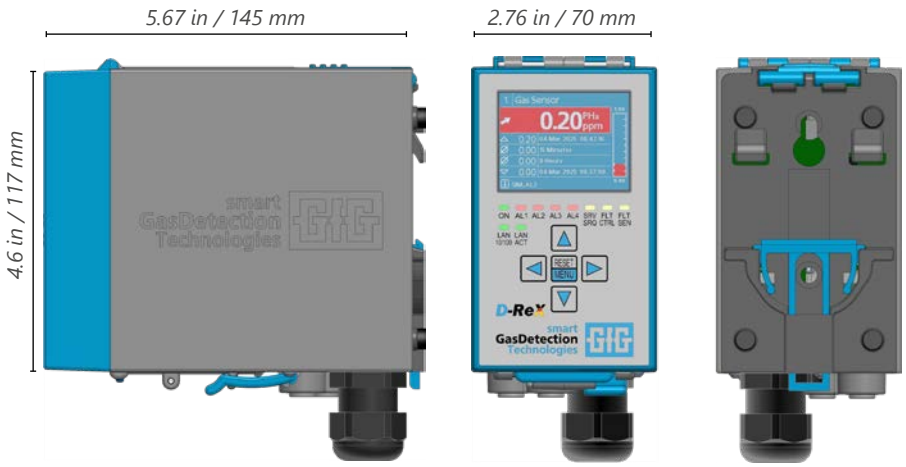
MADE IN GERMANY

GfGsafety.com

D-ReX®

Made for what fabs really need

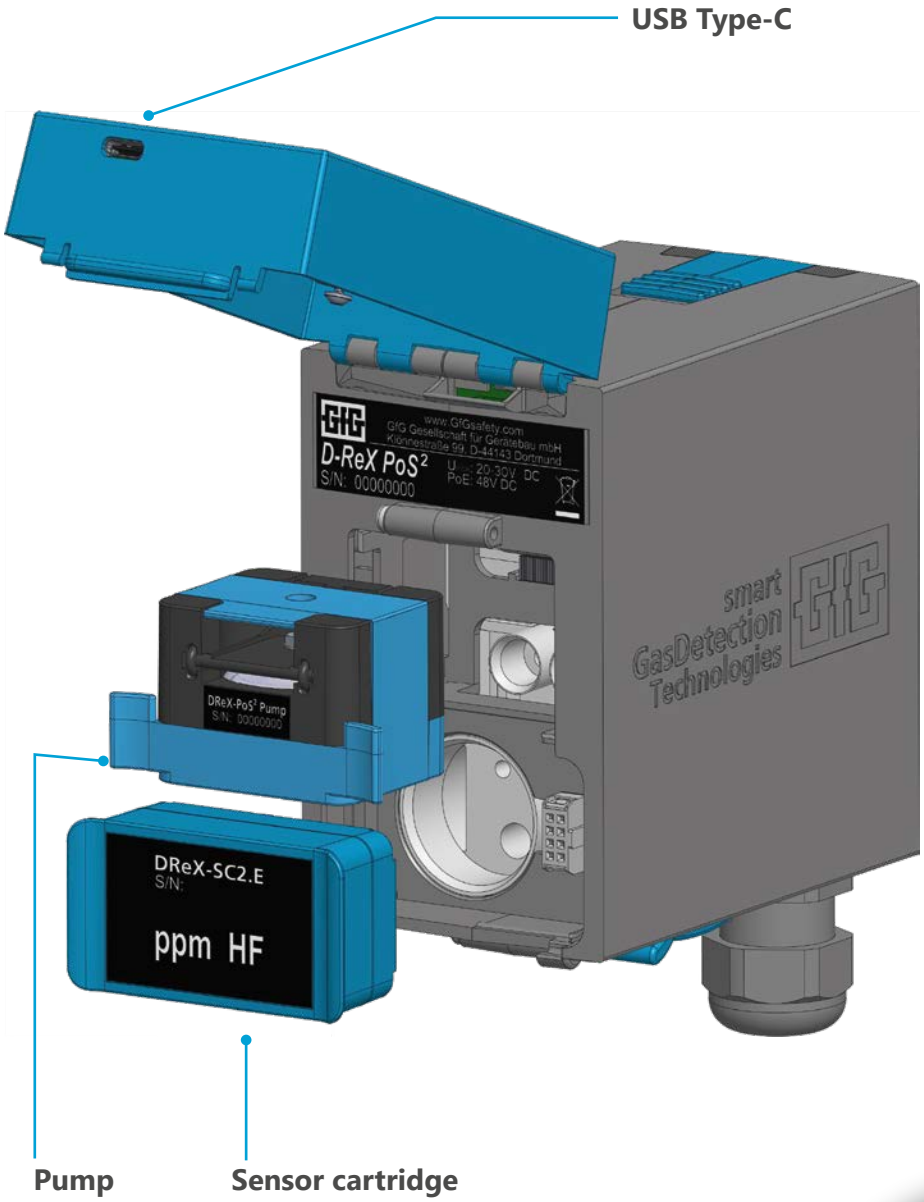
In semiconductor fabs, space is often limited – especially for auxiliary systems such as gas detection equipment. The D-ReX PoS² was designed with a compact housing to fit seamlessly into space-constrained environments without sacrificing performance.



At the same time, ease of service plays a crucial role in reducing the total cost of ownership.

The D-ReX PoS² was developed with a strong focus on minimizing maintenance time and effort – helping to keep large-scale gas monitoring systems efficient and cost-effective over time.

Save Time and Money during Maintenance



The D-ReX PoS² is designed to make servicing as quick and simple as possible.

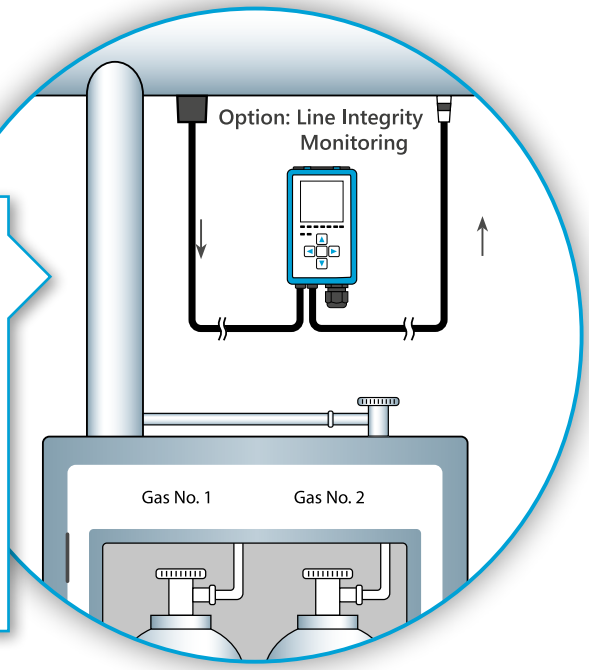
Just open the front cover to replace the reusable sensor cartridge.

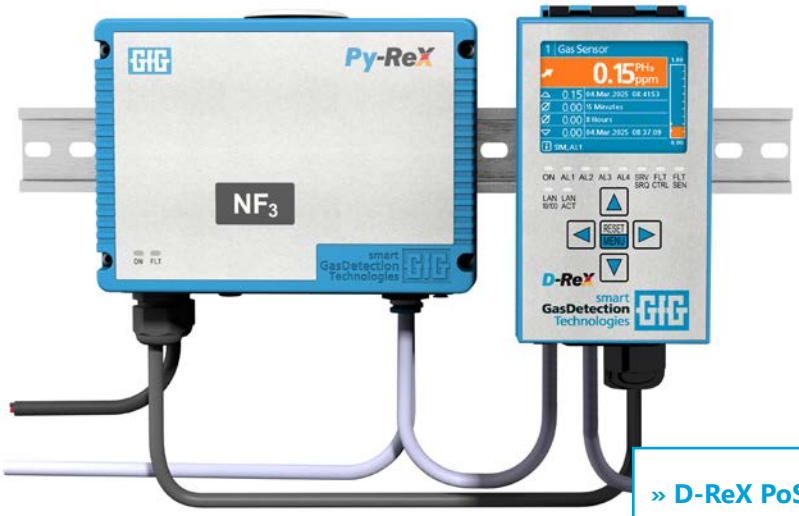
Only the sensor needs to be replaced at the end of its service life, not the sensor cartridge.

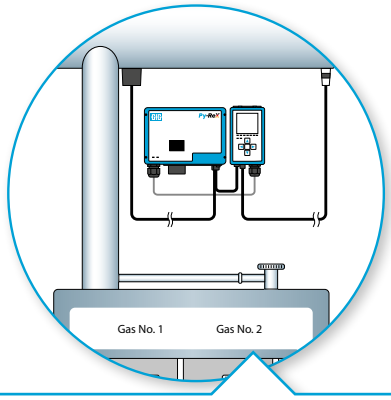
The smart sensors come pre-calibrated and are ready to operate immediately.

The pump can be replaced just as easily. Only the worn mechanical parts are exchanged – the electronics remain safely inside the device.

» **D-ReX PoS² (Point of Sampling)**
Monitoring of gases via extraction using a built-in pump (suction distance up to 30 meters). The sensor is situated within the D-ReX. Furthermore, the D-ReX PoS² offers optional monitoring of the hose lines to detect leaks or blockages at an early stage. The Line Integrity Monitoring (LIM) technology continuously works to prevent unnoticed intake of secondary air.







» D-ReX PoS² with Pyrolyzer

Some fluorine- or chlorine-containing gases that cannot be directly detected by sensors can be thermally decomposed using a pyrolyzer into detectable reaction products. The Py-ReX is the matching pyrolzyer for the D-ReX PoS², enabling the detection of these gases. Gas is drawn into the D-ReX through the Py-ReX, where it is broken down into detectable components.

D-ReX®

USPs:

» Hinged front for easy service
» Small footprint to meet fab space requirements
» High-resolution, full-color 2.4" TFT display
» Plain-text status messages – no codes, no guesswork

Options:

» Line Integrity Monitoring
» Py-ReX Pyrolyzer

Features:

» 3x internal relays (form C, configurable)
» Smart sensors for more than 60 gases
» Hot-swappable smart sensor cartridge
» Tool-free maintenance
» Power-over-Ethernet (PoE) communication
» Web server for browser access
» Password-protected menu
» Interface: Analog output: 4–20 mA
Digital: RS-485 (Modbus/RTU)
10/100 Mbit Ethernet (Modbus/TCP)
» Bright status and alarm LEDs
» Data logger to review sensor and alarm history
» Marked as CE

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

D-ReX PoS²

In fabs, gas monitoring is commonly performed via extraction. This may be because the maintenance of a remote sensor would be too complicated or because the target gas has to be broken down into detectable components first. This can be done using a pyrolyzer.

In these cases, the D-ReX PoS² with its integrated pump is an ideal solution. The point of sampling (PoS) can be up to 30 meters away from the D-ReX. This also applies to the length of the recirculation hose.

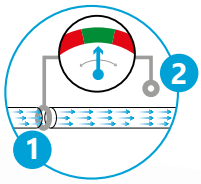
Available Accessory:

- PTFE hose
- Various particle filters
- Push-pull plug-in adapter

Gas in ↑ ↓ Gas out

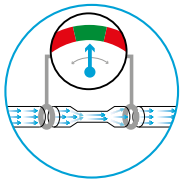
The D-ReX offers optional **Line Integrity Monitoring** alongside flow measurement. This technology continuously monitors the negative pressure in gas-carrying lines. An additional pressure sensor measures the ambient pressure as a reference. If the pressure ratio between the line's negative pressure and the ambient pressure changes, it indicates a leak or blockage in the line. In such cases, the D-ReX reports a fault.

Line Integrity Monitoring



Monitoring the ratio of ❶ line negative pressure and ❷ ambient air pressure

Flow measurement



Monitoring the flow rate of the sampled gas

Py-ReX®

Gas detection in extraction mode combined with pyrolysis

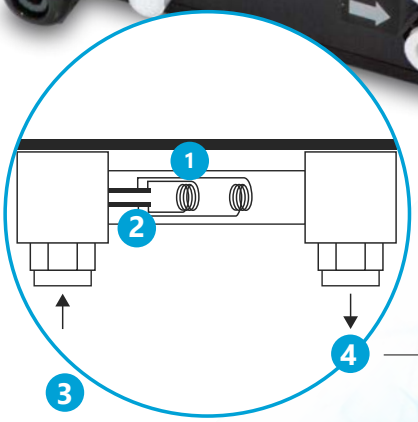
The Py-ReX® pyrolyzer improves the performance of our D-ReX gas detectors. When used in combination with a D-ReX PoS and its integrated pump, the Py-ReX will allow you to detect highly toxic or chemically inactive gases. Since the D-ReX detects their decomposition products, it is able to measure these gases even in small concentrations.

How does pyrolysis work?

Pyrolyzers, sometimes also called "decomposers", are used in many analysis devices. No matter the application however, the goal is always to transform the original gas (target gas) into another gas (measured gas), which can be detected more easily.

The Py-ReX is a filament pyrolyzer. Inside a quartz glass tube, it contains a filament which is heated to a certain temperature – depending on the gas you need to detect. The target gas decomposes into the measured gas (and potentially other components) upon coming into contact with the filament. It is then measured using an electrochemical smart sensor.

The concentration of measured gas can then be used to calculate the original concentration of target gas.



1 Filament
2 Quartz glass tube
3 Target gas in
4 Measured gas out

Why choose a filament pyrolyzer?

All pyrolyzers use heat to disassemble samples. In devices which analyze unknown samples for their components, pyrolysis often takes place without oxygen and in precisely defined thermic conditions.

Adhering to such specific parameters is not necessary for reliable gas detection, since both the monitored target gas as well as the expected decomposition product are known in advance. This is why filament pyrolyzers have been appreciated as the most reliable and durable solution for pyrolyzing gases for years now.

Some manufacturers also sell pyrolyzers which use an α-radiation absorption method. In this process, a radioactive α-radiation source generates a continuous ion current in the measuring chamber and a reference chamber.

The decomposition products generated as a result of pyrolyzing the target gas absorb parts of this ion current in the measuring chamber and the difference between the values in the two chambers are then used to calculate the concentration of target gas.

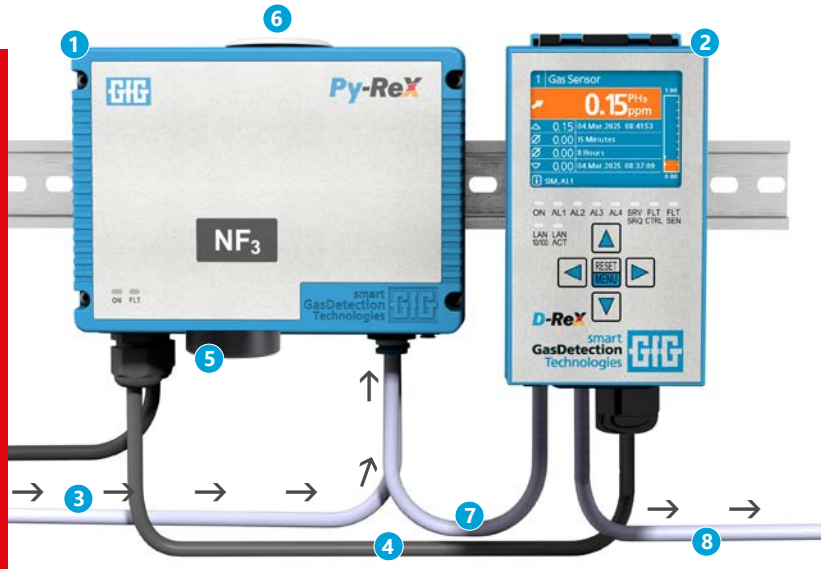
We deliberately decided against using this approach when developing the Py-ReX, since it would bring only disadvantages to users:

- It does not improve measuring accuracy or speed.
- Users would continuously have to take precautions regarding the use, storage and transport of radioactive material.
- Pyrolyzers cannot just be disposed or recycled, but instead have to be sent back to the manufacturer in special safety packaging.
- They must be labeled as radioactive "Type L" packages by a qualified forwarding agent for every transport. Special restrictions also apply for air transport.

Which gases do you need a pyrolyzer for?

Most inert gases used in the semiconductor industry and industrial processes are fluorine-based. But there are also fluorine-free inert gases, such as 1,2 dichloroethene, which need to be monitored.

The temperature needed for the pyrolysis process depends on the specific gas. That's why the Py-ReX is calibrated meticulously, ensuring the decomposition products needed for the subsequent detection are created.



1. **Py-ReX**
2. **D-ReX *PoS²***
3. Gas inlet for feeding the gas to be measured into the Py-ReX
4. Power supply between Py-ReX and D-ReX
5. Air inlet for cooling the pyrolyzer
6. Outlet for the heated air
7. PTFE connecting hose between Py-ReX (gas outlet) and D-ReX (gas inlet)
8. Gas outlet for recirculating the gas

Easy to Use and Maintain

The D-ReX PoS² is a very user-friendly, easy-to-maintain gas detector.

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 precise information about the current measured values, the short-term and long-term exposure, as well as any malfunctions that may have occurred. Information can be displayed in English and German. Additional languages will be supported in future updates.

User interface with display, control keys and status LEDs

Clear information

No longer will you have to decipher cryptic error codes. Information on any issue is instead displayed in plain text. Status LEDs provide an additional instant overview of vital components of the system.

Intuitive device management

All device settings can be configured directly via the integrated display and user interface – no external tools required. Alternatively, a laptop can be connected to the D-ReX PoS² via Ethernet or USB Type-C to perform configuration or upload predefined settings using the configuration software.

Measured value simulation

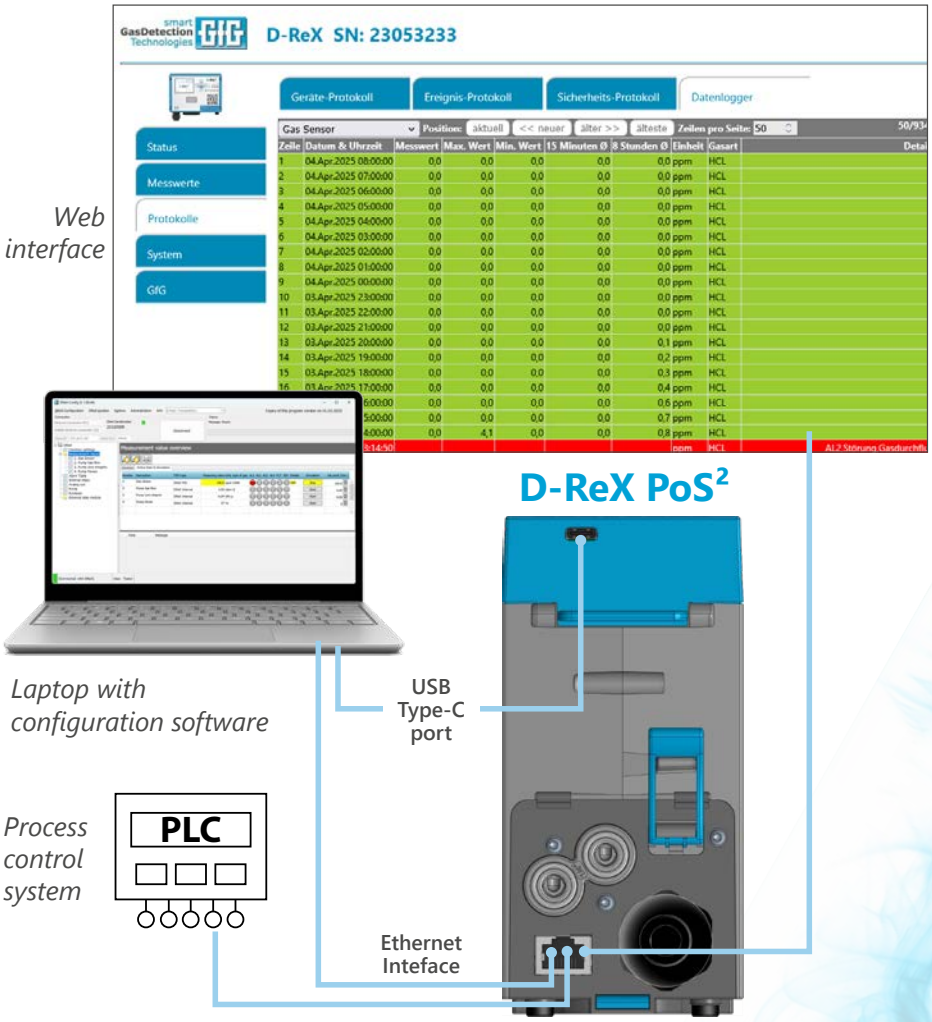
The measured value simulation enables testing of the gas detection system's behavior under various condition - such as faults or alarms – without requiring test gas. This function was specifically developed to provide a user-friendly and effective way to verify gas detection systems and connected system controls without the need to use test gas.

Configuration options

The D-ReX PoS² is equipped with a PoE-capable Ethernet interface and a USB Type-C port, both located on the underside of the device.

Use the Ethernet port to integrate the D-ReX into higher-level process control systems via Modbus TCP, or to access live data and the internal data logger through the built-in web interface (HTTP).

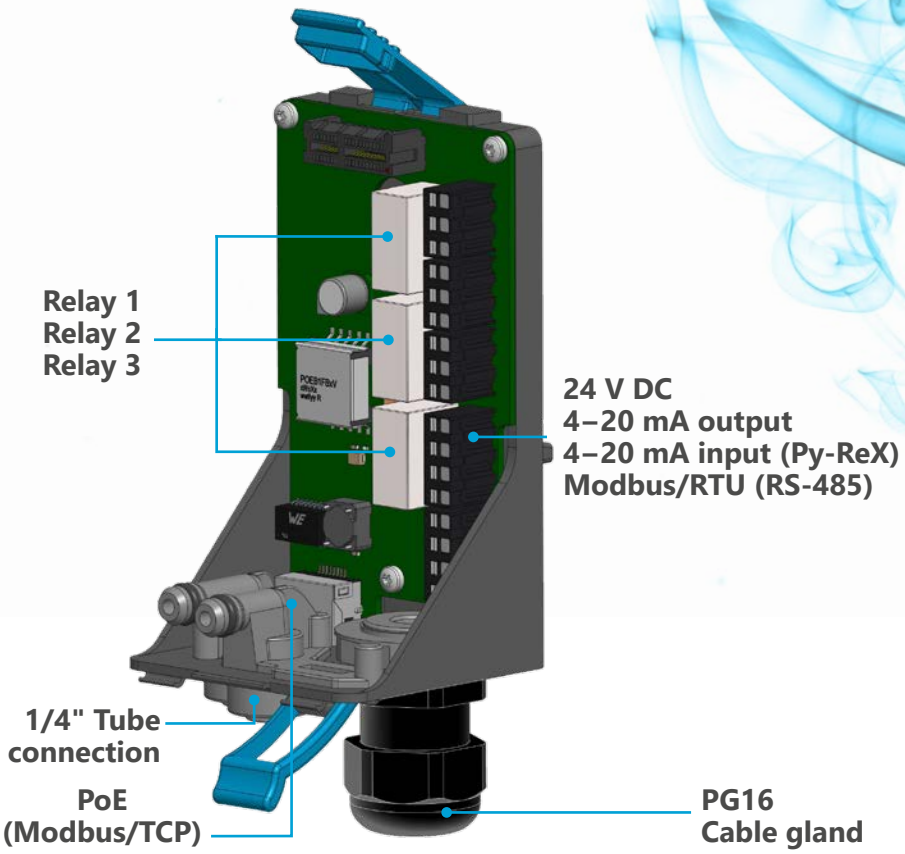
Device settings can be configured using a laptop connected to the D-ReX PoS² via USB or Ethernet. Configuration is performed using the dedicated software tool, allowing for quick setup and parameter adjustments.

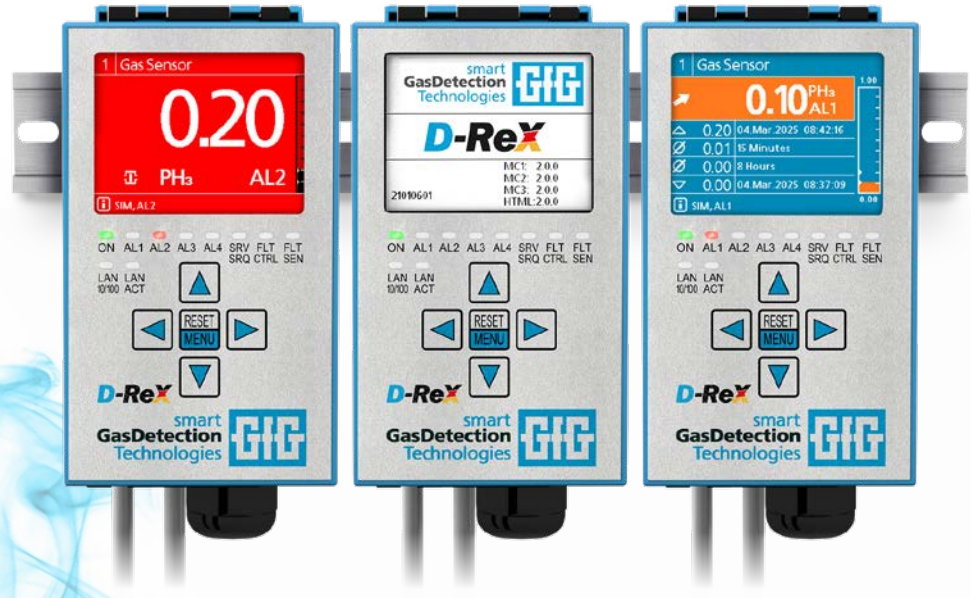


Mounting and Installation

The D-ReX PoS² is mounted to the wall using two screws or DIN rail mount. All electrical connections – including power supply, signal output, and relays – are located on the rear-mounted terminal block, which remains fixed to the wall during device replacement. A cable gland on the bottom rear side of the housing provides strain-relieved cable entry, and the gas inlet and outlet ports are positioned directly next to it for easy connection of supply and exhaust tubing.

For applications requiring relays to control external alarm devices or safety measures, the D-ReX provides three internal, freely programmable form C relays.



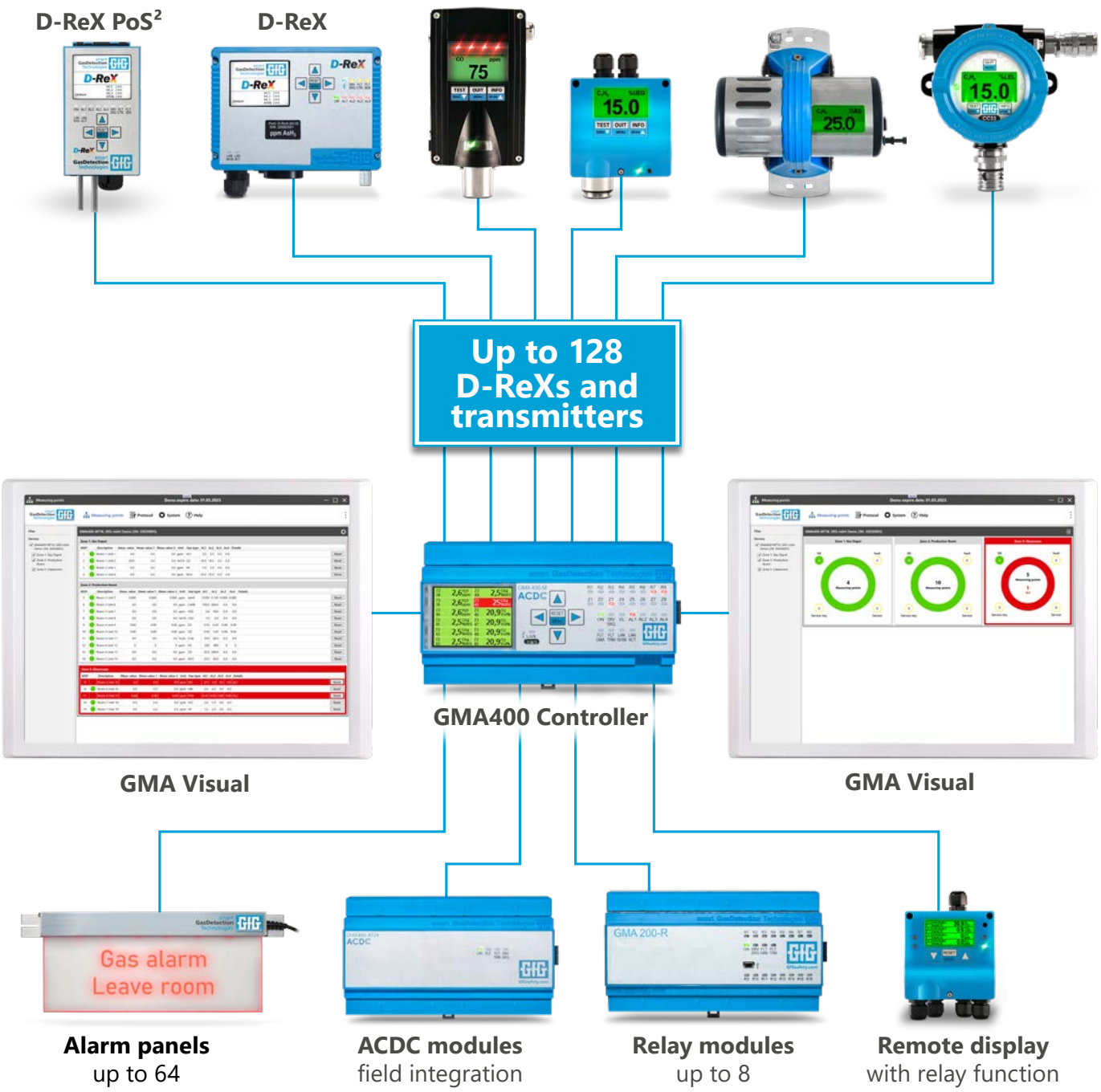


The slim device front (width = 70 mm) enables space-saving installation of multiple units side by side, while the front cover provides easy access to replaceable components.

Regardless of the mounting method, the main unit can be pulled forward after releasing the locking hooks at the top and bottom – allowing quick and easy device replacement without affecting the existing installation.

System Integration and Visualization

The D-ReX PoS² can be integrated into gas detection systems of any size.



In complex gas detection systems, multiple detectors monitor critical areas for hazardous gas concentrations.

The GMA400 controller enables centralized monitoring of up to 128 D-ReX PoS² units or a combination of various transmitters, providing a clear overview of system-wide status and measured values. For enhanced situational awareness, the GMA400 can be expanded with a TFT touch panel PC running the visualization software.

This provides a clear, structured view of all measurement points and enables targeted response to alarms and system faults.

Versatility in gases and measuring ranges

A wide range of durable smart sensors, covering all important gases of the semiconductor industry as well as the relevant measuring ranges, is available for the D-ReX. The following list is merely a selection of these. Please note that a pyrolyzer is needed for the detection of some gases. **Other gases on request.**

Gas	Formula	Nominal Range	Sensor
Ammonia	NH_3	0–100 ppm**	EC
Ammonia	NH_3	0–1000 ppm**	EC
Ammonia	NH_3	0–5000 ppm	EC
Arsine	AsH_3	0–1 ppm**	EC
Arsine (zero H_2) (no cross-sensitivity to H_2)	AsH_3	0–1 ppm**	EC
Arsine LT[1] LDL[2]	AsH_3	0–1 ppm**	EC
Boron trichloride	BCl_3	0–30 ppm	EC
Boron trifluoride	BF_3	0–20 ppm	EC
Bromine	Br_2	0–5 ppm	EC
Butane	C_4H_{10}	0–100 % LEL	CC
Carbon monoxide	CO	0–500 ppm**	EC
Carbon dioxide	CO_2	0–10000 ppm	IR
		0–1 vol %**	
Carbon dioxide	CO_2	0–1 vol %	IR
Carbon dioxide	CO_2	0–5 vol %	IR
Carbon dioxide	CO_2	0–10 vol %	IR
Carbon dioxide	CO_2	0–25 vol %**	IR
Chlorine	Cl_2	0–10 ppm**	EC
Chlorine dioxide	ClO_2	0–2 ppm**	EC
Chlorine trifluoride	ClF_3	0–2 ppm**	EC
Diborane LT[1]	B_2H_6	0–1 ppm**	EC
Dichlorosilane (DCS)	SiH_2Cl_2	0–30 ppm**	EC
Ethane	C_2H_6	0–100 % LEL	CC
Ethylene	C_2H_4	0–100 % LEL	CC
Ethylene oxide	ETO	0–20 ppm**	EC
Fluorine	F_2	0–5 ppm	EC
Germanium hydrogen LT[1]	GeH_4	0–3 ppm	EC
Heptane	C_7H_{16}	0–3000 ppm	PID
Hexamethyldisilazane	HMDS	0–500 ppm**	EC
		0–5000 ppm**	
Hexane	C_6H_{14}	0–100 % LEL	CC
Hydrazine	N_2H_4	0–1 ppm**	EC
Hydrogen	H_2	0–100% LEL	CC
Hydrogen	H_2	0–2000 ppm**	EC
Hydrogen	H_2	0–1 vol %**	EC

Gas	Formula	Nominal Range	Sensor
Hydrogen	H_2	0–4 vol %**	EC
Hydrogen bromide	HBr	0–30 ppm**	EC
Hydrogen chloride	HCl	0–30 ppm**	EC
Hydrogen cyanide	HCN	0–30 ppm**	EC
Hydrogen fluoride	HF	0.5-10 ppm	EC
Hydrogen selenide LT[1]	H_2Se	0–3 ppm**	EC
Hydrogen sulfide	H_2S	0–100 ppm**	EC
Isobutylene	C_4H_8	0–2000 ppm	PID
		0–200 ppm	
Methane	CH_4	0–100 % LEL	CC
Methane	CH_4	0–5 vol %	IR
Nitrogen dioxide	NO_2	0–30 ppm	EC
Nitrogen monoxide	NO	0–100 ppm**	EC
Oxygen (5-year sensor, lead-free)	O_2	0–25 vol %	EC
Ozone	O_3	0–1 ppm	EC
Ozone	O_3	0–5 ppm	EC
Pentane	C_5H_{12}	0–100 % LEL	CC
Propane	C_3H_8	0–100 % LEL	CC
Propane	C_3H_8	0–2 vol %	IR
Phosgene	$COCl_2$	0–2 ppm	EC
Phosphine (no cross-sensitivity to H_2)	PH_3	0–1 ppm	EC
Phosphine	PH_3	0–1 ppm	EC
Propane	C_3H_8	0–100 % LEL	CC
Propane	C_3H_8	0–2 vol %	IR
Silane	SiH_4	0–50 ppm**	EC
Sulfur dioxide	SO_2	0–10 ppm**	EC
Tetraethyl orthosilicate (TEOS)	$C_8H_{20}O_4Si$	0–100 ppm	EC
Trimethyl borate (TMB)	$C_3H_9BO_3$	0–100 ppm**	EC
Requires a pyrolyzer			
1,2-dichloretane (EDC)	$C_2H_4Cl_2$	0–50 ppm	EC
Fluormethane (Methylfluorid, R41)	CH_3F	0–100 ppm	EC
Hexafluorobutadiene	C_4H_6	tbd	EC
Nitrogen trifluoride	NF_3	0–50 ppm	EC
trans-1,2-Dichloroethylene (DCE)	$C_2H_2Cl_2$	0–300 ppm	EC

[1] **Long-time:** Sensor with ionic liquid electrolyte for long service life, even in difficult conditions (e.g. high temperatures)
[2] **Lower Detectable Limit:** Refer to sensor data sheet for details.

** **Preset measuring range**, alternative measuring ranges possible, see sensor data sheet

Technical Specification: D-ReX PoS² & Py-ReX

D-Rex PoS²

Gases:	See gas list
Measuring Principle:	Sensor dependent; available options: EC = electrochemical | CC = catalytic combustion | IR = infrared | PID = photoionization
Sampling Method:	Extraction with pump (if applicable, in combination with Py-ReX)
Display and Interface:	Display: 2.4" full color TFT (320 x 240 pixels) Interface: 5 push buttons
Selectable Languages:	German, English (more languages coming soon)
Communication:	» Analog output: 4–20 mA » Analog input: 4–20 mA for Py-ReX » Digital: RS-485 (Modbus/RTU) » 10/100 Mbit Ethernet (Modbus/TCP) » USB Type-C port Relays: 3x internal (configurable) form C relays Max. 3 A / 30 V DC Min. 10 mA / 5 V
Response Time:	Varies by sensor (see sensor data sheet)
Expected Average Life of the Sensor:	Varies by sensor (see sensor data sheet)
Operating Temperature: Operating Humidity: Operating Pressure:	14 to 104 °F / -10 to +40 °C 5 to 90 % RH 70 to 130 kPa
Power Supply:	24 V DC SELV/PELV PoE = 48 V DC
Housing: Mounting: Weight: Dimensions:	PC / ABS / Glass fibre reinforced IP 30 Wall-mounted or DIN rail IEC/EN approx. 690 g (depending on device equipment) 70 x 117 x 145 mm / 2.7 x 4.6 x 5.7 in (W x H x D)
Labelling:	CE

Py-ReX

Gases	See gas list
Pyrolysis principle:	Filament pyrolysis
Sampling:	Extraction using the D-ReX PoS² integrated pump
Control elements:	2 Status LEDs
Communication:	Analog outlet: 4–20 mA
Warm-up time:	< 60 s
Expected average lifetime of the pyrolyzer:	> 2 years
Temperature: Humidity: Air pressure:	14 to 104 °F / -10 to +40 °C 5 to 90 % RH 70 to 130 kPa
Power supply:	15 to 30 V DC SELV/PELV
Housing: Mounting: Weight: Dimensions	PC / ABS / Glass fibre reinforced DIN rail IEC/EN 485 g 145 x 105 x 78 mm / 5.7 x 4.1 x 3.0 in (L x H x W):
Labels:	CE

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