3 Introduction to portable instruments

In the beginning, there was the canary. These little finches would warn miners about dangerous gases underground: if they stopped singing, the miners had to get out quick. Crude and inaccurate methods of determining gas concentrations in the atmosphere like this one have long been consigned to history.

Nowadays, precise measuring instruments monitor the concentration of dangerous gases and flammable vapors. The latest of these are compact, small, robust and flexible single-gas and multi-gas units. Gases and vapors are not always necessarily harmful; after all, the earth's atmosphere is made of them. It is not until their concentration exceeds critical levels (risk of poisoning and explosion) or drops below certain levels (risk of suffocation through oxygen deficiency) that they can become a threat. This is why portable gas detection devices are used in all kinds of ways throughout many branches of industry. Scenarios range from individual employees and small groups of workers – all the way to large-scale operations such as the industrial shutdown of an entire petrochemical plant. Instruments measuring the various dangerous gases have to perform reliably under changing conditions. This can place great demands on reliability, durability, and flexibility, because in the end the detection equipment is directly responsible for the safety and health of workers. Not every unit may be used in every working environment. Before a device is used, you have to determine whether its specifications are sufficient. These requirements are all laid down in various standards and directives.

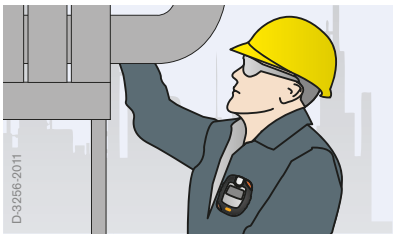
3.1 Application areas for portable gas detection

Portable gas detection instruments are subject to very diverse requirements. Different application areas require solutions tailored to the measurment task, which also take into account the respective ambient conditions.

It is generally possible to distinguish between the following application areas:

Personal monitoring

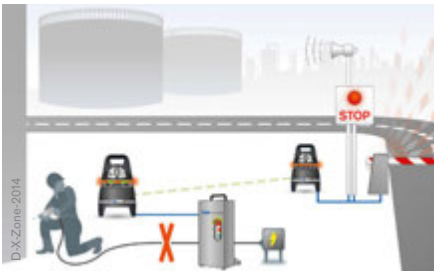
– These devices are designed to warn the wearer about gas risks in the immediate vicinity. For this reason, they are usually worn on work clothing. The basic requirements that these units therefore have to fulfill are wearing comfort, durability, and reliability. Continuously measuring single-gas and multi-gas instruments are suitable for this kind of work.

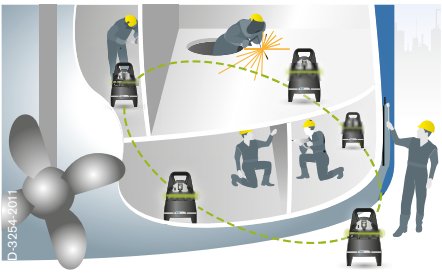


Area monitoring

– In contrast to the personal gas detector area monitors will be placed at central or critical locations to monitor workspaces optimally and independently from persons.

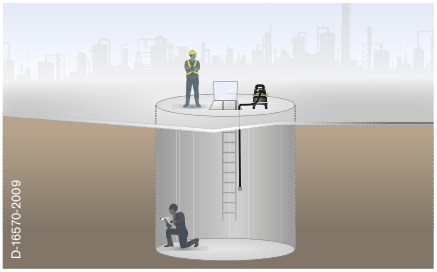
– For this, the basic requirements are robustness, stability and excellent alarm awareness (optical and acoustic) as well as a longest possible battery runtime. Increased security level can be achieved by connecting the area monitors to wireless alarm chains and by transferring the measurement values from instrument to instrument as well as to mobile terminals.





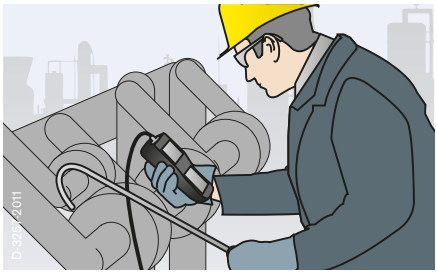
Confined space entry

– Maintenance and repair work often require people to climb into confined spaces. These areas of work can be especially dangerous because of the lack of space, the lack of ventilation, and the presense or development of hazardous substances. A clearance measurement is required before entry. Multi-gas instruments are used together with corresponding pumps and accessories such as hoses and probes. After a successful measurement where no hazards have been found, the same instruments can be used for continuous personal monitoring while working in the confined space.



Leak detection

– Leakages can occur wherever gases or liquids are stored or transported. It is important to identify leakages quickly so that the appropriate measures can be taken to avert harm to people, the environment, and the facility. Detection devices combined with corresponding pumps must be able to respond quickly so as to detect small changes in concentration. High levels of reliability are another minimum requirement for these measuring instruments.



3.2 Requirements for gas detection instruments

As safety products, gas detection devices for industrial use must fulfill the statutory requirements (explosion protection, electromagnetic compatibility), as well as other requirements, so that their quality and reliability remains assured even under tough conditions.

Explosion protection standards:
Design stipulations ensure that the gas measuring instrument does not become a source of ignition itself. Globally accepted standards include CENELEC (ATEX), CSA, UL, EAC, etc.

Protection ratings as defined by EN 60529 (IP Code)
The IP code provides information about the degree to which a casing provides protection against foreign objects and water.

IP = International Protection/Ingress Protection Extract based on DIN EN 60529:

First index number	Protection against solid foreign objects	Second index number	Protection against water
	5 Protection against contact. Protection against interior dust deposits		5 Protection against projected water from any angle
	6 Complete protection against touch. Protection against dust penetration		6 Protection against penetrating water during temporary flooding
			7 Protection against penetrating water during temporary immersion
			8 Protection against penetrating water during prolonged submersion

D-16408-2009

Protection class IP 67 provides a high degree of robustness, although this can have negative consequences in terms of vapor permeability. The MEWAGG research group ("Mess- und Warngeräte für gefährliche Gase") – part of BG Chemie (Germany's statutory employment accident insurance fund for the chemical industry) – therefore advises users who need to detect not only gases like methane and propane, but also higher hydrocarbons and solvents, to check the suitability of equipment with the manufacturer. This can, for example, involve a detection equipment assessment under ATEX.

Quality of measurement functions

Maintaining a predefined detection quality, even under extreme ambient conditions (temperature, pressure, wind, moisture, vibration, and so on)

EN 45 544 – for toxic gases and vapors
EN 50 104 – for oxygen
EN 60 079-29-1 – for flammable gases and vapors

Electromagnetic compatibility as defined by EN 50270

Electrical and electronic devices should not be influenced or interfered with by other electrical, magnetic, or electromagnetic fields – and vice versa. For instance, this means that using a mobile phone or a radio in the immediate vicinity of gas detection devices should not interfere with the instrument's detection signal, nor should the instrument interfere with the phone. EMC guidelines and standards define means of proving and confirming a device's insensitivity to interference and low level of interference output. Simply complying with the requirements of a standard or guideline may not be sufficient depending on the various

operating and ambient conditions. Rugged industrial applications require much more robust devices. Dräger pays special attention to these requirements, for example, with an additional in-house „robustness test."

RoHS and REACH

The requirements for materials and substances used must also be considered during the development and production of gas detection equipment. The European RoHS (Restriction of Hazardous Substances) Directive requires that six particularly dangerous substances may not be contained in electrical and electronic devices. The REACH Regulation (Registration, Evaluation, Authorization, and Restriction of Chemicals) requires that the presence of particularly hazardous materials in products must be disclosed. Dräger seeks to avoid such substances as far as possible within the scope of technical conditions and meets the relevant directives and regulations in this regard.

3.3 Explosion protection

Industrial processes very often involve flammable substances, including sometimes flammable particles. In these areas, flammable gases and vapors can sometimes be released on a process-related basis (such as relief valves) or by unforeseen incidents (breakdowns). As a means of prevention, areas such as these are designated EX areas ("zones") in which only equipment which is reliably protected against ignition may be used.

Explosion protection is standardized worldwide; IEC (international), CENELEC (European) and NEC 505 North American standards are similar, and based on the three-zone concept which is rapidly gaining acceptance in the USA.

Zone in IEC, NEC 505 and CENELEC	Dangerous, explosive atmosphere exists ...
Zone 0	constantly, regularly or long-term
Zone 1	occasionally
Zone 2	rarely and for short periods

American explosion protection compliant with NEC 500 is still typically based on the dual division concept:

Division in NEC 500	Dangerous explosive atmosphere exists ...
Division 1	constantly or occasionally
Division 2	rarely and for short periods

3.6 Laws and regulations in USA, Canada, and Mexico

Laws and regulations in most municipalities, states, and provinces in North America require certain products to be tested to a specific standard or group of standards by a Nationally Recognized Testing Laboratory (NRTL). There are a number of third party approval agencies in the US – UL, FM, ETL and many others. They all provide listings or classifications for explosion protection and provide some performance testing. They do not have any regulatory or legal status. They are primarily a certification to verify the safety of a product for insurance purposes and to minimize liability. Most of the NRTL are also recognized for certifications for Canada.

Underwriters Laboratories Inc. (UL)
is a private third party product safety certification organization. UL develops standards and test procedures for products, materials, components, assemblies, tools and equipment, chiefly dealing with product safety. UL is one of several companies approved for such testing by the U.S. federal agency OSHA (Occupational Safety and Health Administration). OSHA maintains a list of approved NRTL's.

UL develops standards for safety, often based on American National Standards (ANSI) and evaluates many types of products. A typical standard for electronic products includes not only requirements for electrical safety, but also risk of fire and mechanical hazards. UL evaluates products for compliance with specific safety requirements. UL develops its Standards to correlate with the requirements of installation codes, such as the National Electrical Code (NEC).

As one method of protection, UL evaluates instruments for Intrinsic Safety (IS) for use in hazardous areas. The IS rating means that the instrument will not be the source of ignition in a potentially explosive environment. The areas are defined by the type of hazard that may exist (Class), the possibility of a hazard being present in the area (Division) and the specific hazards that may be encountered (Group). UL 913 is the applicable Standard for Safety for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.

Hazardous Location:

An area where the possibility of explosion and fire is created by the presence of flammable gases, vapors, dusts, fibers or filings.

Class I	Those areas in which flammable gases or vapors may be present in the air in sufficient quantities to be explosive or ignitable.
Class II	Those areas made hazardous by the presence of combustible dust.
Class III	Those areas in which there are easily ignitable fibers or filings present, due to type of material being handled, stored or processed.

Division 1	In which ignitable concentrations of hazards exists under normal operation conditions and/or where hazard is caused by frequent maintenance or repair work or frequent equipment failure.
Division 2	In which ignitable concentrations of hazards are handled, processed or used, but which are normally in closed containers or closed systems from which they can only escape through accidental rupture or breakdown of such containers or systems.

Groups

The gases and vapors of Class I locations are broken into four groups by the codes A, B, C and D. These materials are grouped according to the ignition temperature of the substance, its explosion pressure and other flammable characteristics.

Class II – dust locations – groups E, F & G. These groups are classified according to the ignition temperature and the conductivity of the hazardous substance.

The gases and vapors of Class I locations are broken into four groups by the codes A, B, C and D. These materials are grouped according to the ignition temperature of the substance, its explosion pressure and other flammable characteristics.	**Group A**	Acetylene
	Group B	Hydrogen
	Group C	Ethyl-Ether, Ethylene, Cycle Propane
	Group D	Gasoline, Hexane, Naphtha, Benzene, Butane, Propane, Alcohol, Lacquer Solvent Vapors, Natural Gas
Class II – dust locations – groups E, F & G. These groups are classified according to the ignition temperature and the conductivity of the hazardous substance.	**Group E**	Metal Dust
	Group F	Carbon Black, Coal, Coke Dust
	Group G	Flour, Starch, Grain Dust

Operating Temperature Codes

Maximum Temperature		NEC 500 CSA/UL Codes	IEC, ATEX NEC 505 Codes
Degrees C Codes	Degrees F	Temperature Codes	Temperature
450	842	T1	T1
300	572	T2	T2
280	536	T2A	
260	500	T2B	
230	446	T2C	
215	419	T2D	
200	392	T3	T3
180	356	T3A	
165	329	T3B	
160	320	T3C	
135	275	T4	T4
120	248	T4A	
100	212	T5	T5
85	185	T6	T6

These are simplified definitions – refer to National Electrical Code (NEC), Article 500 for complete definitions.

Notes

1) T1 through T2D not applicable to Class II location.
2) T2A through T2D, Class I Group D only.

A typical UL classification would look like this:
Only as to intrinsic safety for use in hazardous locations

Class I&II, Div.1, Grps A,B,C,D,E,F,G

Safe in atmospheres containing the gases listed in the chart above

Use in areas where the hazard could exist at any time

For use in potentially explosive gas or dust atmospheres

As part of a global harmonization effort, the Zone classification system can be used in North America on a voluntary basis (refer to article 505 of the NEC).

NEC 500 CSA/UL Codes	IEC, ATEX NEC 505 Codes
Division 1: Where ignitable concentrations of flammable gases, vapors or liquids: – Are likely to exist under normal operating conditions – Exist frequently because of maintenance/ repair work or frequent equipment failure	**Zone 0:** Where ignitable concentrations of flammable gases, vapors or liquids are present continuously or for long periods of time under normal operating conditions. **Zone 1:** Where ignitable concentrations of flammable gases, vapors or liquids: – Are likely to exist under normal operating conditions – May exist frequently because of repair, maintenance operations or leakage
Division 2: Where ignitable concentrations of flammable gases, vapors or liquids: – Are not likely to exist under normal operation conditions – Are normally in closed containers where the hazard can only escape through accidental rupture or breakdown of such containers or in case of abnormal operation of equipment.	**Zone 2:** Where ignitable concentrations of flammable gases, vapors or liquids: – Are not likely to exist under normal operation conditions – Occur for only a short period of time – Become hazardous only in case of an accident or some unusual operating condition

US Mine Safety Health Administration (MSHA)

In the United States, equipment for use in mines must be approved by the US Mine Safety Health Administration (MSHA). MSHA maintains its own test facilities and has specific standards for electrical equipment being used in mines. MSHA defines and enforces safety regulations for all types of mining operations as legislated by the US Congress. This includes both underground and above ground coal mines, metal/nonmetal mines and large tunneling operations. The MSHA approval process is a legal requirement for use of equipment in a mine. MSHA considers all underground operations as hazardous locations. An MSHA approval reads a bit differently than a UL approval label:

Permissible Gas Monitor

Tested for intrinsic safety in Methane-Air mixtures only

The Canadian Standards Association (CSA)

The Canadian Standards Association (CSA) is a not-for-profit association composed of representatives from government, industry, and consumer groups. They are involved with many diverse areas of specialization such as climate change, business management and safety and performance standards, including those for electrical and electronic equipment, industrial equipment, boilers and pressure vessels, compressed gas handling appliances, environmental protection, and construction materials. CSA also provides advisory services, training materials and print and electronic published standard documents. Currently forty percent of all the standards issued by CSA are referenced in Canadian legislation.

CSA developed the CAN/CSA Z299 series of quality assurance standards still in use today. They are an alternative to the ISO 9000 series of quality standards.

They do all of the review and testing for Intrinsic Safety and conduct performance testing. They propose standards which are often codified into law or become de facto standards in Canada. CSA is a recognized NRTL for testing and safety, not only for Canada but also for the US.

Mexican Safety and Health

Mexican Safety and Health is controlled by the Norma Official Mexicana (NOM) regulations. Nom -005-STPS-1998 is very comparable to 29 CFR 1910.1200, the basic OSHA regulation in the US. While using US OSHA regulations as a basis, the Mexican government has implemented local requirements. They accept the testing and standards of any of the Nationally Recognized Testing Labs.

HAZARDOUS LOCATIONS CLASSIFICATIONS

Classification Material Presence	IEC, ATEX NEC 505 Codes	NEC 500 CSA/UL Codes
Gas & Vapors		
Acetylene	Group IIC	Class I/ Group A
Hydrogen	Group IIB	Class I/ Group B
Ethylene	Group IIB	Class I/ Group C
Propane	Group IIA	Class I/ Group D
Methane	Group I or IIA	Class I/ Group D
Dust		
Metal	Group IIIC	Class II/ Group E
Coal	Group I or IIIC	Class II/ Group F
Grain	Group IIIB	Class II/ Group G
Fibers (All)	Group IIIA	Class III

3.7 Single-gas measuring instruments

If the danger of toxic gases or vapors can be narrowed down to a single gas or condustive component, then single-gas measuring and warning devices are the ideal solution for personal monitoring in the workplace. They are small, robust, and ergonomic. These devices are usually attached to the work clothing near the breathing area, but do not limit the movement of workers. They monitor the ambient air continuously and produce an alarm (visual, acoustic, and by vibration) if the gas concentration exceeds an alarm limit preset in the device. This enables employees to respond immediately to dangers if accidents occur during normal operation, or if unforeseen events occur during maintenance and repair work.

Dräger Pac Family

Each instrument of the Pac family is equipped with one XXS sensor. These miniaturized electrochemical sensors enable a small, ergonomic instrument design. The sensor sits right behind a replaceable dust and water filter which protects it from outside influences. A powerful battery and the extended application range from -40°C to + 55°C for the Pac 6x00/8x00 series provide more safety even in extreme environments. Additional sensors, like ozone and phosgene, or the use of dual sensors, like CO LC / O_2 and the hydrogen compensated CO sensor (CO H_2-CP), extend the range of application of the handy single gas detectors. The green illuminating D-Light shows the device is tested and ready. Alarm thresholds are stored in the instrument (A1 = pre-alarm/A2 = main alarm). Instruments with an oxygen sensor provide the possibility of alarming with a pre- and a main alarm for both rising and falling concentrations. If the gas concentrations exceed or fall below these alarm thresholds, the instrument sets off an audible, visual, and vibrating alarm. A large non-verbal display indicates important information such as the respective gas concentration or remaining operating time and battery capacity. Durability and explosion protection are two other important factors when choosing the right gas detection device. Accessories like the Bump Test Station or X-dock Module can be easily used for the entire instrument family.

Dräger X-am 5100

The Dräger X-am 5100 is designed for the measurement of the gases / vapors hydrazine, hydrogen peroxide, hydrogen chloride and hydrogen fluoride. These special gas hazards are difficult to detect because they adsorb to different surfaces. The open gas inlet projecting from the device prevents that adsorbing surfaces are between the gas and the gas sensor. A rapid response of the proven XS sensors is thus also ensured for these special gases.

Dräger Pac 6000/6500 and Dräger Pac 8000/8500


D-4977-2017


D-4987-2017


D-4989-2017


D-4996-2017

Reliable and precise even in harsh conditions. Quick sensor response times and a powerful battery ensure additional safety. With the broad measurement spectrum the Pac family can be used in a variety of applications including in applications with special gases such as ozone and phosgene. The instrument can be equipped with a hydrogen-compensated CO sensor or with a Dräger dual sensor. This enables the detection of two gases in one measurement, either H_2S with CO or O_2 with CO.

OTHER BENEFITS

Compliance-Signal (D-Light) for more safety
Extended application range due to a wide temperature range and additional sensors
Cost-efficient because of durable sensors and powerful battery
Clear reading due to white backlight
Optimal monitoring of oxygen concentrations (saturation or deficiency) with respective pre and main alarms
Ready for use again quickly, due to easy changeable dust filter in case of pollution


D-16219-2016


D-17769-2016


D-2581-2018

Dräger X-am 5100

D-11213-2011

The Dräger X-am 5100 is designed for the measurement of the gases/vapors hydrazine, hydrogen peroxide, hydrogen chloride and hydrogen fluoride. These special gas hazards are difficult to detect because they adsorb to different surfaces. The open gas inlet projecting from the device prevents that adsorbing surfaces are between the gas and the gas sensor. A rapid response of the proven XS sensors is thus also ensured for these special gases. Dräger X-am 5100 can only be operated in diffusion mode.

OTHER BENEFITS

Usage in industrial area – Ex approved

Measurement performance of the sensors are independent of the device

ST-7817-2005

Personal monitoring

ESPECIALLY SUITED FOR THE FOLLOWING APPLICATIONS

Personal monitoring	small and light rapid respond time of the Dräger XS Sensors Battery life > 200 hours

3.8 Multi-gas measuring instruments

D-16493-2016

If hazardous substances (Ex-Ox-Tox) occur in the work place, then it is advisable to use continuous multi-gas measuring instruments. These enable different measuring approaches be used (infrared, catalytic bead, PID, and electrochemical sensors) in one device, thus drawing on the strengths of the measurement principles.

The constellation of the sensors depends on the application. Up to 7 gases can be detected in real-time and continuously. As well as being used for personal monitoring and area monitoring, multi-gas measuring instruments can also be used for clearance monitorings and leak detection with the help of optional accessories. Multi-gas measuring instruments include the Dräger X-am 2500/5000/5600 and X-am 3500/8000 as well as X-am 7000.

DRÄGER X-AM 8000 - THE ALLROUNDER

Dräger X-am 2500/5000/5600


D-77497-2013


ST-9468-2007


D-27784-2009

Dräger offers a complete product series for the simultaneous measurement of different gases. The Dräger X-am 2500/5000/5600 family is the latest instrument generation of Dräger's gas detection technology. Its practical design, cell-phone size, low weight, and the long-life of the electrochemical XXS sensors make this family the perfect companion for personal monitoring. Combined with an optional external pump and hose or probe, they are perfect for confined space entry measurements. The Dräger X-zone 5500 extends the application of these instruments to innovative area monitoring instruments with various application possibilities (does not apply to X-am 2500).

OTHER BENEFITS

Robust: water and dust protection compliant with IP 67

Reliable gas inlets from both sides

Precise, vapor-sensitive Ex monitoring

Ideal solution for functional testing and calibration
(automatic testing and calibration station – Dräger X-dock & Dräger Bump Test Station)


ST-7317-2005

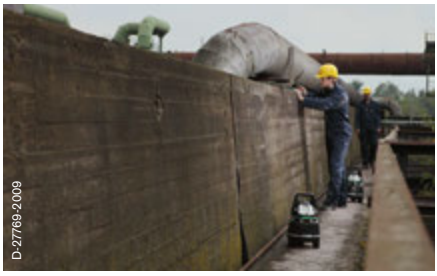
Personal monitoring


D-15766-2016

Confined space entry


D-15075-2016

Leak detection


D-27769-2009

Area Monitoring

Dräger X-Zone 5500/5800

D-23612-2009

State-of-the-art area monitoring – in combination with the gas detectors Dräger X-am 5000, 5100 and 5600 the Dräger X-zone 5500 and X-zone 5800 are suitable for the measurement of one to six gases. The easy transportable, robust and waterproof X-zone expands the mobile gas detection to a unique system with various different application possibilities.

OTHER BENEFITS

IP 67 and Zone 0 approval for industrial applications

Wireless communication of X-zone's for frequencie: 868 MHz, 915 MHz, 433 Mhz and 430 MHz

Robust and trouble-free connection up to 100m between two X-zone

Robust and simple to be used induction wireless charging technology available

PowerOff-function: via the potential-free alarm contact external equipment can be switched off during an alarm occur.

Permanent power supply of the X-zone 5800 in explosion-proof areas by means of Power Supply Ex

D-27592-2009

D-27601-2009

ESPECIALLY SUITED FOR THE FOLLOWING APPLICATIONS

Area Monitoring	Up to 25 Dräger X-zone 5500/5800 can be automatically interconnected to form a wireless fenceline. This allows a continuous monitoring of larger areas, e.g. pipelines or industrial tanks during industrial shut downs, up to 120 hours.
Confined space entry	An optional intergrated pump allows the continuous monitoring of confined space entry or locations which are difficult to access, for a distance of up to 45 m.

The Dräger X-zone 5500/5800 transforms the Dräger personal gas detection instruments Dräger X-am 5000/5100/5600 into innovative area monitoring devices for a wide range of applications. A patented solution for more safety.

With the flexible sensor equipping of the Dräger X-am 5000, X-am 5100 and X-am 5600 the fields of application of the Dräger X-zone 5500/5800 are manifold. Just insert a different Dräger X-am 5x00, which is equipped with an alternative sensor setup, and the Dräger X-zone 5500/5800 is ready for a different application. The modern induction charger is simple to use, comfortable and has no issues with dirty charging contacts, so the device is easy to maintain.

The Dräger X-zone 5500/5800 affords a new portable safety concept. Up to 25 Dräger X-zones can be automatically interconnected to form a wireless fenceline. This interconnection of the area monitoring devices allows the rapid safeguarding of larger areas, e.g. of pipelines or industrial tanks during industrial shutdowns. In the event of a gas alarm, the device transmits the alarm signal to all units that are part of the fenceline, which then signal a daughter alarm. The daughter alarm is, in contrast to the red master alarm, displayed green/red by the illuminated LED ring, thus allowing and providing a fast and easy recognition of the alarm itself as well as of the alarm-trigging devices. With the 360° alarm signalization, the acoustic and optical alarm can be recognized from all sides. This ensures an easy and clear evacuation alarm and alerting.

With the help of a potential-free alarm contact on the Dräger X-zone 5500/5800 external devices such as horns, lamps or traffic lights can be switched. Alternatively, the signal from the alarm chain can be forwarded to a variety of evaluation devices via the Modbus interface.

The X-zone Com enables wireless access to the data of the Dräger X-zone 5500/5800 via the GSM network. Status queries and alarms via SMS, periodical sending of data via e-mail or presentation in a cloud service - the X-zone Com sends all relevant data such as gas name, gas type, gas concentration, alarms and faults directly to the device of your choice.

The X-zone Com is designed to be easily commissioned with minimal installation effort.

As an alternative to these solutions, it is also possible to pass the Modbus signals of the Dräger X-zone 5500/5800 directly to a control room. By this a direct connection to a PLC can be realized.

Dräger X-am 3500/8000


D-6521-2017


D-410-2018

The Dräger X-am 3500/8000 family are advanced gas detection devices with an integrated, powerful pump for simultaneous and continuous monitoring of up to four gases in the Dräger X-am 3500 and up to seven gases in the X-am 8000. The devices are optimized for professional clearance measurements before entry and work in confined spaces and containers, as well as for the search of gas leaks. The X-am 8000's five sensor slots and an extensive number of different sensors (including various dual sensors for measuring two gases with just one slot) ensure a flexible adaptation to individual measurement tasks. An infrared sensor or photoionization detector can be plugged in one slot in the X-am 8000, and an infrared sensor or catalytic heat tone sensor in another slot. Both instruments have three slots for electrochemical sensors in XXS format for the measurement of oxygen and toxic gases. Despite the diverse performance capabilities of the devices, their operation is very simple and sets new standards. In particular, the color display, the operation with three large buttons and the flexible switching between diffusion and pump operation during use contribute to this.

OTHER BENEFITS

- Built-in high performance pump allowing a measurement with a hose up to 45 m
- Inductive charging of the power supply
- Use in Ex Zone 0, temperature class T4 in every assembly version
- High performance catalytic bead and infrared sensors and photoionization sensors (only in Dräger X-am 8000) with low detection limits
- Wizards for different measurement tasks:
  - Confined space entry measurements: Calculation of the necessary hose flooding time depending on the probe length, set measurement gas and temperature limit
  - Leak search: visual and audible display of the gas concentration
  - Use of pre-tubes with the PID sensor: benzene-selective measurement
- Event report including impact detection


D-16791-2016

Confined space entry


D-16357-2016

Leak detection

ESPECIALLY SUITED FOR THE FOLLOWING APPLICATIONS

Confined space entry:	Wizard for confined space entry measurements, build-in, high performance pump, extensive probe portfolio
Leak detection:	Wizard for leak detection, extensive assortment of DrägerSensors for the measurement of > 100 different gases
Area monitoring:	IP68, accessory: base for placing the instrument upright, particularly loud horn (100 dB @ 30 cm/1 ft.)

A Bluetooth® module enables the x-am 8000 to communicate with other systems and exchange data. This saves time and helps to manage the measurement tasks more efficiently.

An additional useful tool is the **Mobile Solution (Android App and Cloud)**, specially designed for the X-am 8000. It allows, for example, the readout of measurement values away from the point of sampling on the smartphone and thus support particularly confined space entry measurements. You also can easily and conveniently use the app to create and administrate measurement reports.

To measure hard-to-detect hydrocarbons, you can fit the Dräger X-am 8000 with one of two high-performance PID sensors. Two different types are available: The PID HC covers a measurement range of 0 to 2,000 ppm (isobutylene). The PID LC ppb is particularly suited for a measurement range of 0 to 10 ppm (isobutylene) with a low resolution in the range below 1 ppm.

For benzene-specific measurements, the X-am 8000 can be used with a pre-tube. The advantage: you only need one measuring device for this application, which significantly reduces the costs of purchasing, maintaining and transporting devices in use. A built-in assistant supports the use of the pre-tubes.

3.9 Multigas Scanner

D-21-2020

The Dräger X-pid 9000/ 9500 detects volatile organic substances such as benzene even at the lowest concentrations. To determine the concentration of certain hazardous substances, the device combines two measuring modes and thus optimally supports measuring strategies for clearing hazardous areas or confined spaces. The “Seeker” measuring mode determines the total concentration of volatile organic hydrocarbons in the ambient air in a broadband measurement. In “Analysis” mode, the instrument selectively and precisely measures target substances that the user selects in advance.

Sensor unit
compiles measurenment values them via Bluetooth to the control unit

Integrated photoionisation detector (PID)
for measuring in the low ppb range

Control unit
with large touch screen and connectivity via Wi-Fi and 4G/LTE

D-806-2018

Integrated gas chromatography (GC)
to separate compounds in gas-vapour-mixtures

Integrated pump
for attaching a hose of up to 10 m lenght

Mobile App
allows intuitivee handling and control

Seeker mode: Broadband measurement for pre-tests and localization of measuring points

The Seeker mode is used to continuously measure the total concentration of several volatile organic compounds in the ambient air at the workplace and in potentially explosive atmosphere. The measurement mode Seeker displays a VOC sum signal and is comparable to single gas PID measuring devices.

Analysis mode: Selective measurement for monitoring carcinogenic substances

The analysis mode is used to measure the concentration of individual preset hazardous substances, so-called target substances, in the ambient air at the workplace and in potentially explosive atmospheres. Individual response factors of the target substances are considered and thus an exact concentration is determined.

Dräger X-pid 9000/9500

D-810-2018

The selective PID gas measurement device is ideal for users who frequently test for hazardous toxic substances. Benzene, butadiene and other volatile organic compounds (VOCs) are carcinogenic even in the smallest concentrations. Selective measurement is necessary because other gases and vapors are often also present. The gas measurement device allows for short test times and laboratory-quality results.

OTHER BENEFITS

- Target substance database expandable by the customer
- Lower operating costs by dispensing with consumables
- High selectivity and low detection limits for more safety by separating gas mixtures into individual substances
- Robust behavior under all conditions due to reduction of environmental influences
- Easy operation via ex-protected smartphone via mobile app
- Measurement results in laboratory quality
- Simple function test and easy calibration
- Use in explosion-proof areas

D-4439-2019

Entry into confined spaces/clearance measuring

D-47-2020

Exposition measurement