From a pure alarm system to active monitoring
Alarm Management Systems for the central medical gas supply
Full control over the supply of medical gases

Medical gases are indispensable in hospitals. The health and the life of your patients depend on a continuous supply of compressed air, oxygen, nitrous oxide, carbon dioxide and vacuum. It is therefore essential that the Gas Management System operates reliably at all times – round the clock at 365 days a year. In this context, the Alarm Management System is of key importance.

The Alarm Management System (AMS) monitors the continuity of the medical gas supply, the performance and the operation of the Gas Management System and the quality of the medical gases delivered. These safety objectives are defined in the standard ISO 7396-1. In an emergency, the AMS must enable the responsible person to immediately identify the cause of a fault and rectify it before it adversely affects the medical gas supply.

We at Dräger are at your side as your competent and reliable partner when it comes to the planning and implementation of your AMS. Our sophisticated and innovative solutions help you to reliably fulfil all regulatory requirements and ensure a constant and safe supply of patients with medical gases.

Dräger’s AMS intelligent information management system provides ideal support for a hospital’s workflow. The modular design concept offers maximum safety and flexibility and the system can easily be upgraded or extended. It also enables us to develop the future-ready solution that is just right for you, incorporating your existing external systems and reducing the need for capital investment.

In addition to fulfilling statutory requirements, the Dräger AMS offers you a wide range of options for the active and automated monitoring of your medical gas supply. This enables you to identify weak spots at an earlier stage and to optimise safety and efficiency in your hospital processes. More information can be found on the following pages.
Keep an eye on your medical gas supply, round the clock and in all areas

As part of the Gas Management System, the Alarm Management System monitors the delivery of medical gases from the central supply to the various points of delivery. Dräger offers scalable solutions that are ideally tailored to the size and emergency response plan of your hospital.

**CYLINDER MANIFOLD SYSTEMS**
Cylinder manifold systems supply the hospital with medical gases. The Gas Control Station monitors the pressure in the gas cylinders and liquid tanks as well as the various intermediate pressures as far as the line pressure at the distribution system. An integrated Alarm System Interface (ASI) passes the data on to the AMS. Additional sensors can be integrated flexibly via an Analog Input Module (AIM) into the AMS in order to monitor factors such as room temperature and gas concentration in the area of the system.

**COMPRESSED AIR SYSTEMS**
In medical compressed air systems, air is compressed by compressors and prepared for medical use. Data collectors record the operating status of the compressor system, the conditioning of air for medical use and the condensate drain devices. The Medical Air Guard (MAG) monitors the purity of the medical compressed air in accordance with the threshold limits from the European pharmacopoeia. Furthermore, sensors can be flexibly integrated in order to provide values such as volume flow, room temperature and the dew point in the AMS.

**VACUUM SYSTEMS**
Medical vacuum plants use pumps to produce vacuum required for extracting secretions. The switching signals from the pumps are processed in the control cabinet Medical Vacuum Control (MVC) and passed on to the the AMS by means of an integrated data collector.

**DIRECT FEEDBACK LOCATED IN THE SUPPLY CENTRES**
Whether for medical gases, compressed air or vacuum: Local operating signals such as ‘On/Off’ or ‘Fault/No fault’ provide the supply centres with direct local feedback on the current status of the system. The data is displayed on freely configurable LED panels that can be labelled as required (e.g. Monitor L or Monitor LL).
A pipeline system is used to convey the medical gases from the supply centres to the wards and on to the patients. Here, additional sensors can be deployed in different areas, for example in order to monitor the line pressure or the gas flow. The current signal that reflects the measurements from these sensors is passed on to the AMS by means of an Analog Input Module (AIM). The AIM can also monitor whether these measurements exceed or fall below the threshold limits and can transmit corresponding signals to the AMS.

**TECHNICAL MANAGEMENT**
For a central overview, the signals from the medical gas supply are summarised on a display in the Technical Management office or in the hospital’s control centre. This may take the form of a simple LED display (e.g. Monitor LLT) or a convenient touch panel such as the Gas Communication Cockpit (GCC 1000). Alternatively, the signals from the AMS can be transmitted via a gateway to the Building Management System, for example in order to make use of the reporting functions offered by the control system.

**MONITORING OF CLINICAL AREAS**
The Area Control Units (ACU) monitor the medical gas supply of the individual clinical areas. Since the shut-off cabinets in large wards are often located far apart, it is usually advisable to make additional alarm signals available in the central ward office or admissions desk (e.g. in the form of a Monitor 3G or Monitor L). This ensures that the hospital staff is always kept directly informed.

**PHARMACY**
The GCC 1000 provides hospital pharmacists with a convenient method of monitoring the quality of medical compressed air from their office. The data from the Medical Air Guard and all signals sent by the medical gas supply are transmitted to the mobile display unit. The GCC 1000 offers special functions such as the collection of data and the observation and analysis of trend values in order to provide substantial quality assurance evidence for medical compressed air.
Acting responsibly on the basis of reliable information

Dräger’s Alarm Management System provides you with clear and comprehensible signals exactly where you need them. Thanks to the extensive range of options for summarising and prioritising alarm signals, selective and targeted display and the transmission of data to external systems, all responsible persons are kept informed suitably.

CENTRAL MONITORING AND ALARM SYSTEM WITH A WIDE RANGE OF FEATURES
According to ISO standard 7396-1, all GMS alarms must be displayed at a central location that is monitored 24 hours a day. The Dräger AMS helps you to fulfil this requirement by offering you a method of consolidating alarms for the entire system or for certain areas, such as nursing wards or hospital pharmacists. As soon as one of the individual alarms is activated, the common alarm is also set. This gives Technical Management, for example, an instant overview of the entire medical gas supply and enables service work to be organised purposefully and with a minimum of effort.

Collective alarms are especially useful for transmitting signals to large control systems handling all of the hospital’s building services. The control system remains clear and uncluttered, and since there are only a small number of data points that need to be created on the control system, the effort is reduced considerably. At the same time, connecting the AMS to the Building Management System enables you to fully benefit from your control system’s ability to display, transmit (in mobile mode), store and analyse your GMS data. The corresponding investments in your building services pay off even more.
UNAMBIGUOUS AND Targeted
ALARM MESSAGES IN ALL RELEVANT AREAS

With the Dräger AMS, alarms can be displayed on a variety of different display units: The signals are shown exactly where they need to be seen and no alarms are displayed to target groups for whom they are not relevant. Alarms can also be sent to several locations simultaneously, for example to the operating room, the ward office and the technical department. This ensures that an alarm is received immediately by all persons concerned, without unnecessarily distracting any other members of staff.

The colour-coded signal lights are easy to understand: Operating alarms are indicated in yellow while emergency alarms are indicated in red. During normal operation, when no alarms are active, a green LED remains on, so that any power failure would be noticed. The Monitor LLT features a text display for showing clear instructions. For example, it can be used to display the location of the alarm and the telephone number of the technician to be called.

With Dräger AMS ...
- keep a clear overview on your medical gas supply
- receive direct local feedback in the supply centrals
- summarise and prioritise alarms
- all persons concerned by an alarm are informed simultaneously
- selected reports are made available in a targeted way
- existing reporting functionality of the building management system is used
Intelligent networking technology for uncompromising safety

A closed network with its own protocol guarantees reliable data communication within the AMS. You can therefore rest assured that every alarm signal will be displayed at the intended location in accordance with the predefined signal priority.

PROTECTED DATA COMMUNICATION IN A CLOSED SYSTEM
The Dräger AMS is designed as a closed system with its own cable network and used only for the Gas Management System data. This eliminates the risk of errors caused by other data traffic and prevents interference from outside, e.g. hacker attacks.

The system uses its own network protocol and no central computer for communication within the system, providing even greater reliability and security. Each device communicates autonomously within the network and performs additional local functions as required (Local Operating Network/LON). During startup, a configuration programme configures the devices in the network and ensures that there is always sufficient bandwidth available to transmit all the signals.

All devices in the AMS are monitored to be ready to communicate. This is done by each display device in turn sending queries to the device allocated to it as a data source. If no response is received, the display device shows a communication alarm. This informs the user immediately so that the cause of the fault can be traced.

VALIDATION AS A MEDICAL DEVICE
Because the GMS passes the gases on directly to medical devices, it is validated as a medical device according to the Medical Device Directive. As an integrated component of the GMS, the AMS must therefore fulfil correspondingly high safety requirements. The whole system receives CE certification on site once it has been completely installed in the hospital.

However, external sensors, alarm contacts and display systems can be connected via interface modules such as the AIM in order to integrate the AMS more flexibly into your hospital’s building services. This opens up, additionally to the AMS alarm signals required by the standard, various possibilities concerning the central monitoring, reporting and documentation of your medical gas supply.
Boundaries of the GMS as a validated medical device to external devices.
Stay flexible and reduce costs with a future-ready solution

Protecting your investment is a key element of our network concept: Due to its modular design and open topology, the Dräger Alarm Management System can be flexibly integrated into your existing and future requirements.

READY FOR UNLIMITED OPPORTUNITIES

The AMS data is transmitted via a twisted pair cable connecting the devices with one another. The sequence and branching structure of the connections are of no significance for this system. This means that further devices can be connected without modifying the existing wiring, which saves both time and money. New features can be incorporated within the existing system simply by upgrading the network protocol.

In addition, external signals can be received via data collectors and AIM, to be passed on to external systems via a GMS-Gateway or a Monitor R. Data can also be converted to other network protocols so that existing systems, e.g. your Building Management System or an OR panel, can be used for alarms to cut down investment costs.

Large-scale systems which would exceed the electrical transfer capacity because of the length of cable (> 500 m) or the number of devices (> 64), are structured and extended by using signal amplifiers known as L-switches. This gives the Alarm Management System the flexibility to expand along with the system to be monitored. There is no need to completely replace the system in the face of increased capacity or changes in requirements.
Active monitoring keeps you ahead

The Dräger Alarm Management System is much more than just an alarm system. Because a variety of different measurements can be included, it enables you to pro-actively monitor, analyse and optimise your medical gas supply.

DETECT WEAK SPOTS BEFORE THEY TRIGGER ALARMS
In addition to the prescribed alarms and operating modes, the AMS can also take and display a wide range of measurements. This enables Technical Management to monitor the readiness and performance of the GMS in detail. By using early warning alarms and escalation alarms, faults such as pressure fluctuations or the danger of compressors and pumps overheating can be detected, localised and rectified before they reach the alarm threshold. Further monitoring options make your medical gas supply safer and more reliable. For example, a suitable sensor connected via an Analog Input Module (AIM) can monitor the O₂ or CO₂ content of the ambient air at cylinder manifold systems in the interests of staff safety.

OPTIMISE PROCESSES AND PLAN SYSTEMATICALLY
By analysing the system performance, for example based on data from volume flow sensors, you can determine the hospital’s central consumption, the consumption patterns of individual areas and any instances of misuse. This gives you valuable insights that can be used to improve hospital processes. In addition, the performance data collected provides key information for assessing the scale of the supply systems required when planning new sections of the hospital.
EFFICIENT DOCUMENTATION FOR QUALITY ASSURANCE
The Dräger AMS provides you with an excellent basis for documenting the quality assurance systems of your medical gas supply, for example for submitting to the relevant authorities. Use the functions offered by the GCC 1000 or your Building Management System in order to quickly collect and prepare the consumption and quality data relating to your medical compressed air and all other measurements and signals.

ANALOG INPUT MODULES FOR THE INTEGRATION OF MEASUREMENT DATA
Analog Input Modules enable validated and non-validated sensors with a current output signal to be integrated into the Dräger AMS. This enables to monitor various parameters such as volume flow, gas concentration and room temperature and to analyse them centrally.

WITH ADVANCED MONITORING FEATURES, SUCH AS AIM ...

- Monitor system performance in detail on the basis of measurements
- Monitor the piping network section by section
- Detect weak spots early
- Avoid unintentional gas consumption
- Prevent accidents
- Use resources selectively
- Streamline hospital processes
- Automatically document data for quality assurance
Future ready and future safe – with an Alarm Management System from Dräger

For over 50 years Dräger has been developing innovative solutions for the safe and reliable supply of medical gases in hospitals. This vast experience is reflected in the high quality of our products and services. With Dräger’s team of specialists, your Alarm Management System is in the best of hands right from the start.

We pride ourselves on providing the solution that is just perfect for your particular hospital – a solution that reliably safeguards the constant supply of vital medical gases to your patients whilst at the same time helping you to optimise processes and reduce costs. In order to live up to this challenge, we support you with high-quality products and a comprehensive range of services. On request, we will handle the entire process for you: from planning and installation, commissioning and integration into your Building Management System up to certification. This way you can be sure that your Alarm Management System complies with the prevailing standards and requirements in all respects and is perfectly matched to the requirements of your hospital.

And once the system is up and running, we are still on hand as your competent service partner and, if required, will be on site within 24 hours. This means that your patients, and indeed you as the person responsible, can breathe easily at all times.

There are good reasons to choose Dräger:

• Over 50 years’ experience in the planning and construction of medical Gas Management Systems
• Comprehensive systems expertise ensures smooth interaction between all components
• Extensive clinical applications knowledge ensures optimal, application-oriented planning and design of our systems
• Comprehensive solution from one source from consultancy to planning, through assembly and approval right up to first commissioning and maintenance
• Highest supply reliability through consistent quality and risk management as well as high quality and safety standards
Dräger Alarm Management Systems:

your project is in good hands.

Please contact us today!

We will be pleased to give you detailed information about our Alarm Management Systems. We look forward to hearing from you.

Further Information and the location of the Dräger partner nearest you can be found at: www.draeger.com

Further product literature, such as system brochures, product information sheets and planning documents, are also available for your use. Your regional Dräger partner will be glad to be of service.
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