

Instructions for use

Analog Input Module



WARNING

To properly use this medical device,
read and comply with these
instructions for use.

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1 Information about this document


1.1 Typographical conventions

Text Bold, italicized text indicates labels on the device and on-screen text.


1 Numbers indicate the individual process steps of a sequence of actions. Numbering restarts at number 1 for each new sequence of actions.

(1) Numbers in parentheses refer to elements in figures.

 Numbers in figures are shown in a circle and indicate elements to which reference is made in the text.

 This triangle is used in safety instructions and precautionary statements to indicate possible ways of avoiding the risk.

– Dashes indicate lists.

 This symbol indicates information that facilitates use of the product.

⇒ This arrow indicates the result of a process step.

✓ This check mark indicates the result of a sequence of actions.

1.2 Trademarks

1.2.1 Dräger trademarks

The trademarks are registered in the following countries:

| Trademark | Country |
|------------|-------------------------------------------------------------------------------------|
| Polytron® | Canada, China, Germany, United Kingdom, Japan, USA, Austria, Benelux, France, Italy |
| VarioGard® | EU |

2 Safety-related information

2.1 Intended use

The Analog Input Module (AIM) is used as an interface for sensors and for monitoring parameters such as pressure, flow, dew point, temperature, and gas concentration.

The sensors are installed at various points in the Dräger Gas Management System (GMS). The measured values are then forwarded to the Dräger Alarm Management System (AMS). The AMS displays corresponding alarms when the measured values exceed or fall below limit values. The limit values are defined when the AIM and AMS are commissioned.

The AIM is part of the Dräger AMS.

Flow values can be accrued by the AIM over a given period of time and transmitted as consumption values.

2.2 Environments of use

The AIM is intended for the following environments of use:

- Points of measurement in the central gas supply plants
- Points of measurement in the pipeline system of the central gas supply system

The AIM is not intended for the following environments of use:

- patient environment
- rooms used for medical purposes
- rooms with an explosion hazard
- transport vehicles, e.g., ambulances, airplanes, or helicopters
- MRI environment

2.3 Target groups

2.3.1 Duties of the operating organization

The tasks described in this document specify the requirements that have to be met by each respective target group.

The operating organization of this product must ensure the following:

- The target group has the required qualifications (e.g., has undergone specialist training or acquired specialist knowledge through experience).
- The target group has been trained to perform the task.
- The target group has read and understood the chapters required to perform the task.

2.3.2 Description of target groups

The target groups may only perform the following tasks if they meet the corresponding requirements. For further information, see the following chapter: "Basic safety instructions" (page 8).

2.3.2.1**Users**

Users are the technical personnel responsible for monitoring and servicing the central gas supply system in the hospital. Users must have received instruction on the product.

| Task | Requirement |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Use of the product in accordance with the intended use | Expertise in measurement technology and application of measurement technology in medical gas supply systems |

2.3.2.2**Specialized service personnel**

| Task | Requirement |
|------------------------------------------------------------------|--------------------------------------------------------------|
| Installation | Specialist knowledge in electrical engineering and mechanics |
| Basic and complex service work (inspection, maintenance, repair) | Experience in complex service work on this product |

Dräger recommends arranging a service contract with DrägerService.

2.4**Information on safety instructions and precautionary statements**

Safety instructions and precautionary statements warn of risks and give instructions for the safe use of the product. Failure to observe them may lead to personal injury or property damage.



2.4.1**Safety instructions**

This document contains sections with safety instructions which warn of risks. The type of risk and the consequences of non-compliance are described in each safety instruction.

2.4.2 Precautionary statements

Precautionary statements relate to action steps and warn of risks that may arise when executing the action steps. Precautionary statements precede the action steps.

The following warning signs and signal words indicate precautionary statements and differentiate the possible consequences of non-compliance.


| Warning sign | Signal word | Consequences of non-compliance |
|-----------------------------------------------------------------------------------|-------------|-----------------------------------------|
|  | WARNING | May result in death or serious injury. |
|  | CAUTION | May result in moderate or minor injury. |
| | NOTICE | May result in property damage. |

2.5 Basic safety instructions

2.5.1 Instructions for use

Use of this product contrary to the information in these instructions for use may result in personal injury and property damage.

- ▶ Follow these instructions for use and the instructions for use for all products used in conjunction with this product.
- ▶ The product must only be used for the purpose specified under "Intended use".
- ▶ Keep these instructions for use in an accessible place.

 The instructions for use do not contain any information on the following points:

- Risks that are obvious to users
- Consequences of obvious improper use of the product

2.5.2 Operation of the device by persons outside the defined target groups

The device is fundamentally not intended to be operated by external persons (persons not defined as target groups). The operating organization is responsible for use outside of the intended purpose, in particular by external persons.

If external persons (e.g., visitors) have access to the device, take the following precautions:

- ▶ Inform external persons that unauthorized interactions can lead to malfunctions and injuries.

2.5.3 Modifications to the product

Modifications to the product may lead to malfunctions, which in turn may result in personal injury and property damage, as well as to false alarms in the Alarm Management System.

- ▶ Do not modify this product.

3 Product description

3.1 Design

The Analog Input Module is mounted on a top-hat rail and installed in a surface-mounted housing or a switch cabinet.

3.2 Function

Up to six different sensors can be connected to the Analog Input Module. The sensors measure the status of the gas supply at different points in the Gas Management System.

The measured values are monitored by the AIM. Up to five limit values can be configured per monitored parameter. When the limit values are reached, the AIM generates corresponding status messages and forwards them to the AMS for display.

In addition to the measured values, signals from potential-free contacts can also be transmitted to the Alarm Management System. The potential-free contacts operate according to the closed-current principle (alarm contact open in alarm state).

If the power supply fails, all current count values are saved in the AIM.

3.3 Sensors

For measuring values and generating messages that a standard requires for the Gas Management System, the Dräger sensors listed in these instructions for use must be used. Values measured by other sensors are for information purposes only.

The sensors have 4 to 20 mA current loop.

NOTICE

► Observe the separate instructions for use for the sensors.

3.3.1 Pressure sensor

Pressure sensors are used at various points in the pipeline system and in the central gas supply plants of the GMS in order to monitor the gas pressure.

The following sensors are tested and approved for the AIM:

| Pressure sensor | Part number | Suitable for pressure monitoring at |
|-----------------|-------------|-----------------------------------------------------------------------|
| 10 bar | G34000 | compressed gas lines for ventilation and for operating surgical tools |
| 16 bar | G34001 | compressed gas lines in central compressed air plants |
| 25 bar | G34002 | compressed gas lines for vacuum-insulated evaporators |
| 250 bar | G34003 | compressed gas lines in cylinder manifold systems |
| Vacuum | G34004 | lines in central vacuum plants |

For further information, see chapter "Technical data".

3.3.2 Temperature sensor

Temperature sensors are used in the central gas supply plants or at other points of the pipeline system in order to monitor the ambient temperature.

The following sensors are tested and approved for the AIM:

| Temperature sensor | Part number | Suitable for monitoring the ambient temperature |
|------------------------------------|-------------|---------------------------------------------------------------------|
| Temperature sensor without display | G34030 | in central gas supply plants and in the area of the pipeline system |
| Temperature sensor with display | G34031 | in central gas supply plants and in the area of the pipeline system |

For further information, see chapter "Technical data".

3.3.3 Dew point sensor

Dew point sensors are used at measuring points to monitor the dew point of the medical compressed air produced in the compressed air plant.

The following sensors are tested and approved for the AIM:

| Dew point sensor | Part number | Suitable for monitoring the dew point |
|------------------|-------------|--------------------------------------------|
| Dew point sensor | G49099 | after production of medical compressed air |

For further information, see chapter "Technical data".

3.3.4 Flow sensor

Flow sensors are used at various points in the pipeline system and in the central gas supply plants of the GMS in order to monitor the volume flow and consumption of medical gases in the different areas of the hospital.

Because the AIM can accrue measured values over a given period of time, the total flow volume in the monitored area can be determined.

The following sensors are tested and approved for the AIM:

| Flow sensor | Part number | Suitable for measuring the flow volume of |
|------------------------------------|-------------|------------------------------------------------------------------|
| Flow sensor DN 20 Air | G34019 | compressed air for medical use in lines with a diameter of 20 mm |
| Flow sensor DN 25 Air | G34020 | compressed air for medical use in lines with a diameter of 25 mm |
| Flow sensor DN 32 Air | G34021 | compressed air for medical use in lines with a diameter of 32 mm |
| Flow sensor DN 20 O ₂ | G34024 | oxygen for medical use in lines with a diameter of 20 mm |
| Flow sensor DN 20 N ₂ O | G34023 | nitrous oxide for medical use in lines with a diameter of 20 mm |
| Flow sensor DN 20 CO ₂ | G34022 | carbon dioxide for medical use in lines with a diameter of 20 mm |

For further information, see chapter "Technical data".

3.3.5 Gas concentration sensor

Gas concentration sensors are used in order to monitor the ambient air.

The gas concentration sensors are used in CO₂ and O₂ supply plants or in the corresponding gas lines to measure the concentration of these gases in the air.

The following sensors are tested and approved for the AIM:

| Gas concentration sensor | Part number | Suitable for monitoring the concentration of |
|-------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------|
| VarioGard 2320 IR CO ₂ PL | 8324833 | carbon dioxide in the ambient air of cylinder manifold systems, pipeline ducts, and pipeline shafts |
| Polytron 3000 O ₂ LS 25 Vol. % | 8316645 | oxygen in the ambient air of cylinder manifold systems, pipeline ducts, and pipeline shafts |

For further information, see chapter "Technical data".

4 Getting started

NOTICE

- ▶ The Analog Input Module may only be commissioned by DrägerService.

The Analog Input Module is commissioned and configured together with the Alarm Management System.

Subsequent changes may only be made by DrägerService. The entire Alarm Management System must then undergo a new acceptance procedure.

4.1 Acceptance and handover

The Analog Input Module is part of the Alarm Management System and thus also part of the Gas Management System, which is approved in accordance with the requirements of the Medical Devices Act.

WARNING

Risk of patient and user injury

An incorrectly installed and tested Analog Input Module can endanger the safety of patients and users.

- ▶ Before the AIM is handed over to the operating organization, the proper functioning of the system must be verified by the acceptance test.
In this test, a check is carried out to determine compliance with the requirements of DIN EN ISO 7396-1.
Failure to pass this test means that the AIM must not be put into operation.
Upon conclusion of the installation or service activity, the AIM must be tested and accepted by DrägerService before the AIM can be put into operation.

This test determines

- whether the safety requirements necessary for the protection of patients and personnel are met and
- whether the performance characteristics of the AIM are met.

The test results are documented in writing.

After acceptance, the AIM is handed over to the operating organization along with the associated documentation. The handover is documented for the files.

The users must then be instructed on how to operate the medical device.

5 Operation

After it is put into operation, the Analog Input Module works automatically.

NOTICE

- ▶ Observe the separate instructions for use for the sensors.

The AIM must be permanently connected to the power supply and must not be switched off.

⚠ CAUTION

Risk of patient injury

The alarm and monitoring information is not forwarded if the mains power supply fails.

Important alarms regarding the status of the medical gas supply may remain undetected and the gas supply may become interrupted.

This can endanger the patients being cared for.


- ▶ Make sure that the product is connected to the emergency power supply.
-

6 Troubleshooting

6.1 Fault – Cause – Remedy

If the Analog Input Module is faulty and no longer transmits data, the AMS display devices will detect this and display a communication alarm.

In the event of a communication alarm, notify specialized service personnel such as DrägerService.

 Communication alarms in the AMS network are indicated by a flashing green LED on AMS display devices with LED displays.

7 Cleaning

There is no need to clean the product.

8 Service

Dräger recommends DrägerService for service work.

NOTICE

► Observe the separate instructions for use for the sensors.

8.1 Definition of service terminology

| Concept | Definition |
|-------------|----------------------------------------------------------------------------------------------------------------------|
| Service | All measures (inspection, maintenance, repair) intended to maintain or restore the functional integrity of a product |
| Inspection | Measures intended to determine and assess the current state of a product |
| Maintenance | Regular specified measures intended to maintain the functional integrity of a product |
| Repair | Measures intended to restore the functional integrity of a product after a failure |

8.2 Inspection

There is no need to inspect the product.

8.3 Maintenance

The AIM is maintenance-free.

NOTICE

► Observe the separate instructions for use for the sensors.

8.4 Repair

Dräger recommends that all repairs are performed by DrägerService and that only authentic Dräger repair parts are used.

9 Disposal

9.1 Disposal of the product

At the end of its useful life, dispose of the product in accordance with the applicable legal provisions.

The AIM, as part of the AMS, is a system that is permanently installed in the healthcare facility and must be professionally disposed of when the facility is demolished.

9.2 Disposal of the sensors

At the end of the sensors' useful life, dispose of them in accordance with the applicable legal provisions.

NOTICE

► Observe the separate instructions for use for the sensors.

10 Technical data

10.1 Ambient conditions

During operation

| | |
|-------------------|-----------------------------------|
| Temperature | 0 to 50 °C (32 to 122 °F) |
| Ambient pressure | 600 to 1100 hPa (8.7 to 16.0 psi) |
| Relative humidity | 5 to 95 %, non-condensing |

During storage and transport

| | |
|-------------------|-----------------------------------|
| Temperature | - 20 to 60 °C (- 4 to 140 °F) |
| Ambient pressure | 600 to 1100 hPa (8.7 to 16.0 psi) |
| Relative humidity | 5 to 95 % |

10.2 Operating characteristics

| | |
|---------------------------|------------------------------------------------------------|
| Power supply | 24 V DC \pm 3 V DC |
| Typical power consumption | 0.24 W (excluding sensors) |
| Maximum power consumption | 0.35 W (excluding sensors) 5 W (with 6x 2-wire sensors) |

Terminals for sensors

Analog inputs (4 to 20 mA) 6x 2 pins (PIN A/ PIN + (24 V DC))

Digital inputs 6x 2 pins (PIN D/ PIN + (24 V DC))

Terminals for AMS
 PIN A (polarity-independent)
 PIN B (polarity-independent)
 PIN S (not assigned)

Dimensions

Dimensions (length x width x height) 95 x 85 x 70 mm (3.74 x 3.35 x 2.76 in)

Weight <150 g (0.33 lb)

Electrical protection class

Device Class III

Degree of protection

| | |
|--------------------------|-----------------------------------|
| Housing | IP55 or higher (e.g., G50748) |
| Pressure sensor | IP65 |
| Temperature sensor | IP20 (G34030); IP30 (G34031) |
| Dew point sensor | IP66 |
| Flow sensor | IP65 |
| Gas concentration sensor | IP65 (VarioGard); IP66 (Polytron) |

10.2 Operating characteristics (continued)

| | |
|----------------------------------------------------------------------------------------|---------------------------------------|
| Classification according to Directive 93/42/EEC, Annex IX | Class I |
| UMDNS code | 15-824 |
| Universal Medical Device Nomenclature System – Nomenclature for medical devices | 36-271 |
| Electromagnetic compatibility (EMC) | EN 61326 |
| Standards | DIN EN ISO 7396-1 IEC 61010-1:2010 |

10.3 Sensors

Pressure sensor 10 bar

| | |
|----------------------------------|-----------------------------------------|
| Part number | G34000 |
| Inlet pressure | 10 bar |
| Measurand | Relative pressure |
| Measuring range | 0 to 10 bar |
| Output signal | 4 to 20 mA (2-wire sensor) |
| Accuracy | $\leq \pm 0.5$ % FSO IEC 60770 |
| Electrical connection | Plug and socket compliant with ISO 4400 |
| Mechanical connection | Compliant with ISO 228/1-G1/4A |
| Seal | No separate seal, measuring cell sealed |
| Pin 1 | Supply+ |
| Pin 2 | Supply- |
| Pin 3 | Signal+ |
| Suitable for oxygen applications | |

Pressure sensor 16 bar

| | |
|-----------------------|-----------------------------------------|
| Part number | G34001 |
| Inlet pressure | 16 bar |
| Measurand | Relative pressure |
| Measuring range | 0 to 16 bar |
| Output signal | 4 to 20 mA (2-wire sensor) |
| Accuracy | $\leq \pm 0.5$ % FSO IEC 60770 |
| Electrical connection | Plug and socket compliant with ISO 4400 |
| Mechanical connection | Compliant with ISO 228/1-G1/4A |

10.3 Sensors (continued)

| | |
|----------------------------------|-----------------------------------------|
| Seal | No separate seal, measuring cell sealed |
| Pin 1 | Supply+ |
| Pin 2 | Supply- |
| Pin 3 | Signal+ |
| Suitable for oxygen applications | |

Pressure sensor 25 bar

| | |
|----------------------------------|-----------------------------------------|
| Part number | G34002 |
| Inlet pressure | 25 bar |
| Measurand | Relative pressure |
| Output signal | 4 to 20 mA (2-wire sensor) |
| Accuracy | $\leq \pm 0.5$ % FSO IEC 60770 |
| Electrical connection | Plug and socket compliant with ISO 4400 |
| Mechanical connection | Compliant with ISO 228/1-G1/4A |
| Seal | No separate seal, measuring cell sealed |
| Pin 1 | Supply+ |
| Pin 2 | Supply- |
| Pin 3 | Signal+ |
| Suitable for oxygen applications | |

Pressure sensor 250 bar

| | |
|----------------------------------|-----------------------------------------|
| Part number | G34003 |
| Inlet pressure | 250 bar |
| Measurand | Relative pressure |
| Output signal | 4 to 20 mA (2-wire sensor) |
| Accuracy | $\leq \pm 0.5$ % FSO IEC 60770 |
| Electrical connection | Plug and socket compliant with ISO 4400 |
| Mechanical connection | Compliant with ISO 228/1-G1/4A |
| Seal | No separate seal, measuring cell sealed |
| Pin 1 | Supply+ |
| Pin 2 | Supply- |
| Pin 3 | Signal+ |
| Suitable for oxygen applications | |

10.3 Sensors (continued)

Pressure sensor Vacuum

| | |
|-----------------------|-----------------------------------------|
| Part number | G34004 |
| Inlet pressure | - 1 to 0 bar |
| Measurand | Relative pressure |
| Output signal | 4 to 20 mA (2-wire sensor) |
| Accuracy | ± 1 % FSO IEC 60770 |
| Electrical connection | Plug and socket compliant with ISO 4400 |
| Mechanical connection | Compliant with ISO 228/1-G1/4A |
| Seal | FKM |
| Pin 1 | Supply+ |
| Pin 2 | Supply- |
| Pin 3 | Signal+ |

Temperature sensor without display

| | |
|---------------------------|---------------------------------|
| Part number | G34030 |
| Measuring range selection | - 50 to 160 °C (- 58 to 320 °F) |
| Output signal | 4 to 20 mA (2-wire sensor) |

Temperature sensor with display

| | |
|---------------------------|---------------------------------|
| Part number | G34031 |
| Measuring range selection | - 50 to 250 °C (- 58 to 482 °F) |
| Output signal | 4 to 20 mA (2-wire sensor) |

Dew point sensor

| | |
|-----------------------|------------------------------------------|
| Part number | G49099 |
| Measuring range | -100 to 20 °C tpd |
| Output signal | 4 to 20 mA (2-wire sensor) |
| Electrical connection | Socket compliant with DIN EN 175 301-803 |

Flow sensor DN 20 Air

| | |
|-----------------|--------------------------------|
| Part number | G34019 |
| Measuring range | 0.57 to 226 Nm ³ /h |
| Output signal | 4 to 20 mA (3-wire sensor) |

10.3 Sensors (continued)

Flow sensor DN 25 Air

| | |
|-----------------|--------------------------------|
| Part number | G34020 |
| Measuring range | 0.90 to 352 Nm ³ /h |
| Output signal | 4 to 20 mA (3-wire sensor) |

Flow sensor DN 32 Air

| | |
|-----------------|--------------------------------|
| Part number | G34021 |
| Measuring range | 1.45 to 289 Nm ³ /h |
| Output signal | 4 to 20 mA (3-wire sensor) |

Flow sensor DN 20 O₂

| | |
|-----------------|--------------------------------|
| Part number | G34024 |
| Measuring range | 1.45 to 289 Nm ³ /h |
| Output signal | 4 to 20 mA (3-wire sensor) |

Flow sensor DN 20 N₂O

| | |
|-----------------|--------------------------------|
| Part number | G34023 |
| Measuring range | 1.45 to 289 Nm ³ /h |
| Output signal | 4 to 20 mA (3-wire sensor) |

Flow sensor DN 20 CO₂

| | |
|-----------------|--------------------------------|
| Part number | G34022 |
| Measuring range | 1.45 to 289 Nm ³ /h |
| Output signal | 4 to 20 mA (3-wire sensor) |

Gas concentration sensor

VarioGard 2320 IR CO₂ PL

| | |
|-----------------|----------------------------|
| Part number | 8324833 |
| Measuring range | 0 to 5 vol. % |
| Output signal | 4 to 20 mA (3-wire sensor) |

Polytron 3000 O₂ LS 25 Vol. %

| | |
|-----------------|----------------------------|
| Part number | 8316645 |
| Measuring range | 0 to 25 vol. % |
| Output signal | 4 to 20 mA (2-wire sensor) |

10.4 Power supply unit

The Dräger power supply unit complies with the requirements of the Low Voltage Directive 2014/35/EU, the EMC Directive 2014/30/EU and complies with the limit values for Safety Extra-Low Voltage (SELV) in accordance with the IEC 61140 standard.

Power supply units from third-party providers must also comply with the above and the following requirements and be mountable on a top-hat rail.


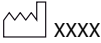









| | |
|-------------------------------------------|------------------------------------------------------------|
| Protection class of the power supply unit | I with protective ground conductor or II |
| Degree of protection of the housing | Minimum IP20 |
| Input voltage | 100 to 240 V AC |
| Voltage frequency | 50/60 Hz |
| Output voltage | 24 V DC |
| Power output | Minimum 10 W |
| Ambient temperature | - 20 to 60 °C (- 4 to 140 °F) |
| Ambient pressure | Approved for the ambient pressure at the installation site |

11 Annex

11.1 Abbreviations

| Abbreviation | Explanation |
|--------------|--------------------------------------------------------------------------------|
| AIM | Analog Input Module |
| AMS | Alarm Management System |
| DIN | Deutsches Institut für Normung (German standardization organization) |
| GMS | Gas Management System |
| ISO | International Organization for Standardization |
| UMDNS | Universal Medical Device Nomenclature System, nomenclature for medical devices |

11.2 Symbols

| Symbol | Explanation |
|-------------------------------------------------------------------------------------|---------------------------------|
|  | Manufacturer |
|  | Date of manufacture |
|  | ESD warning symbol |
|  | Follow the instructions for use |
|  | Storage temperature |
|  | Relative humidity |
|  | Atmospheric pressure |
|  | Part number |
|  | Revision index |
|  | Serial number |
|  | Quantity |

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Directive 93/42/EEC concerning medical devices



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Dräger reserves the right to make modifications to the device without prior notice.

