Guide to Operation

Honeywell

Sat-Ex FTT Versions

Sat-Ex 20202-0400 FTT
Sat-Ex 20202-0405 FTT/R
Sat-Ex 20202-0450 FTT/C
Sat-Ex 20202-0455 FTT/C/R

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Preface

This guide to operation describes the instrument in detail. For proper operation and optimum exposure protection, please read it thoroughly prior to installation and start-up of the instrument and strictly observe all instructions included.

I. Safety and Warning Notices

The Sat-Ex is tested and certified to comply with the requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres. Use of the instrument must be in accordance with the conditions specified in the examination certificate. The instrument must not be used in areas with explosive gas atmospheres (zone 0).

Installation and wiring must be performed by qualified and authorized personnel strictly observing the regulations for equipment used in potentially explosive atmospheres as well as the special conditions of use stated in the instrument's examination certificate.

The installation must also comply with any local electrical and fire codes.

For connection of the Sat-Ex to external control and alarm systems, it is compulsory to use self-contained junction boxes meeting protection class "Ex e".

These junction boxes must be closed prior to start-up of the system and may subsequently only be opened in compliance with the directives for potentially explosive atmospheres.

Do not apply power until the complete system is ready for start-up.

It is not permitted to make any modifications to the instrument or instrument components or to use faulty or incomplete parts.

Use only sensors designed and certified for Sat-Ex instruments.

Never install sensors that were used before in instruments other than Sat-Ex.

Sat-Ex instruments must never be opened while energized.

! Non-observance of any directive results in immediate cancellation of the instrument's registration.

II. General Terms of Use

Conventional Usage

The Sat-Ex is designed for continuous monitoring of TLV or LEL levels of hazardous gas concentrations in ambient air and may only be used for the purpose described in this guide to operation.

Maintenance and Service

According to the regulations the equipment must be inspected and serviced at regular intervals to ensure proper operation. All service procedures must be performed by qualified personnel and must be recorded for verification. We recommend to have your service personnel trained at Honeywell Analytics or to conclude an Honeywell Analytics service contract.

Inspections are to examine the actual condition, maintenance includes measures to maintain the specified condition, and repairs are measures to restore the specified condition. Repairs may only be carried out by trained and qualified personnel. Inspections, service, and repairs are measures to maintain the specified condition.

For inspections, maintenance, and repairs only original Honeywell Analytics spares, consumables and accessories approved for intrinsic safe operation of the instrument may be used. Refer to section 8 for order information on spares, consumables, and accessories.

Use in Areas Subject to Explosion Hazards

The Sat-Ex is tested and certified to comply with the requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres. Use of the instrument must be in accordance with the conditions specified in the examination certificate. The instrument must not be used in areas with explosive gas atmospheres (zone 0).

It is prohibited to modify the instrument or instrument components or to use faulty or incomplete parts. When repairing the instrument or its components make sure to strictly observe all regulations for equipment intended for use in potentially explosive atmospheres as well as the special conditions of use stated in the instrument's examination certificate. Non-observance of any directive results in immediate cancellation of the instrument's registration.

Liability

If the instrument is repaired by personnel not authorized by or employed with Honeywell Analytics or if the instrument is used in a manner not conforming to its intended use, the liability for its proper function is irrevocably transferred to the owner or user.

Honeywell Analytics is not liable for damage resulting from improper installation, misuse, abuse, neglect or accident. Honeywell Analytics is not liable for damage caused by non-compliance with the notices given above.

Above notices do not extend or modify Honeywell Analytics warranty and liability provisions stated in their General Terms and Conditions of Sale.

For further information, please contact your local Honeywell Analytics representative.

This section provides basic understanding of the instrument and its operation.

1.1 Principle of Operation

The Sat-Ex is a gas monitoring instrument especially designed and certified for use in hazardous areas. The instrument is designed to interface with LONWORKS™ free topology systems. A free topology architecture allows the user to wire gas monitoring instruments and control devices with virtually no topology restrictions. Power is supplied by a local 12 to 24 VDC power supply.

Target gas and measuring range depend on the type of sensor chosen. The sensor comes with the specific data in its internal data memory. When a sensor is inserted, this data is loaded into the instrument's internal memory.

Sat-Ex versions FTT and FTT/R use electrochemical sensors for the surveillance of toxic and corrosive gases at TLV levels (TLV = Threshhold Limit Value). The sensor output signal is amplified electronically, digitised and the resulting concentration value is transmitted to the communication network.

Sat-Ex versions FTT/C and FTT/C/R are used for monitoring combustible gases and vapours. These instruments use catalytic sensors and are factory calibrated for the detection of methane in air mixtures with concentrations up to 5 %-vol. (100 % LEL Lower Explosion Limit). The sensor output signal is amplified electronically, digitised and the resulting concentration value is transmitted to the communication network. To allow the surveillance of a variety of other combustible gases, a specific correction factor called "K-Factor" can be entered.

Sat-Ex versions FTT/R and FTT/C/R include the relay option and provide 3 single-pole single-throw relays for activation of external alarm devices. When the actual gas concentration exceeds the alarm levels, the instrument will activate the appropriate alarm relay and display an according message. A relay will also be activated in case of an instrument fault.

1.2 Operating States

There are four different operating states for the Sat-Ex, Monitoring Mode, Maintenance Mode, Warning Condition, and Diagnostics. Depending on the selected operating state, the green status LED is either on, off, or flashing.

1.2.1 Monitoring Mode

The Monitoring Mode is the instrument's standard operating mode. In the Monitoring Mode, the instrument continuously monitors for hazardous gas concentrations and checks for alarm levels and instrument faults.

The instrument's self-diagnostics provide on-line preventive maintenance information identifying electronics or sensor problems. For example a sensor selftest is performed every 24 hours. The sensor selftest is not available with instruments using oxygen sensors and catalytic sensors. The green LED located above the <set> key is on.

1.2.1.1 Alarm Level Settings

The settings for Alarm Level 1 and Alarm Level 2 are automatically loaded when installing the sensor. Standard settings are 1x and 2x TLV or 20 and 40 % LEL for the target gas. The Alarm Setup function in the Configuration Menu allows the user to change the alarm levels according to their specific requirements.

Whenever the concentration of the target gas exceeds the factory or user programmed alarm levels, the instrument will document this concentration alarm condition on its LCD display and transmit an according message to the network.

Instruments with relay option will additionally trigger the associated alarm relays.

1.2.1.2 Reset Alarms Function

Ex factory, Alarm 1 and Alarm 2 are preprogrammed "enabled" and "latching". In the event of a concentration alarm, the alarm indication with latching alarms will continue until the alarm is manually acknowledged by actuating the <set> key. If the password protection is enabled, the password must be entered (see Configuration Menu / Security Function).

Alarm Reset is not possible, if the alarm condition is still present.

1.2.1.3 Exiting the Monitoring Mode

Exiting the Monitoring Mode and entering the Maintenance Mode may be password protected. To prevent the instrument from manipulations by unauthorized personnel, it is recommended to enable this function (see Configuration Menu / Security Function).

- Password enabled:
Actuate the <esc> key to exit the Monitoring Mode and enter the password. The screen to enter the password is shown for one minute. During this period the Monitoring Mode remains active in the background. When the correct password has been entered, the instrument is in the Maintenance Mode, it is not monitoring, and the green LED is off.

- Password disabled:
Actuate the <esc> key to exit the Monitoring Mode. The instrument is now in the Maintenance Mode, the instrument is not monitoring, and the green LED is off.

1.2.2 Maintenance Mode

The Maintenance Mode indicates a complete absence of monitoring capability. The green status LED is off. A maintenance message is transmitted to the communication network.

Instruments with relay option additionally trigger the fault relay, depending on the configuration.

1.2.3 Warning Condition

A warning condition indicates that the instrument requires some attention, but is still able to monitor and operate as programmed.

The following will occur when the instrument detects a warning condition:
- the green status LED is flashing
- a warning message is transmitted to the communication network; depending on the configuration, this function can be enabled or disabled.
- depending on the configuration, the fault relay will be activated (only instruments with relay option)

1.2.3.1 Reset Warning Condition

Actuate the <set> key to acknowledge and reset a Warning Condition.
Refer to Section 7, Troubleshooting for specific warnings.

1.2.4 Diagnostics

Instrument faults refer to a problem which prevents the Sat-Ex from operating properly and interferes with the ability to monitor or document concentration alarms.

When the instrument has detected an instrument fault, a fault message is transmitted to the communication network and the fault relay is activated (only instruments with relay option). The green status LED is off. The LCD display is flashing while indicating the specific fault message.

The Sat-Ex lists specific instrument responses to instrument faults. For information on the various fault messages and instructions on how to correct a fault condition, please refer to section 7, Troubleshooting.

1.3 Menu structure

Besides the Monitoring Mode, there is also menu operation for the Sat-Ex. Menu operation comprises three groups of functions, maintenance, calibration, and configuration. A password (if enabled) must be entered to exit the Monitoring Mode and to obtain access to the Main Menu.

1.3.1 Maintenance Menu

This function covers the realtime service procedures required for a regular maintenance of the instrument (e.g. sensor replacement).

1.3.2 Calibration Menu

Use the calibration function to dynamically calibrate the Sat-Ex with a known concentration of the target gas or manually by entering a new correction K-Factor.

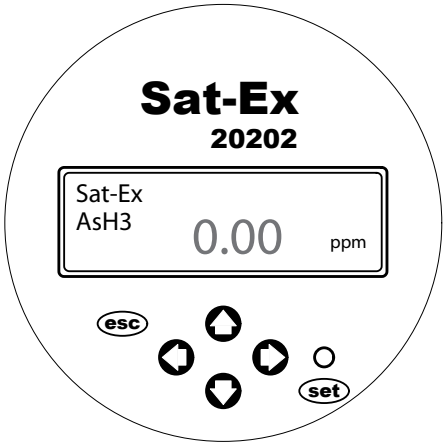
1.3.3 Configuration Menu

Use this function to configure the Sat-Ex and to program instrument and monitoring parameters to suit individual requirements.

! Note:

If the instrument was in the Monitoring Mode when last powered down, it will automatically return to the Monitoring Mode when power is restored.

1.4 Operational Elements



Located behind the glass window of the Sat-Ex is the graphic display, the keypad consisting of six keys, and above the Set Key the green status LED.

The keys are actuated with the bar magnet provided with each instrument.

1.4.1 Keypad Functions

- Escape Key <esc>
- Set Key <set>
- 4 Cursor Keys marked with an arrow, <up>, <down>, <left>, <right>.

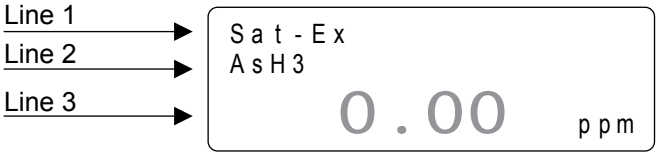
In the Maintenance, Calibration, and Configuration Menu, these keys provide the following functions: To move forwards and backwards in the menus, use the cursor keys <down> and <up>. Select a function by actuating the <set> key.

To enter text or figures, use the cursor keys <left> and <right> to reach the desired cursor position. Use the cursor keys <up> and <down> to select the letter, figure, or sign you wish to enter. Bring the cursor to the next position, select the next letter, figure, or sign. After entering the complete text, use the <set> key to confirm the changes. If you do not want to save the changes, abort by actuating the <esc> key.

1.4.2 Graphic Display

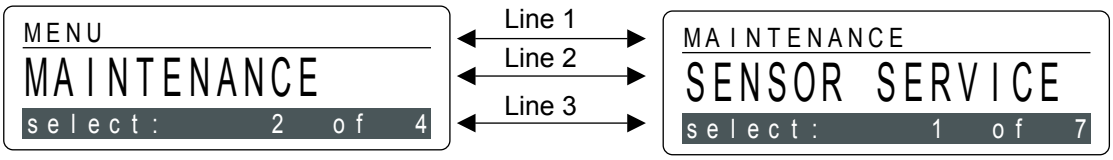
Depending on the operating mode the structure of the graphic display is different. Three basic versions are illustrated and explained below. A detailed description is given in the according sections.

Display Structure for Monitoring Mode



Line 1 offers the possibility to enter a user specific description, e.g. monitoring location (max. 13 spaces; the name of the instrument is entered here when delivered). Line 2 shows the name of the gas monitored. Line 3 indicates the actual gas concentration and the concentration unit. Gas name and concentration unit are data stored in the memory of the sensor installed.

Display Structure for Menu



Line 1 shows the actual position in the menu. In the left example the actual position is Main Menu, in the right example it is the submenu Maintenance. Line 2 shows one of the selection possibilities. Line 3 shows the number of the selection possibility presently displayed and indicates also the total of selection possibilities available in this menu or sub-menu.

! Note:
The number of selection possibilities is subject to the instrument version and may be different than indicated in this guide to operation.

1.5 Technical Specifications

Sat-Ex Version	FTT	FTT/R	FTT/C	FTT/C/R
Part Number	**20202-0400**	**20202-0405**	**20202-0450**	**20202-0455**
Sensor Type used				
electrochemical	X	X		
catalytic			X	X
Power Requirements				
voltage	12 ... 24 VDC			
consumption	ca. 0.6 W	ca. 1.5 W	ca. 1.0 W	ca. 2.0 W
Network	LonTalk™ protocol			
data transmission	78 kBit per second			
wiring topologies	free, e.g. bus, star, loop, or mixed			
Connecting Cable (Instrument delivered with 2m of cable attached)				
4-wire shielded cable 2x2x0,5mm^2	X		X	
10-wire shielded cable 5x2x0,5mm^2		X		X
Relay Outputs contacts 3 x SPST (Single-Pole Single-Throw) max. ratings 250 VAC / 30 VDC, 2A		X		X
Graphic Display	122 x 32 dots with backlight			
Status LED	green			
Keypad	6 function keys			
Tool for Operating Controls	cylindric bar magnet			
Physical Dimensions (including sensor and cable fitting) dimensions (LxWxH)	300 x 143 x 143 mm	11.8" x 5.6" x 5.6"		
weight	3.5 kgs	7.72 lbs		
Mounting	wall mounting			
Protection Class	IP 66			
EMC Directive 2004/108/EC	EN 50270			
Operating Conditions temperature	-20 °C ... +40 °C	-4 ... +104 °F		
pressure	800 ... 1100 hPa			
humidity	20 ... 90 % r.h.			
Safety Approvals	II 2G Ex d [ib] IIC T4 BVS 04 ATEX E 101 X 0158			

This section explains installation and initial start-up procedures.

2.1 General Guidelines

Please consider the aspects indicated below before locating the instrument.

Consider the properties of the target gas (for example lighter or heavier than air etc.) and locate the instrument accordingly. For personal monitoring applications the instrument should be mounted at head level.

The instrument should be mounted as close to the monitoring location as possible and should be easily accessible for operation and maintenance. For narrow monitoring locations or duct mounting a sensor extension is available as an option. Sensor extensions are available with a length of 1, 2 and 3 meters (3, 6, 9 feet).

Ensure that the area immediately surrounding the instrument is free from objects that might hinder free flow of air. The instrument should be installed away from any possible liquid sources, extreme dust and dirt sources and should be protected against rain and sunlight.

Regarding the power requirements and operating conditions, please follow the specifications indicated in section 1, Technical Specifications. Instructions for wiring follow in the course of this section.

Electrochemical sensors which are not in use should be stored in a cool, dry place. This does not apply to catalytic sensors.

2.2 Installation Instructions

Electrical devices with metal housing require an additional external connector for ground wire or equalization of potential. For this purpose the Sat-Ex provides a cable shoe at the exterior of the housing. The minimum conductor cross section of the connected wire must be 4 mm2. A lock washer prevents this connection from getting loose or distorted. The far end of the conductor must be connected to the in-plant grounding bar.

As stated in the examination certificate of EXAM the Sat-Ex was tested and approved as electrical apparatus according to Ex d [ib] IIC T4. Installation must be in strict compliance with all conditions specified in the certificate.

This protection class reflects the combination of flameproof housing "d" and intrinsic safety "ib". This means that the Sat-Ex is not a completely intrinsic safe instrument, but includes voltage and current limiting elements to provide intrinsically safe circuits for the sensor to be connected.

Due to these intrinsically safe circuits, maintenance measures as for example sensor exchange can be performed without making it necessary to shut-down the entire system.

For connection of the Sat-Ex to external control and alarm systems it is compulsory to use selfcontained junction boxes meeting protection class "Ex e". These junction boxes must be closed before start-up of the system and may only be opened in compliance with the regulations for hazardous environments since this circuit is not intrinsically safe.

Do not apply power until the complete system is ready for start-up.

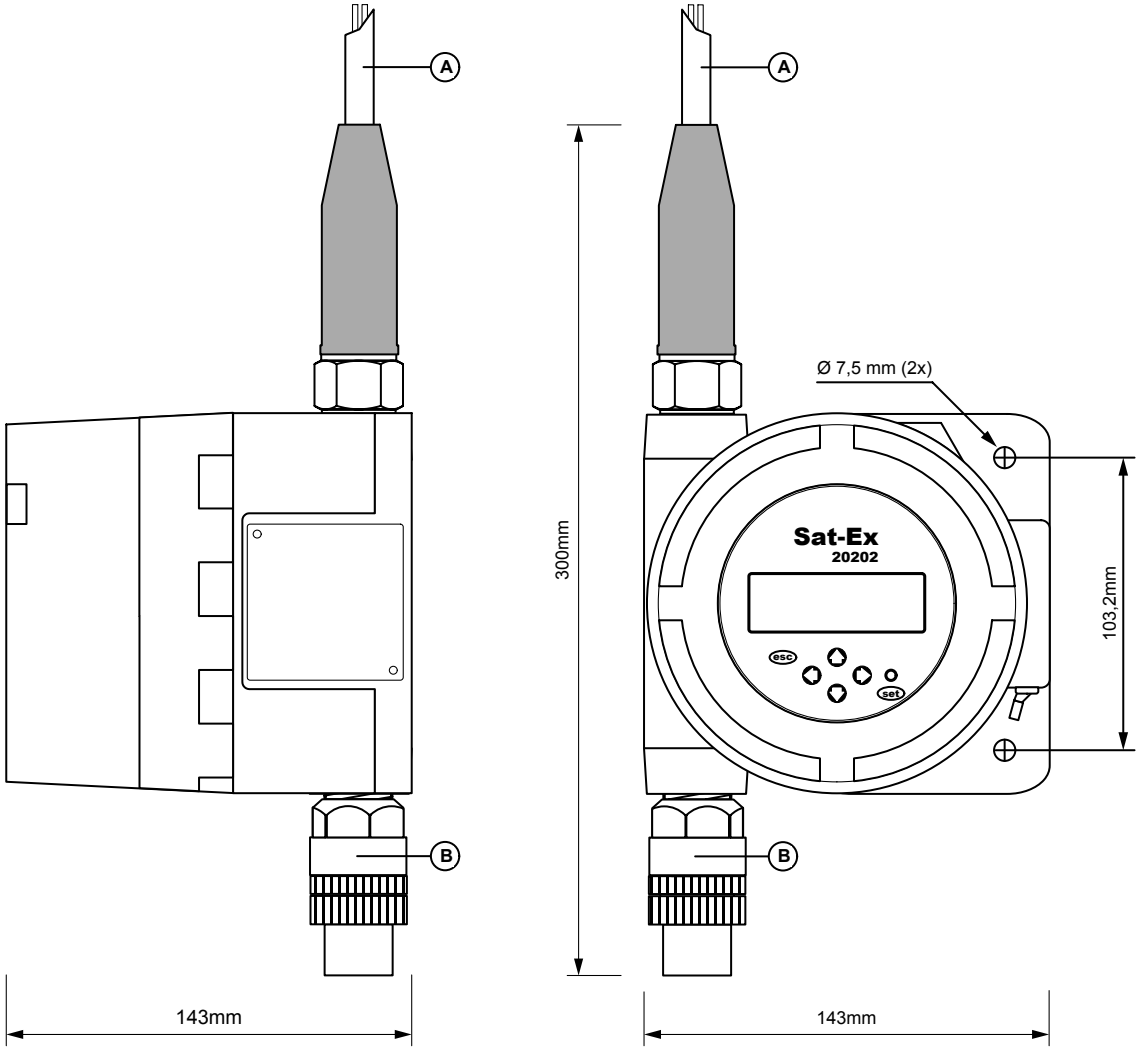
2.3 Mounting the Instrument

The housing provides two holes for mounting the instrument. The instrument must be mounted with two screws in a vertical position on a plane and stable surface.

The instrument's connecting cable (A) faces the top, the sensor holder (B) faces the bottom, display and functional elements face the front.

Mount the self-contained junction box meeting protection class "Ex e" at a maximum distance of 2 meters (6 feet) to the instrument.

Connect the instrument to the junction box as shown in the wiring diagram.



!Note:
For connection of the Sat-Ex to external control systems it is compulsory to use self-contained junction boxes meeting protection class "Ex e".

Junction boxes must be closed before start-up of the system and may only be opened in compliance with the regulations for hazardous environments.

Do not apply power until the complete system is ready for start-up.

2.3.1 Mounting Instruments with Sensor Extension

Instruments with electrochemical sensors and instruments with catalytic sensors use different sensor extensions which are not interchangeable. Mounting, however, is the same for both types. Accessories and spare parts are listed in section 8.

Mount the instrument on a plane and stable surface as described before.

Now connect sensor extension and instrument:

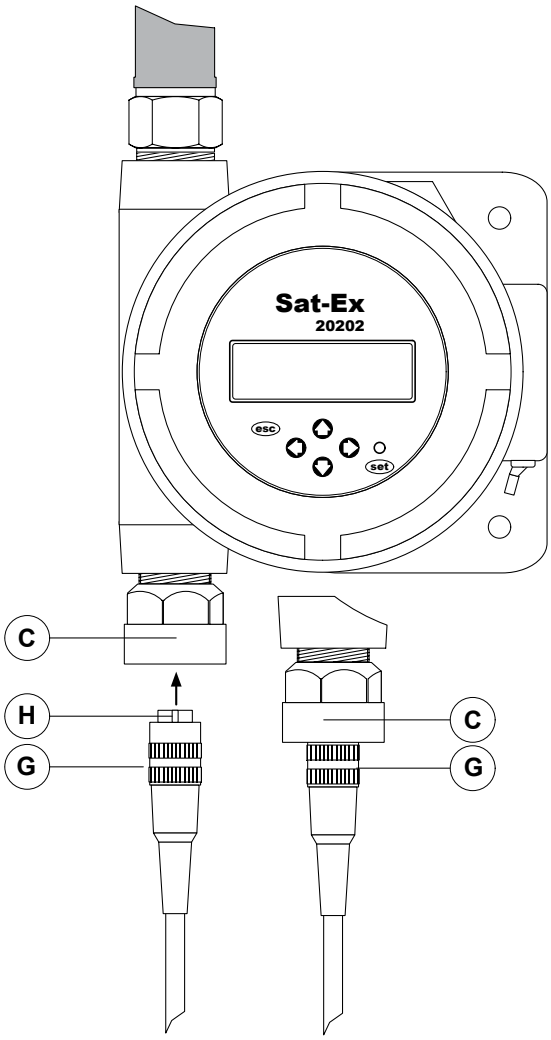
Connect the connector socket (G) of the sensor extension to the sensor pin connector of the instrument (C), aligning nose of the sensor pin connector and groove (H) of the connnector socket.

Screw down sensor extension and sensor plug (C).

C fitting with sensor pin connector of the instrument

G sensor extension with screw joint and connector socket

H positioning aid (groove) on the connector socket



Located at the far end of the sensor extension is the fitting with the sensor pin connector (A).

Connect the sensor (D) to the pin connector (A) of the sensor extension, aligning the positioning aids groove and nose.

Make sure the O-ring (C) is fitted properly before connecting threaded joint (E) and milled nut (B).

A union nut (G) with sealing ring (F) is provided for fastening.

A sensor extension with sensor pin connector

B milled nut

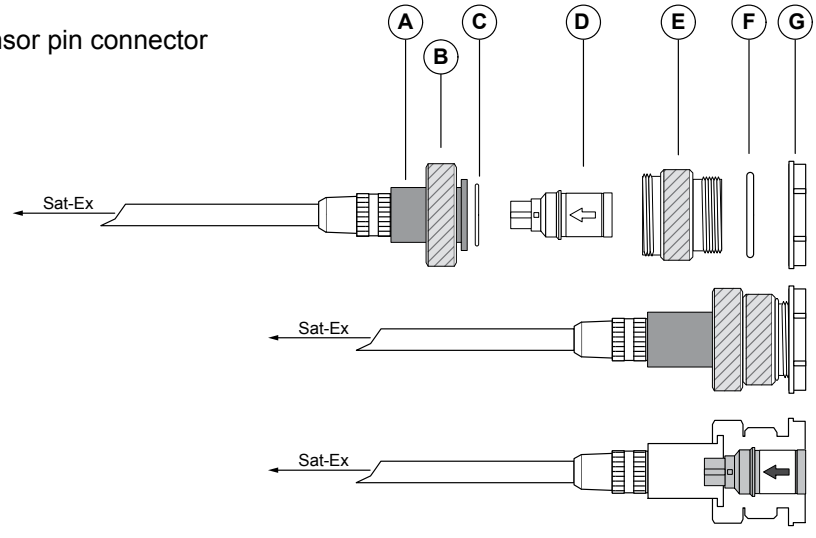
C O-ring

D sensor

E threaded joint

F sealing ring

G union nut



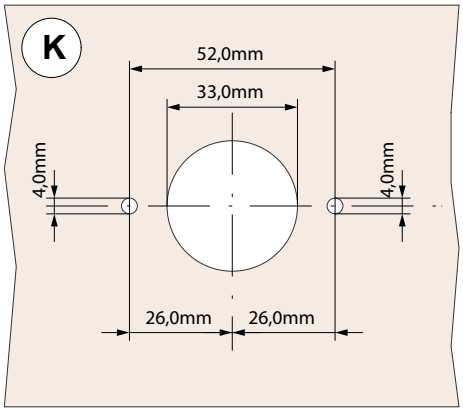
2.3.2 Mounting Sensor Extensions to Exhaust Ducts

For applications with monitoring points located in exhaust ducts, sensor extensions are used in combination with special saddles for duct mounting. These saddles are available in different sizes suitable for many common duct diameters.

Attach the sensor extension to the instrument as described in section 2.2.1.

Prior to mounting the saddle, 3 holes must be drilled into the duct; see figure (K) for details:

- 1 hole (ID 33 mm) for the sensor
- 2 holes (ID 4 mm) for the fastening screws of the saddle (H)

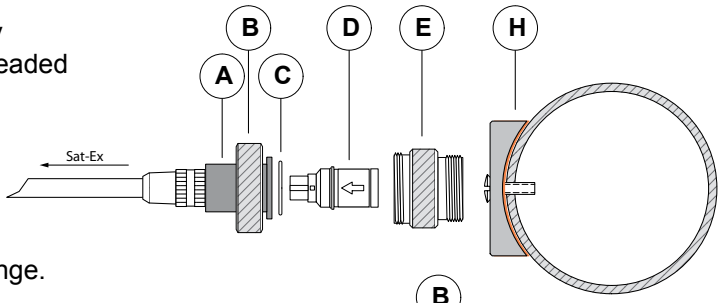


Put the 2 fastening screws through the holes in the saddle (H) and the holes in the silicon seal ring. Fasten the saddle with these screws to the duct. The silicon seal ring must be between duct and saddle.

Screw the threaded joint (E) to the saddle (H).

Connect the sensor (D) to the pin connector of the sensor extension (A), aligning the positioning aids groove and nose.

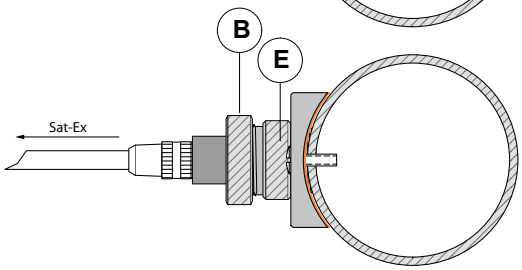
Make sure the O-ring (C) is fitted properly and screw together milled nut (B) and threaded joint (E).



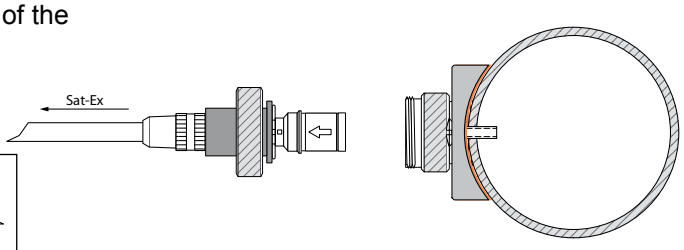
Now the sensor extension is firmly connected with the saddle.

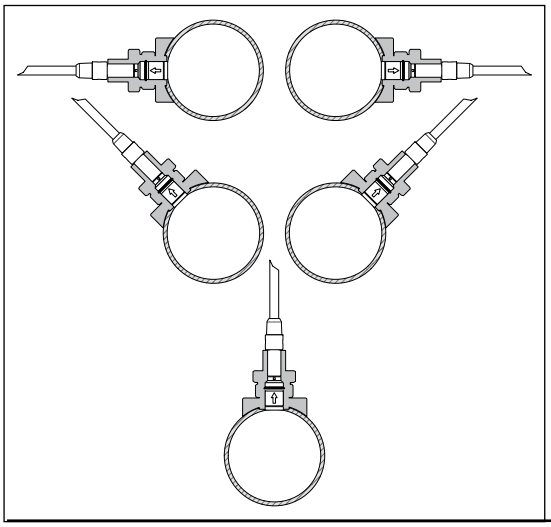
Unscrew the milled nut (B) to release the connection, for example for a sensor change.

Special blind plugs are available to cover saddles at sample points not in use or obsolete.



To ensure the sensor to work properly, please note that the saddle may only be mounted in one of the positions shown below.





A sensor extension with sensor pin connector

B milled nut

C O-ring

D sensor

E threaded joint

H mounting saddle, includes silicon sealing and 2 fastening screws

2.4 Electric Wiring

Installation and wiring must be performed by qualified and authorized personnel in compliance with any local electrical and fire codes.

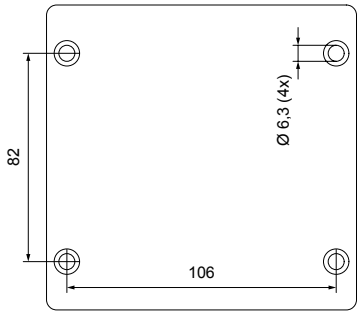
Wiring for the Sat-Ex and its related equipment must comply with the regulations on electrical installations in areas subject to explosion hazards and the special conditions of use stated in the instrument's examination certificate. Non-observance of any directive immediately nullifies the instrument's registration.

For connection of the Sat-Ex to external control and alarm systems it is compulsory to use self-contained junction boxes meeting protection class "Ex e". These junction boxes must be closed prior to start-up of the system and may only be opened in compliance with the directives for potentially explosive atmospheres. According to the regulations, cable glands of junction box connections that are not used, must be covered with blind plugs (A), approved for use in hazardous environments.

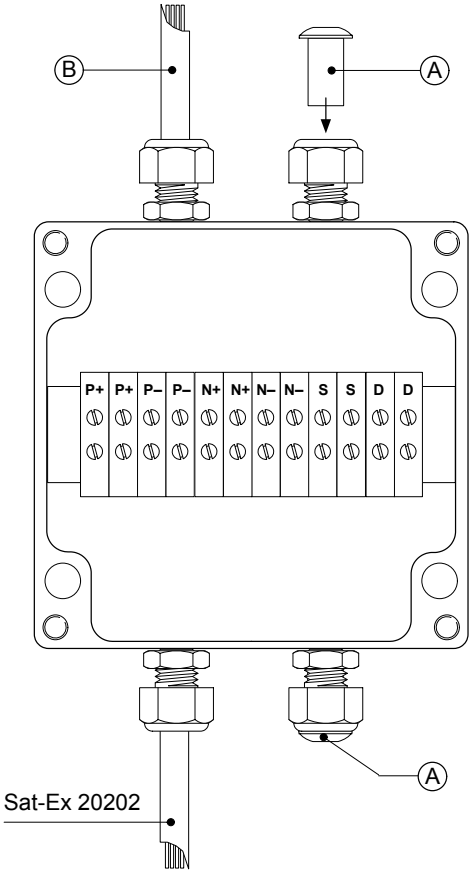
To interface with external control devices use of a shielded 4-wire cable 2x2x1.0 mm2 is recommended.

2.4.1 Wiring Sat-Ex FTT and FTT/C

A shielded 4-wire cable of 2 m length is firmly attached to the instrument. Connect the wires at the far end of this cable to the terminals in the junction box as stated in the below table.



"Ex e" Junction Box Connection			
Sat-Ex 20202 FTT FTT/C		⟷	External Devices (B)
marker	colour	signal	marker
P+	white	12 ... 24 VDC	P+
P-	black	ground	P-
N+	white	network +	N+
N-	black	network -	N-
S		shield	S

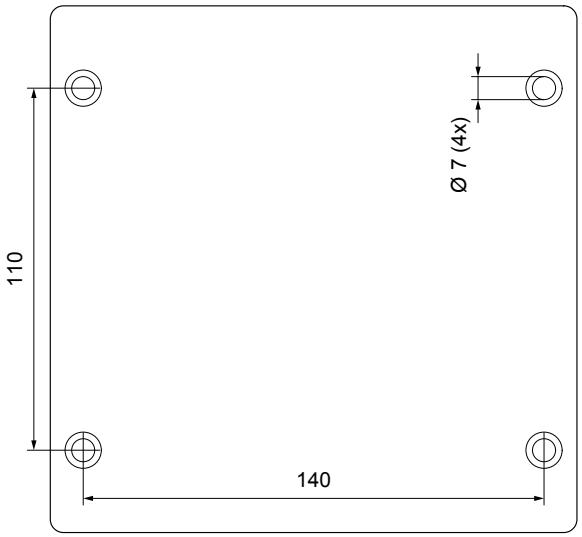


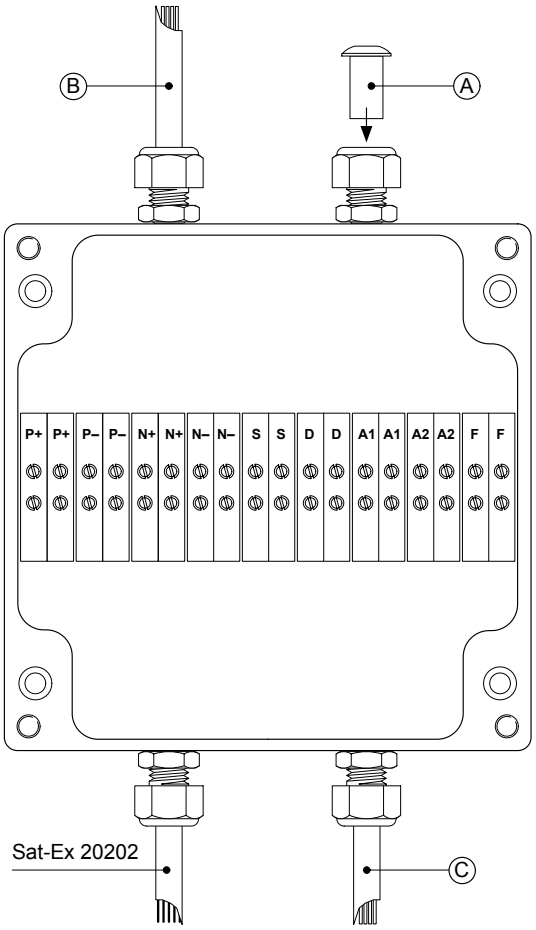
"Ex e" Junction Box - Part No. 20230-0100

According to the regulations cable glands of junction box connections that are not used, must be covered with approved blind plugs (A).

2.4.2 Wiring Sat-Ex FTT/R and FTT/C/R

Instruments with relay option are delivered with a shielded 10-wire cable of 2 m length. Connect the wires at the far end of this cable to the terminals in the junction box as stated in the below table.





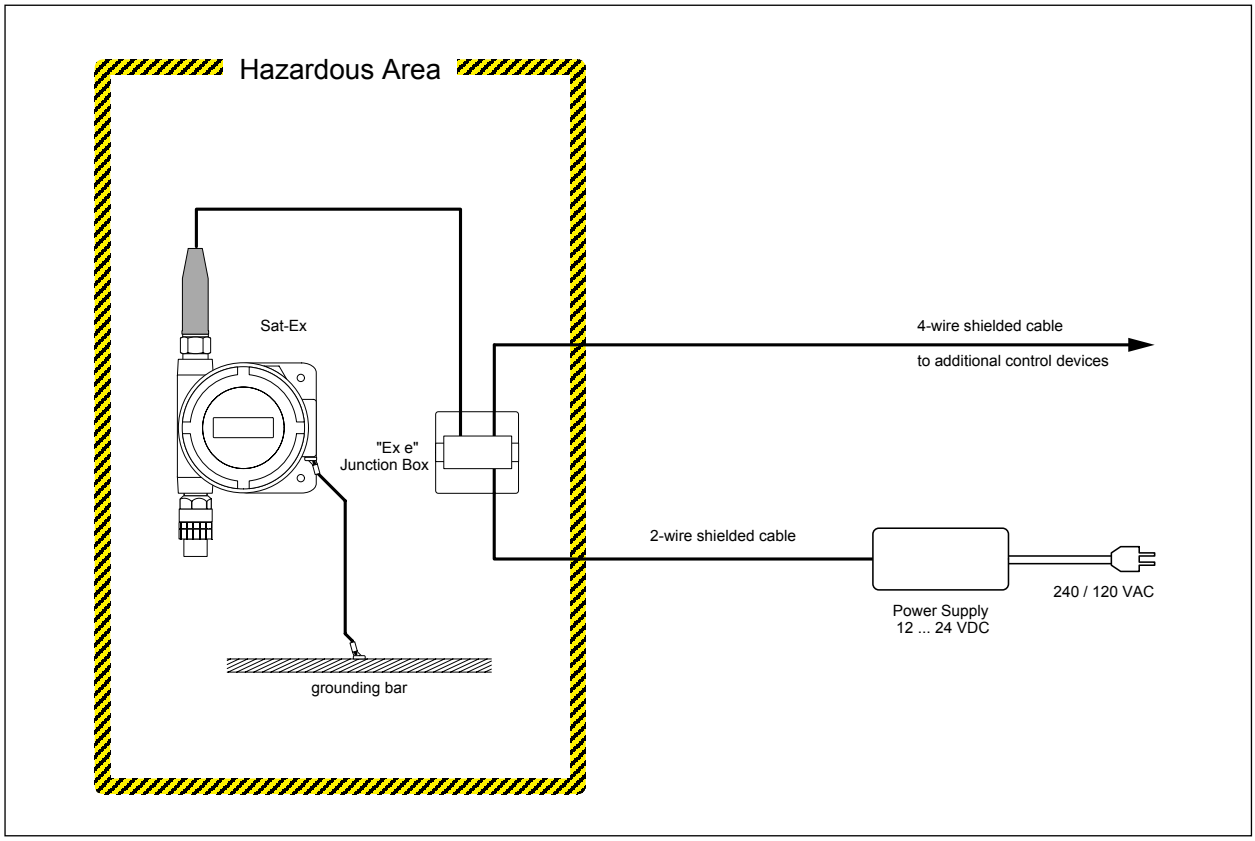
"Ex e" Junction Box Connection			
Sat-Ex 20202 FTT/R FTT/C/R		⟷	External Devices (B) and (C)
marker	colour	signal	marker
P+	white	12 ... 24 VDC	P+
P-	black	ground	P-
N+	white	network +	D
N-	black	network -	N-
S		shield	S
1	white	alarm 1	A1
1	black	alarm 1	A1
2	white	alarm 2	A2
2	black	alarm 2	A2
3	white	fault	F
3	black	fault	F

"Ex e" Junction Box - Part No. 20230-0105

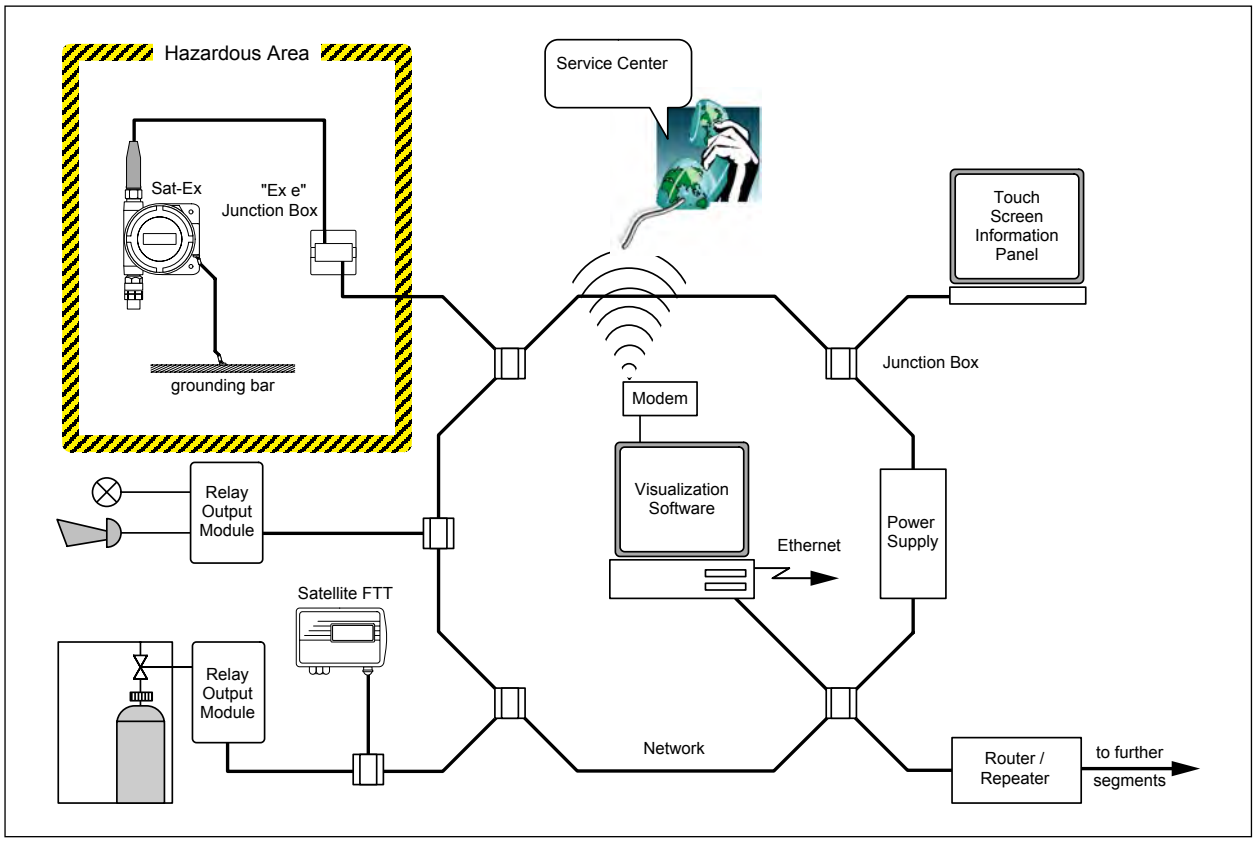
For each of the internal relays two contacts are available in the junction box for activation of external alarm devices for visual or acoustic alarm indication.

According to the regulations cable glands of junction box connections that are not used, must be covered with approved blind plugs (A).

! Note:
All wiring for the Sat-Ex and its related equipment must be in compliance with any local electricaland fire codes. The Sat-Ex wiring must be kept away from any high power lines. All shielding for the wiring must be connected together and grounded at only one point in the system.



Wiring Diagram Sat-Ex FTT - Basic Configuration



Wiring Diagram Sat-Ex FTT - Typical Configuration

2.5 Start-Up

When installation is completed and the system is ready for start-up, a sensor must be assigned to each instrument. Every sensor was gas calibrated at the factory and these sensor specific calibration parameters are stored in its integrated data memory. Make sure to use only sensors designed and certified for use with Sat-Ex instruments.

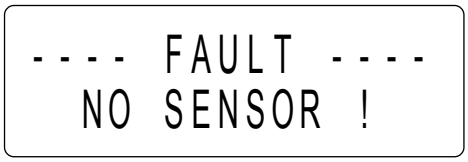
Ex factory the instruments are shipped either unconfigured or already preconfigured according to the customer's specifications.

For preconfigured instruments a certain sensor, which can be identified by its serial number printed on the packaging and the sensor label, is assigned and documented to one particular Sat-Ex. These data are stated in the test certificate provided with the shipment.

Switch on the power supply. The instrument performs a sensor warm-up (except with oxygen sensors) and the graphic display shows the below screen until the displayed value is zero. The required warm-up time depends on the type of sensor. The instrument is in the Maintenance Mode and the green LED is off.

The instrument will automatically switch to the Monitoring Mode. The graphic display shows the below screen, the green status LED is on, the instrument is monitoring.

If the instrument displays the message "FAULT - NO SENSOR" when power is supplied, there is no sensor fitted (or a sensor not designed for use with Sat-Ex instruments).



To eliminate this problem, plug in the assigned sensor as described hereafter in section 2.6.

! Note:
Use only sensor types designed and certified for use with Sat-Ex instruments.

Never install sensors that were used before in instruments other than Sat-Ex.

If the instrument does not perform as described above and a fault message is shown, please refer to section 7, Troubleshooting.

! Instruments with CATALYTIC sensors:
Zero Adjustment must be performed prior to start–up. It is recommended to repeat Zero Adjustment every 4 to 6 weeks. For details refer to Section 5, Calibration.

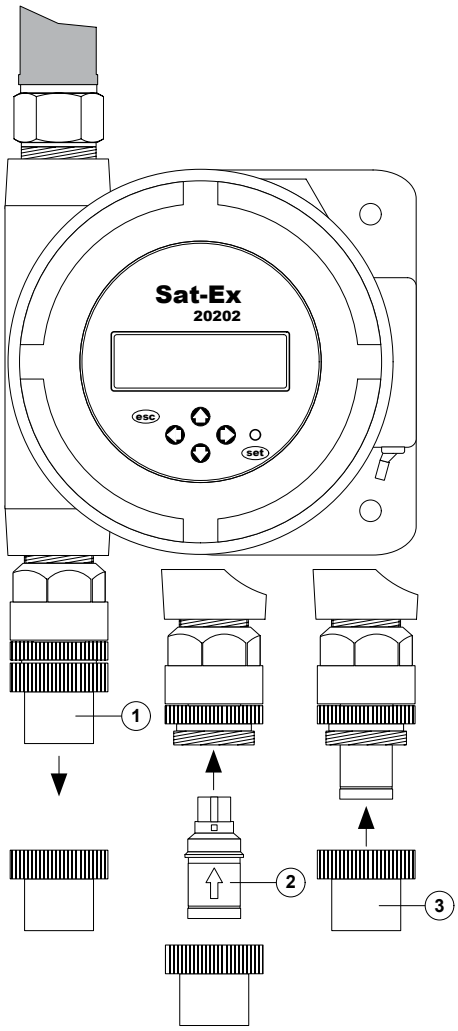
! Instruments with OXYGEN sensors:
Span Adjustment must be performed prior to start-up. It is recommended to repeat Span Adjustment every 4 to 6 weeks. For details refer to Section 5, Calibration.

2.6 Installing the Sensor

Unpack the assigned sensor. Certain sensor types are shipped with a shorting link to help extend sensor life during storage. This link must be removed prior to installation.

2.6.1 Instruments without Sensor Extension

- Unscrew and remove the cap from the instrument's sensor holder (1).
- Connect the sensor with its connector socket to the pin connector of the instrument, aligning the positioning aids groove and nose (2).
- Put the cap over the sensor and reconnect it to the sensor holder of the instrument (3).
- A sensor warm-up is performed, which may take several minutes. There is no warm-up with oxygen sensors.

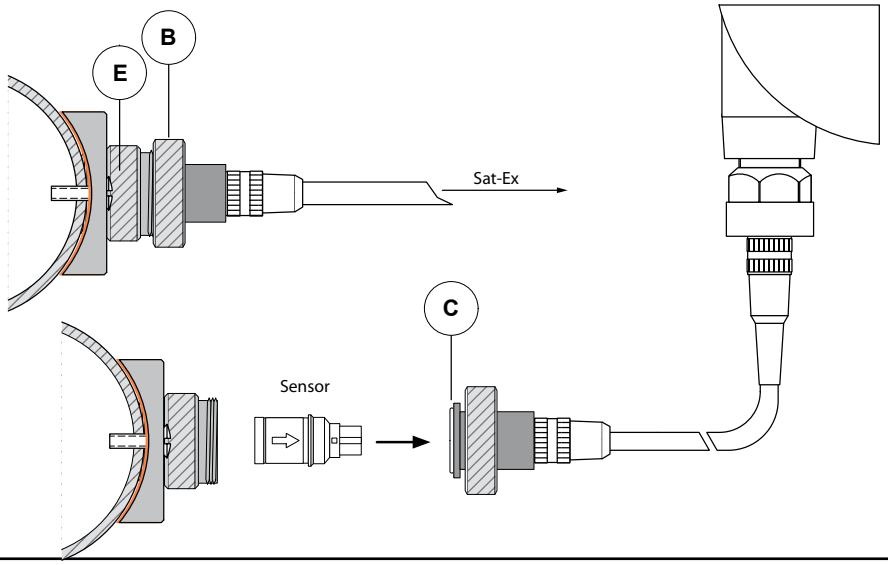


As soon as the sensor warm-up is finished, the instrument automatically switches to the Monitoring Mode; see section 2.5 for details.

2.6.2 Instruments with Sensor Extension

- Release the connection of milled nut (B) and threaded joint (E) at the far end of the sensor extension.
- Connect the sensor with its connector socket to the pin connector of the sensor extension, aligning the positioning aids groove and nose.
- Make sure the O-ring (C) is fitted properly and reconnect milled nut (B) and threaded joint (E).
- A sensor warm-up is performed, which may take several minutes. There is no warm-up with oxygen sensors.

As soon as the sensor warm-up is finished, the instrument automatically switches to the Monitoring Mode; see section 2.5 for details.

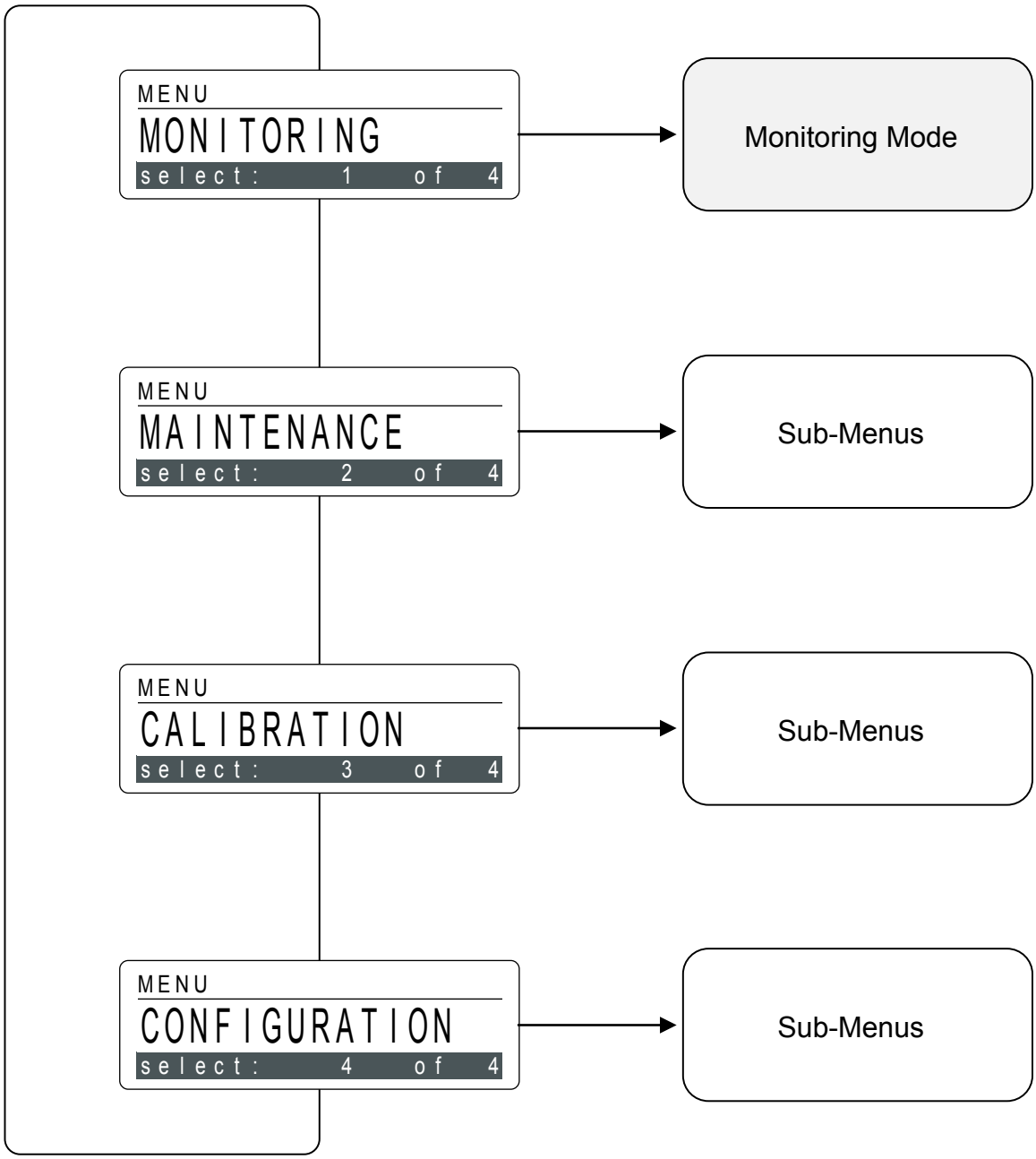


This section explains the different monitoring conditions and the submenus available under the Main Menu.

3.1 The Main Menu Screens

When the <esc> key is actuated, the instrument will leave the Monitoring Mode and go to the Main Menu. The instrument is now in the Maintenance Mode and the green LED is off. Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu. Actuate the <set> key to select a submenu. Actuate the <esc> key to go back to the Main Menu.

To return to the Monitoring Mode, go to the menu 'MONITORING' and actuate <set> to select. The display shows the monitoring screen again and the illuminated green LED indicates, that the instrument is in the Monitoring Mode.



Main Menu - Monitoring

The instrument is in the operating mode Maintenance and the green LED is off.
Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu.
Actuate the <set> key to enter the Monitoring Mode.

<Normal Condition>

This screen and the illuminated green LED indicate that the instrument is in the Monitoring Mode and is operating properly.

<Alarm 1 Condition>

This screen shows that Alarm Level 1 has been exceeded and that there is an actual gas concentration of 0.07 ppm AsH3.
(f.i. Alarm 1 set at 0.05 ppm AsH3)

<Alarm 2 Condition>

This screen shows that Alarm Level 2 has been exceeded and that there is an actual gas concentration of 0.12 ppm AsH3.
(f.i. Alarm 2 set at 0.10 ppm AsH3)

Main Menu - Maintenance

The instrument is in the Maintenance Mode and the green LED is off. Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu.
To select a submenu, actuate the <set> key to enter.

Submenus - Maintenance

Sensor Service
screen 1 of 7

Alarm Reset
screen 2 of 7

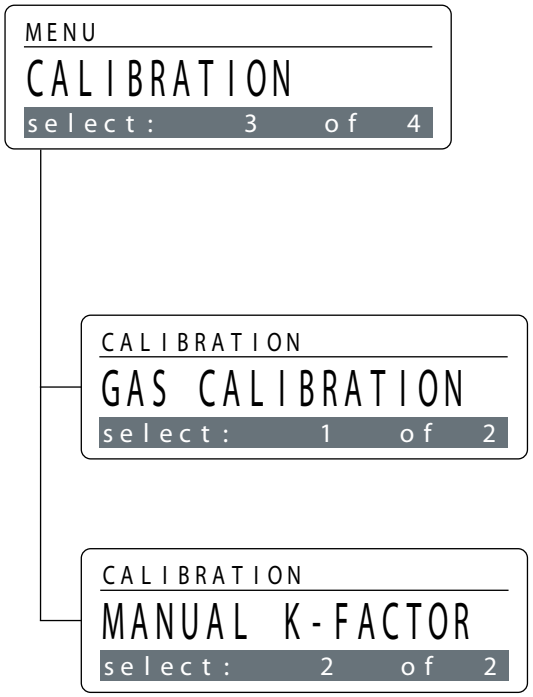
Alarm / Warn Test
screen 3 of 7

Device Infos
screen 4 of 7

Sensor Infos
screen 5 of 7

Reset Device
screen 6 of 7

Service
screen 7 of 7



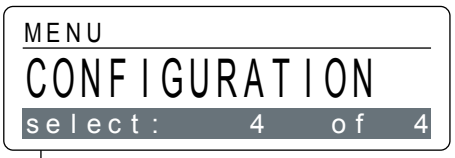
Main Menu - Calibration

The instrument is in the Maintenance Mode and the green LED is off. Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu.
To select a submenu, actuate the <set> key to enter.

Submenus - Calibration

Gas Calibration
screen 1 of 2

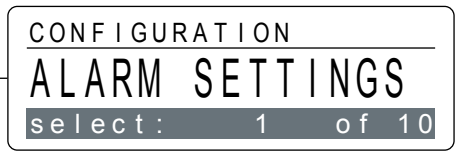
Manual K-Factor
screen 2 of 2



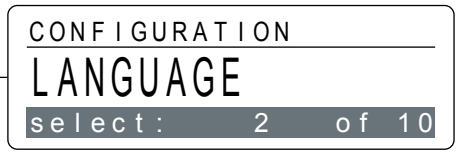
Main Menu - Configuration

The instrument is in the Maintenance Mode and the green LED is off.
Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu.
To select a submenu, actuate the <set> key to enter.

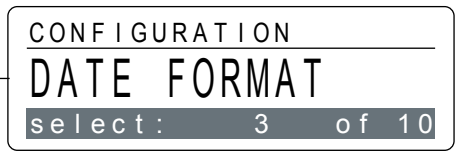
Submenus - Configuration



Alarm Settings
screen 1 of 10



Language
screen 2 of 10

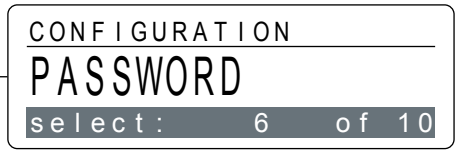


Date Format
screen 3 of 10

Auto Selftest
screen 4 of 10

! This function is not available with instruments using oxygen sensors or catalytic sensors.

Security
screen 5 of 10



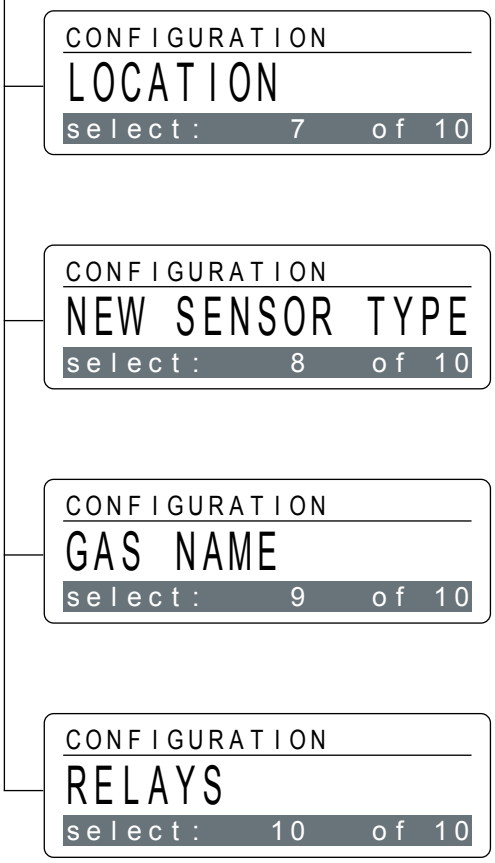
Password
screen 6 of 10

continued

Main Menu - Configuration

Submenus - Configuration

continued



Location
screen 7 of 10

New Sensor Type
screen 8 of 10

Gas Name
screen 9 of 10

Relays
screen 10 of 10

! This submenu is only available for instruments with relay option

This section explains routine maintenance procedures including sensor replacement and specific information on sensor and instrument.

Main Menu - Maintenance

The instrument is in the Maintenance Mode and the green LED is off. Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu.
To select a submenu, actuate the <set> key to enter.

Submenus - Maintenance
Sensor Service
screen 1 of 7

Alarm Reset
screen 2 of 7

Alarm / Warn Test
screen 3 of 7

Device Infos
screen 4 of 7

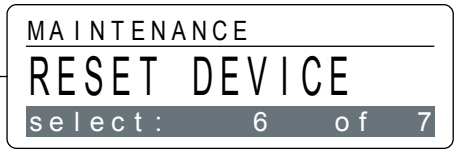
Sensor Infos
screen 5 of 7

continued

Main Menu - Maintenance

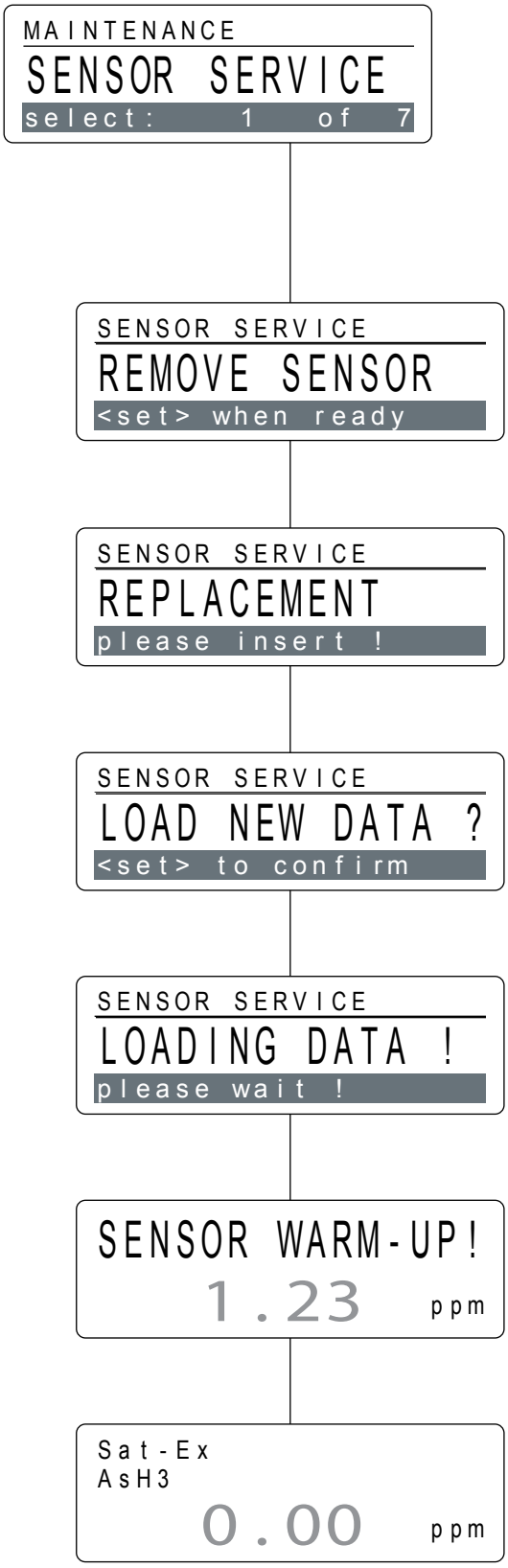
continued

Submenus - Maintenance



Reset Device
screen 6 of 7

Service
screen 7 of 7



Sensor Service

To perform a sensor replacement with a new sensor, which must have the same part number; see section 8 for Sensor Information. Use the <set> key to enter and follow the dialogue displayed at the bottom line of the screen.
When the instrument has finished the sensor service procedure, it will automatically enter the Monitoring Mode.

Remove Sensor

Remove the sensor presently installed and actuate the <set> key to proceed.

Replacement

Insert the new sensor and actuate the <set> key to continue.

Load New Data ?

If you want the data of the new sensor to be loaded, confirm this by actuating the <set> key.

Loading Data !

The new data are now loaded from the sensor into the instrument's internal memory.

<Sensor Warm-Up Condition>

A sensor warm-up is performed and this screen is shown until the displayed value is zero.
This does not apply for oxygen sensors.
The warm-up time required depends on the type of sensor.

<Normal Monitoring Condition>

The instrument will automatically switch to the Monitoring Mode when the sensor service procedure is finished.

Only instruments with catalytic sensors:
If the displayed value is not zero, a zero adjustment must be performed; refer to section 5, Calibration.

! Note:

When a new sensor is installed the K-factor will automatically revert to the default value 1.00. If individual settings are required, they must be entered again; refer to section 5, Calibration. Catalytic sensors are calibrated for methane. When monitoring for other combustible gases, a specific K-factor must be entered.

Alarm Reset

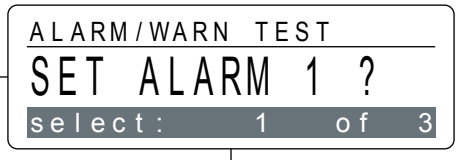
Alarm Reset allows the user to reset the alarm indication of latched alarms. An according message is sent to external alarm devices. Use the <set> key to enter and follow the dialogue displayed at the bottom of the screen. Actuate the <esc> key to exit.

Alarms Off ?

Actuate the <set> key to cofirm the reset of alarm indication with latching alarm.
For non-latching alarms, alarm indication will be reset automatically.

Alarm/Warn Test

Used to verify the alarm function of any associated external device by simulating an Alarm 1, Alarm 2, and warning condition. Use the <set> key to select or use the cursor keys <up> and <down> to continue in the menu.

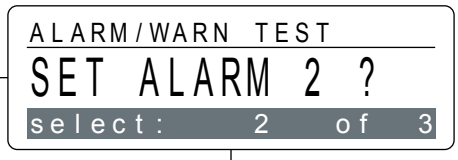


Set Alarm 1 ?

Allows the user to simulate an Alarm 1 condition. Actuate the <set> key to enter.

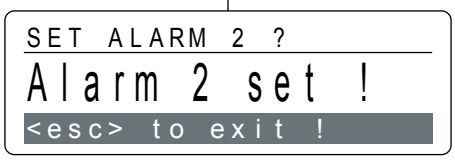
Alarm 1 set !

An Alarm 1 message is transmitted to the network and the according relay is activated. Use the <esc> key to exit.



Set Alarm 2 ?

Allows the user to simulate an Alarm 2 condition. Actuate the <set> key to enter.



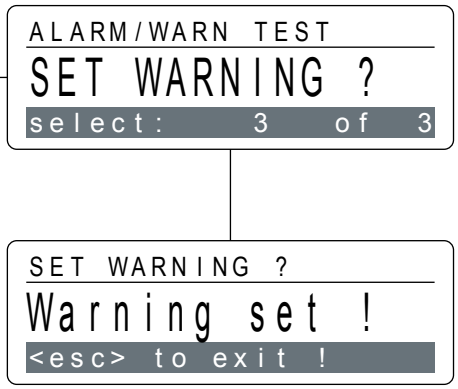
Alarm 2 set !

An Alarm 2 message is transmitted to the network and the according relay is activated. Use the <esc> key to exit.

▼ continued

continued

Alarm/Warn Test



Set Warning ?

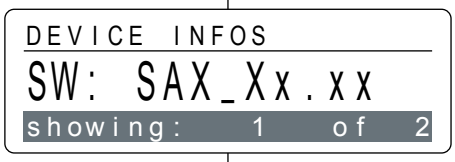
Allows the user to simulate a warning condition. Actuate the <set> key to enter.

Warning set !

A warning message is transmitted to the network and the according relay is activated, depending on the configuration. Use the <esc> key to exit.

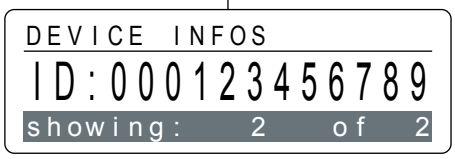
Device Infos

Used to obtain instrument specific information, i.e. software version and ID number. In general these informations are required for service purposes. Actuate the <set> key to select and move with the cursor keys <up> and <down>. Actuate the <esc> key to exit.



<Actual Software Version>

The version of the software presently installed is shown.

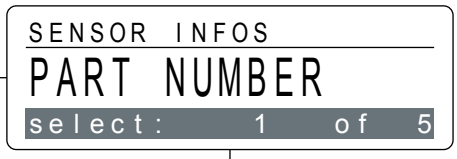


<Specific Identification Number>

The instrument's specific ID identification number is shown.

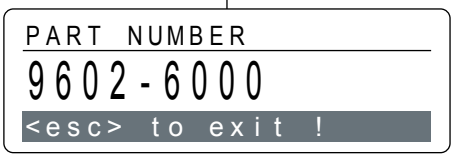
Sensor Infos

Provides specific information about the sensor presently installed, i.e. part number, serial number, date of first calibration, sensitivity, and revision number. These data are stored in the sensor's memory. Actuate the <set> key to select or use the cursor keys <up> and <down> to continue in the menu.



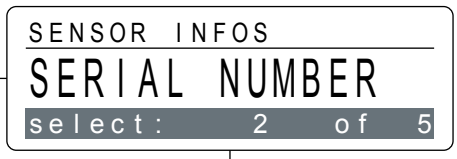
Part Number

Actuate the <set> key to display the part number of the sensor presently installed.



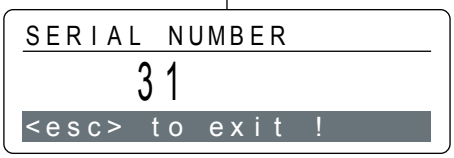
<Actual Sensor Part Number>

Use this information to order replacement sensors. Additional order information is provided in Section 8, Sensor Order Information.
Actuate <esc> to leave.



Serial Number

Actuate the <set> key to display the serial number of the sensor presently installed.

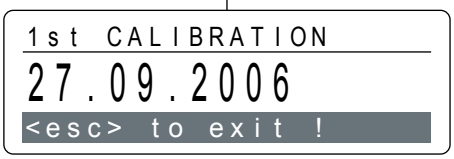


<Actual Sensor Serial Number>

This information may be required for service purposes.
Actuate the <esc> key to leave.

First Calibration

Use the <set> key to display the date when the installed sensor was calibrated for the first time.



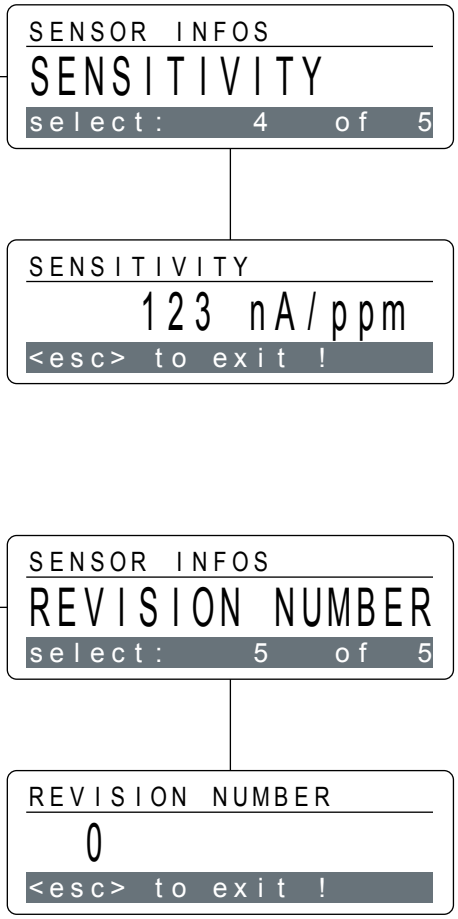
<Date of First Calibration>

This information may be required for service purposes and to check the age of the sensor.
Actuate <esc> to leave.

continued

continued

Sensor Infos



Sensitivity

Use the <set> key to display the sensor sensitivity determined during the first calibration.

<Actual Sensitivity>

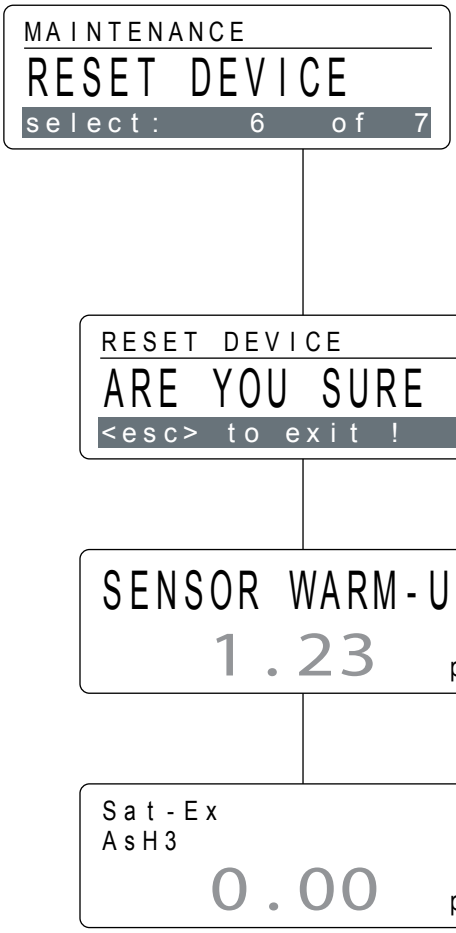
This information may be required for service purposes. Actuate the <esc> key to leave.

Revision Number

Use the <set> key to display the revision number of the gas related information stored in the sensor's memory.

<Actual Revision Number>

This information may be required for service purposes. Actuate the <esc> key to leave.

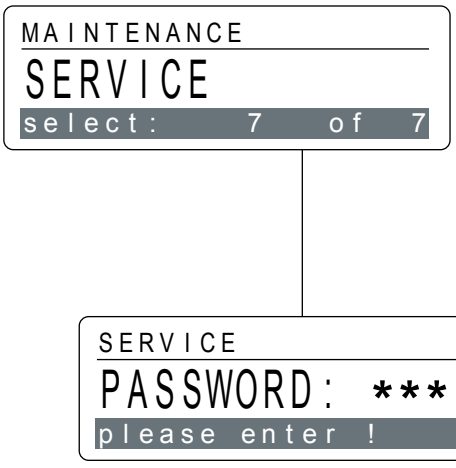


Reset Device
Offers the possibility to perform a "warm start" of the instrument. Actuate the <set> key to select.

Are You Sure ?
This screen is to confirm that a software reset should be performed. Actuate the <set> key to confirm or use the <esc> key to exit.

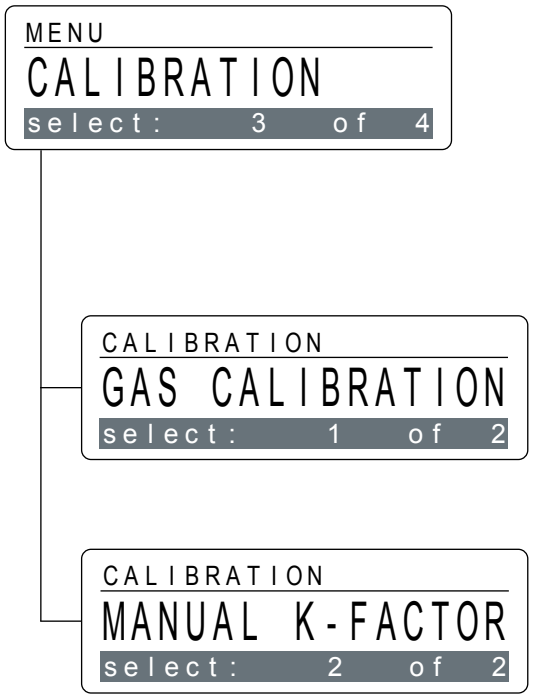
<Sensor Warm-Up Condition>
A sensor warm-up is performed and this screen is shown until the displayed value is zero, except for Oxygen sensors. The warm-up time depends on the type of sensor.

<Normal Monitoring Condition>
The instrument will automatically switch to the Monitoring Mode when the sensor service procedure is finished.



Service
This submenu is used exclusively by trained service personnel. The functions are password protected.

This section describes calibration procedures for the Sat-Ex.
Calibration can be performed either automatically using a dynamic gas calibration or manually by entering a calculated correction factor called K-factor.



Main Menu - Calibration
The instrument is in the Maintenance Mode and the green LED is off.
Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu.
To select a submenu, actuate the <set> key to enter.

Submenus - Calibration
Gas Calibration
screen 1 of 2

Manual K-Factor
screen 2 of 2

! Note:
If a high degree of accuracy in monitoring is required, monthly calibration with calibration gas of a known concentration is recommended.

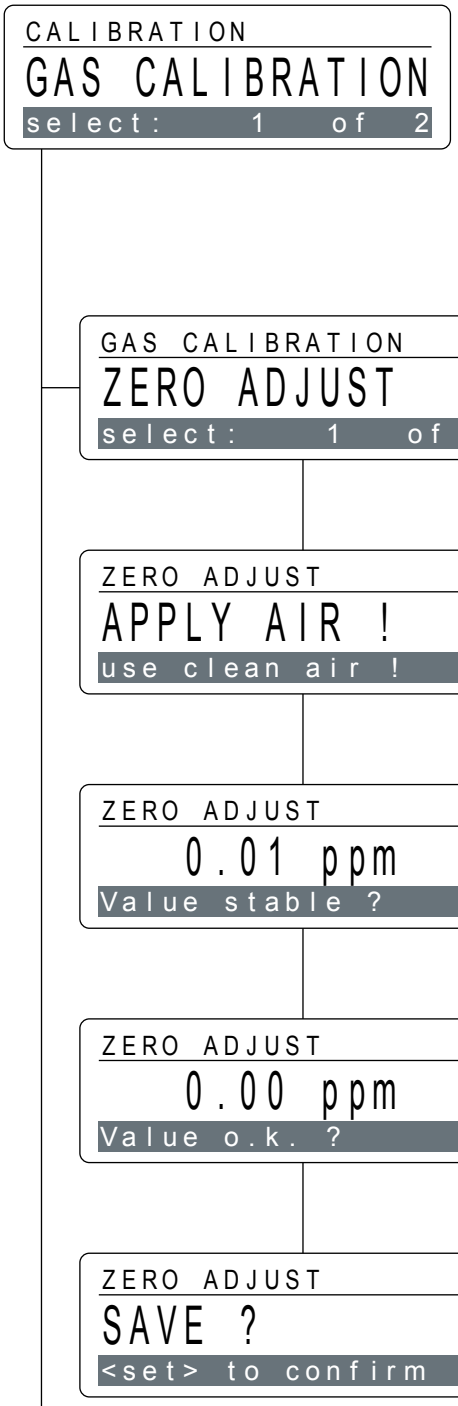
When performing a dynamic calibration, a new correction factor (K-factor) is calculated automatically. The actual value can be displayed in the submenu Manual K-Factor.

Use appropriate safety precautions when handling toxic or corrosive gases and properly vent, if possible.

! Instruments with CATALYTIC sensors:
Zero Adjustment must be performed prior to start–up.
It is recommended to repeat Zero Adjustment every 4 to 6 weeks.

Catalytic sensors must be protected from silicone vapours, which may permanently reduce the sensor's sensitivity.

! Instruments with OXYGEN sensors:
Span Adjustment must be performed prior to start-up.
It is recommended to repeat Span Adjustment every 4 to 6 weeks.



Gas Calibration

The gas calibration submenu is used for dynamic calibration. For zero adjustment use clean or synthetic air free from measuring gas or any other interfering gases. The sensor must be warmed-up before calibration.
For span adjustment it is recommended to use test gas of a known concentration at or slightly above the TLV for the target gas. Always keep to the correct sequence, first perform zero adjustment, then Span Adjustment.

Zero Adjust

Zero adjustment applies for all sensors except oxygen sensors. Use the <set> key to enter and follow the dialogue displayed.

Apply Air !

Apply clean or synthetic air to the sensor and actuate the <set> key to continue.

<Actual Zero Point>

Allow the zero reading to stabilize. If the reading is already zero, zero adjustment is not necessary. Actuate the <esc> key to exit. If the reading is not zero, actuate the <set> key to re-adjust the zero point and to continue the procedure.

<Re-adjusted Zero Point>

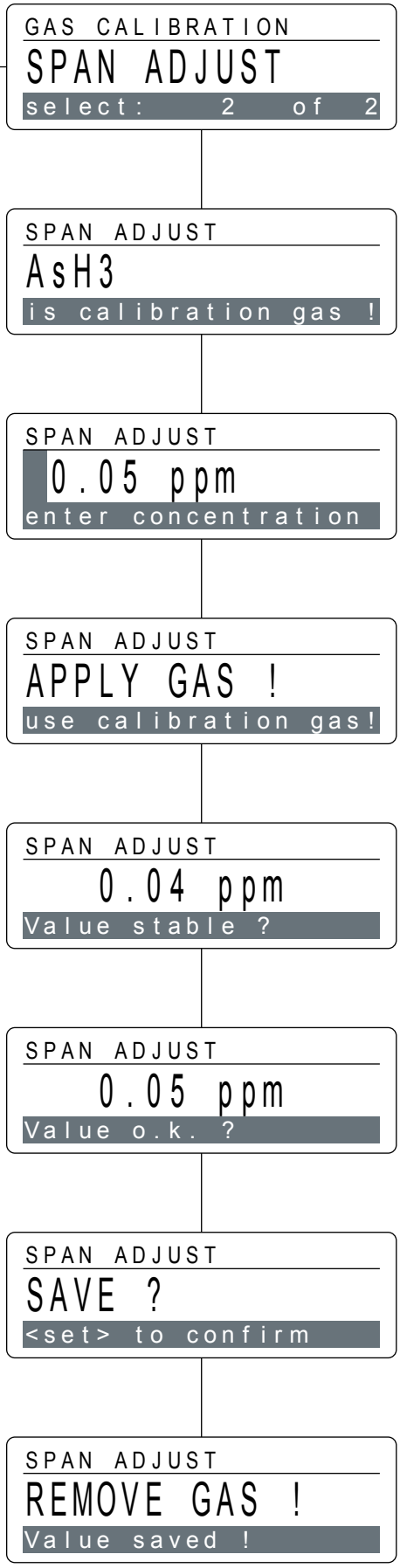
The reading is zero. Actuate the <set> key to proceed.

Save ?

Actuate the <set> key to save the new zero point and store it in the unit's internal memory.

Gas Calibration

continued



Span Adjust

Span adjustment applies for all sensors, including oxygen sensors. Use the <set> key to enter and follow the dialogue displayed.

<Actual Calibration Gas>

The instrument shows which calibration gas is required for the actual sensor type.

<Actual Concentration for Calibration>

The recommended concentration for span adjustment is displayed. Default value is TLV concentration for the target gas,. 20 % LEL for catalytic sensors. When using calibration gas of a different concentration, change the value accordingly. After the new value has been entered, actuate the <set> key to continue.

Apply Gas !

Place the calibration cap over the sensor and start the calibration gas flow (18 l/h or 300 ccm/min).
Actuate the <set> key to continue.

<Actual Span Value>

Allow the reading to stabilize. If the reading matches the concentration of the calibration gas, span adjustment is not necessary. Actuate the <esc> key to exit.
If the reading does not match the concentration of the calibration gas, actuate the <set> key to re-adjust the span value and to continue the procedure.

<Re-adjusted Span Value>

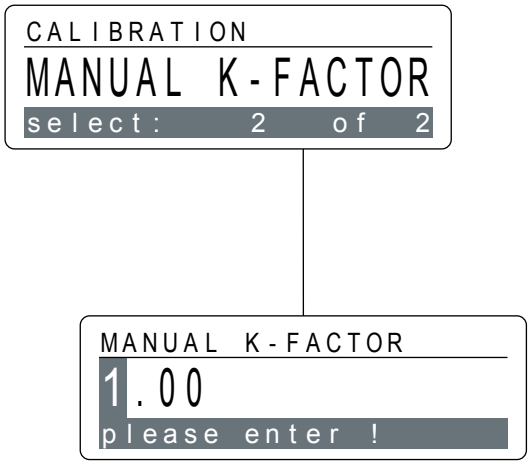
The reading matches the concentration of the calibration gas. Actuate the <set> key to proceed.

Save ?

Actuate the <set> key to save the new span value and store it in the unit's internal memory.

Remove Gas !

Stop the calibration gas flow. Remove gas and calibration cap. Allow several minutes for the sensor to clear.



Manual K-Factor

This submenu is used to manually calibrate the instrument by entering a new K-factor. This factor is a multiplication or correction value used to calibrate the response of the instrument to a specific gas concentration.
The factory default K-Factor for all gases is 1.00.
Use the <set> key to enter. The instrument will display the actual Kfactor.

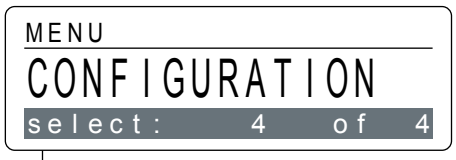
<Actual K-Factor>

Use the cursor keys <left> or <right> to reach the desired position. Use the cursor keys <up> and <down> to select the figures you wish to enter. The K-factor must be in the range of 0.20 and 5.00.
After a new value has been entered, actuate the <set> key to confirm or <esc> to exit.

! Note:
Individual settings for the manual K-factor will automatically revert to the default value 1.00, whenever the sensor is replaced by a new sensor.

! Only instruments using catalytic sensors:
Catalytic sensors are calibrated for methane. When monitoring for other combustible gases, a specific K–factor must be entered.

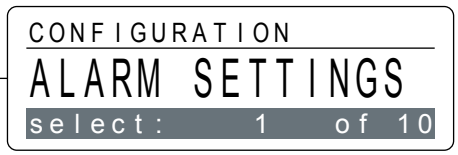
This section describes the instrument's default configuration and procedures how to adapt it to individual requirements.



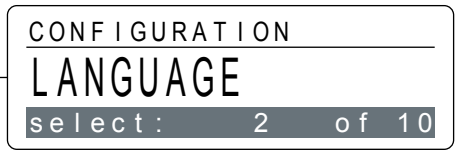
Main Menu - Configuration

The instrument is in the Maintenance Mode and the green LED is off.
Actuate the cursor keys <up> or <down> to move forwards and backwards in the Main Menu.
To select a submenu, actuate the <set> key to enter.

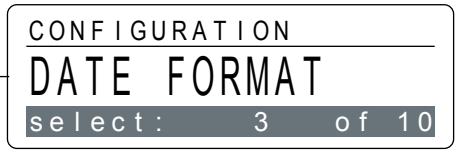
Submenus - Configuration



Alarm Settings
screen 1 of 10



Language
screen 2 of 10



Date Format
screen 3 of 10

Auto Selftest
screen 4 of 10

! This function is not available with instruments using oxygen sensors or catalytic sensors.

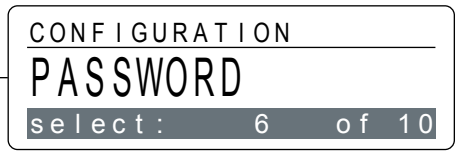
Security
screen 5 of 10

continued

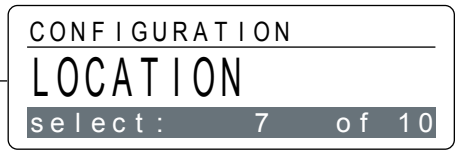
continued

Main Menu - Configuration

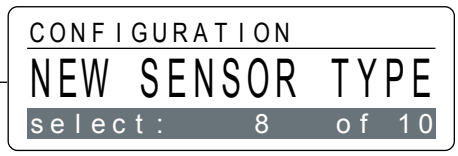
Submenus - Configuration



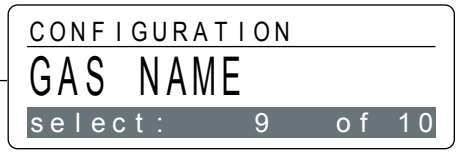
Password
screen 6 of 10



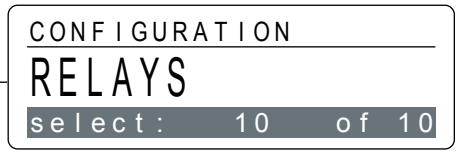
Location
screen 7 of 10



New Sensor Type
screen 8 of 10



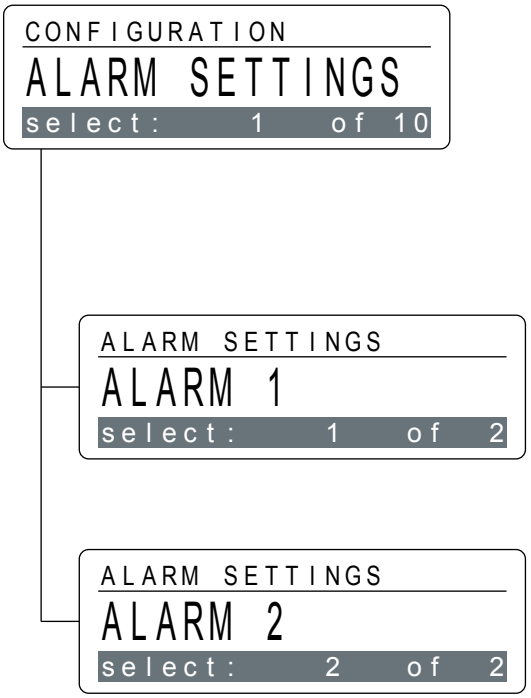
Gas Name
screen 9 of 10



Relays
screen 10 of 10

! This submenu is only available for instruments with relay option.

! Note:
Individual settings for alarm levels and gas name will automatically revert to the factory programmed settings, whenever a new sensor type with a part number different from the part number of the sensor used before is installed.



Alarm Settings

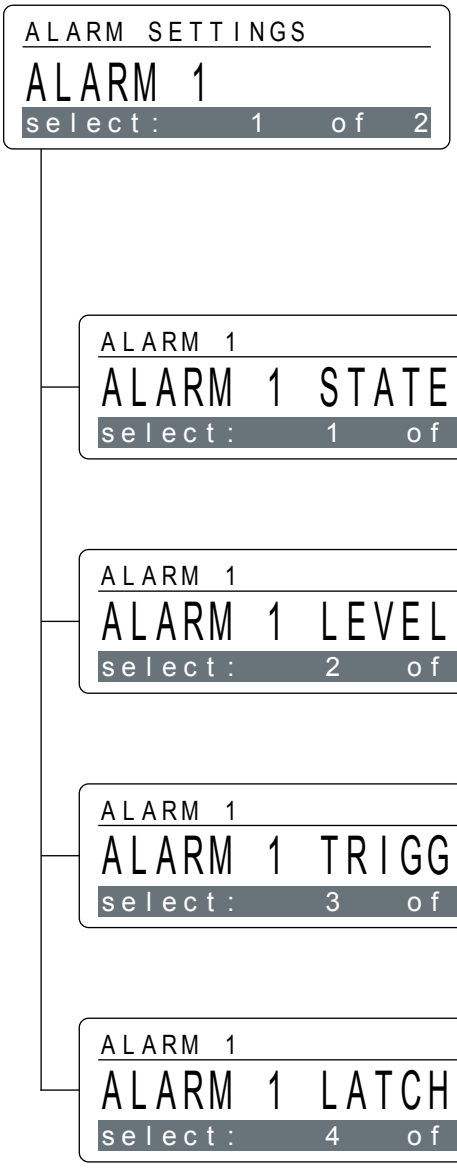
Allows the user to enter or change various settings for Alarm 1 and Alarm 2 activation.
Use the <set> key to enter.

Alarm 1

For Alarm 1 settings, use the <set> key to enter or continue in the menu with the cursor keys <up> or <down>.

Alarm 2

For Alarm 2 settings, use the <set> key to enter or continue in the menu with the cursor keys <up> or <down>.



Alarm 1

Allows the user to configure all parameters for Alarm 1 (lower alarm level) activation.

Alarm 1 State

Used to enable / disable the Alarm 1 activation.

Alarm 1 Level

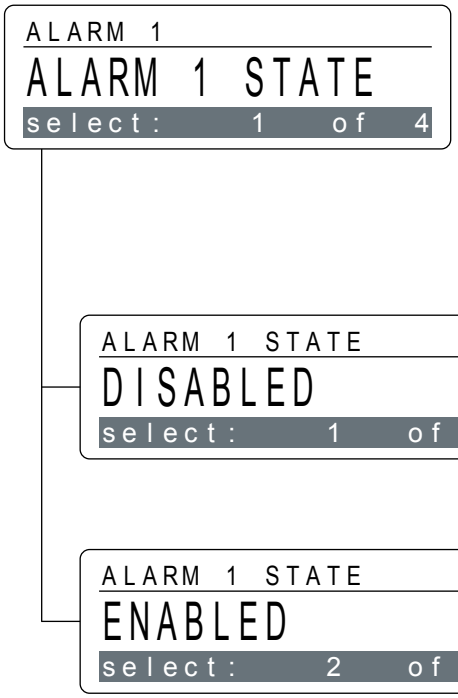
Used to set individual alarm levels for Alarm 1 activation.

Alarm 1 Trigger

Used to define the trigger condition for Alarm 1 activation.

Alarm 1 Latch

Used to define the Alarm 1 activation to be latching or non-latching.



Alarm 1 State

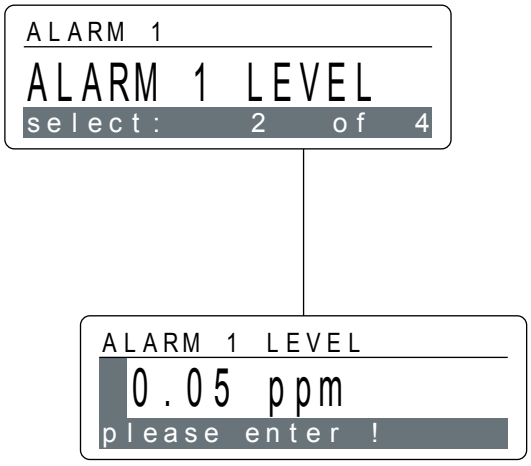
Used to enable / disable the Alarm 1 activation. Default setting is enabled. Use the <set> key to enter. The instrument will show the actual setting.

Disabled

Allows the user to turn off the Alarm 1 activation. Actuate the cursor keys <up> or <down> to change. Actuate the <set> key to confirm or <esc> to exit.

Enabled

Allows the user to turn on the Alarm 1 activation. Actuate the cursor keys <up> or <down> to change. Actuate the <set> key to confirm or <esc> to exit.

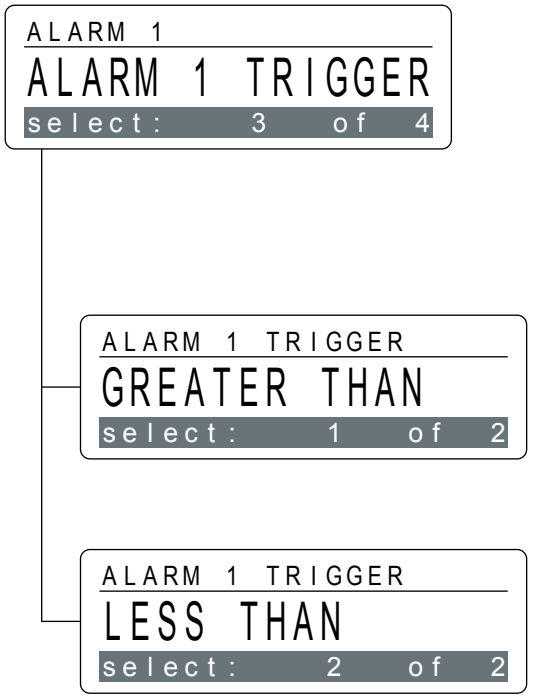


Alarm 1 Level

Used to set individual alarm levels for Alarm 1 activation. Default setting is 1 x TLV respectively 20 % LEL for the target gas. Actuate the <set> key to enter and show the actual setting.

<Actual Alarm 1 Level>

To change the value, use the cursor keys <left> or <right> to reach the desired position. Use the cursor keys <up> and <down> to select the figures you wish to enter. After the new value has been entered, actuate the <set> key to confirm or <esc> to exit.



Alarm 1 Trigger

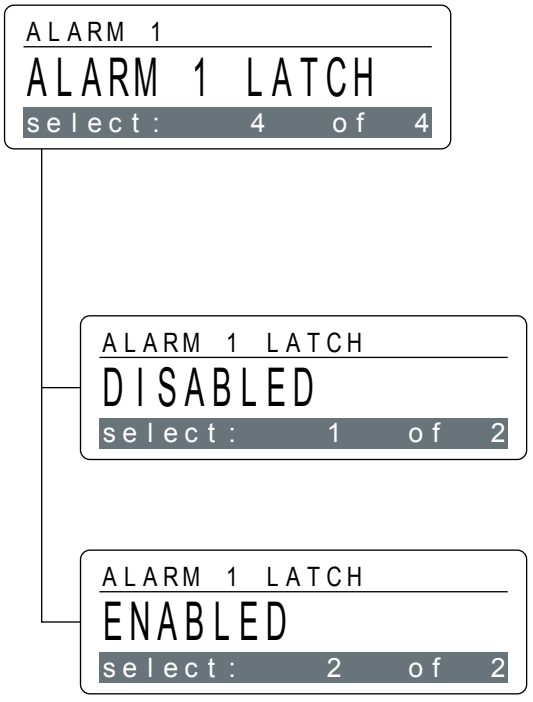
Used to define the trigger condition for Alarm 1 activation. Default setting is Greater Than. Use the <set> key to enter. The instrument will show the actual setting.

Greater Than

Defines that an Alarm 1 condition will be indicated when the actual gas concentration exceeds the preset level for Alarm 1.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Less Than

Defines that an Alarm 1 condition will be indicated when the actual gas concentration falls below the preset level for Alarm 1.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



Alarm 1 Latch

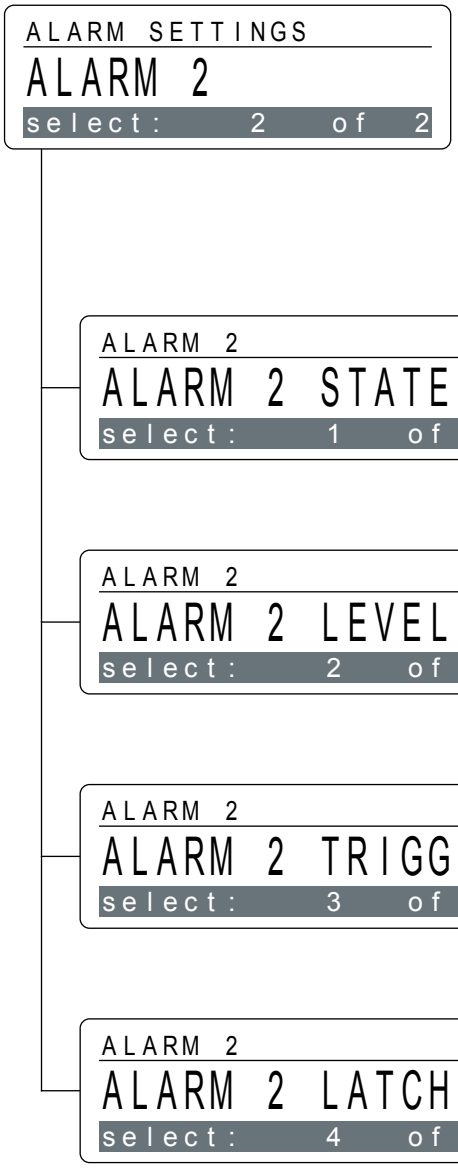
Used to define the Alarm 1 activation to be latching or non-latching.
Default setting is enabled. Use the <set> key to enter. The instrument will show the actual setting.
When enabled, alarm reset must be done manually.
Non-latching alarms will be reset automatically, upon correction of the alarm condition.

Disabled

Defines the Alarm 1 activation to be non-latching.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Enabled

Defines the Alarm 1 activation to be latching.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



Alarm 2

Allows the user to configure all parameters for Alarm 2 (upper alarm level) activation.
For all subsequent Alarm 2 settings, please follow the procedures described in the corresponding section for Alarm 1 settings.

Alarm 2 State

Used to enable / disable the Alarm 2 activation.

Alarm 2 Level

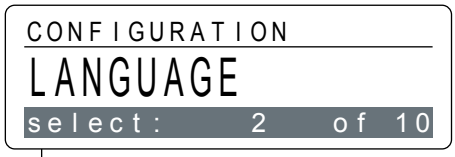
Used to set individual alarm levels for Alarm 2 activation.

Alarm 2 Trigger

Used to define the trigger condition for Alarm 2 activation.

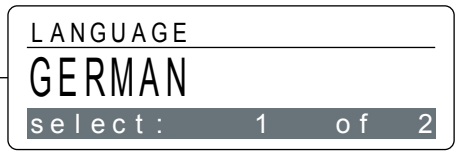
Alarm 2 Latch

Used to define the Alarm 2 activation to be latching or non-latching.



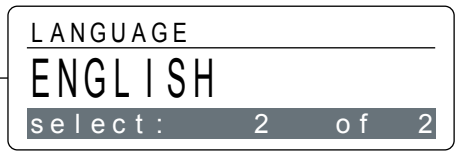
Language

Used to select the desired language for menu operation. Default setting is English.
Use the <set> key to enter. The instrument will display the actual language.



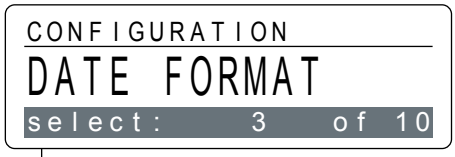
German

Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



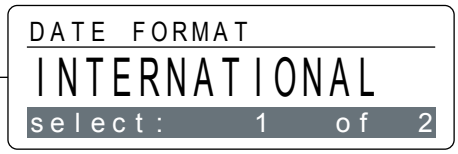
English

Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



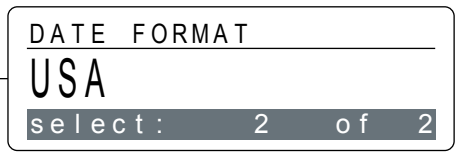
Date Format

Used to define the format how to display the date (only used in the submenu Sensor Infos, Date of First Calibration). Default setting is International.
Use the <set> key to enter. The actual date format is displayed.



International

International date format is DD.MM.YYYY
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



USA

USA date format is MM-DD-YYYY
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Auto Selftest

The instrument's self-diagnostics provides an on-line preventive sensor selftest performed automatically every 24 hours, which may be enabled or disabled. Default setting is enabled.
The Auto Selftest function is not applicable for Oxygen sensors. Use the <set> key to enter. The display will show the actual setting.
The function Auto Selftest is not available with instruments using oxygen sensors or catalytic sensors.

Disabled

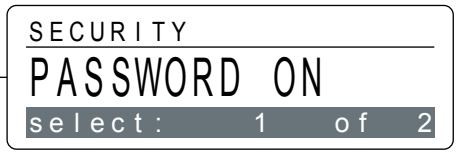
Allows the user to turn off the Auto Selftest.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Enabled

Allows the user to turn on the Auto Selftest.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Security

Exiting the Monitoring Mode and entering the Maintenance Mode, may be password protected, to prevent the instrument from manipulations by unauthorized personnel. Ex factory the password protection is disabled. Use the <set> key to enter. The instruments shows the actual setting.

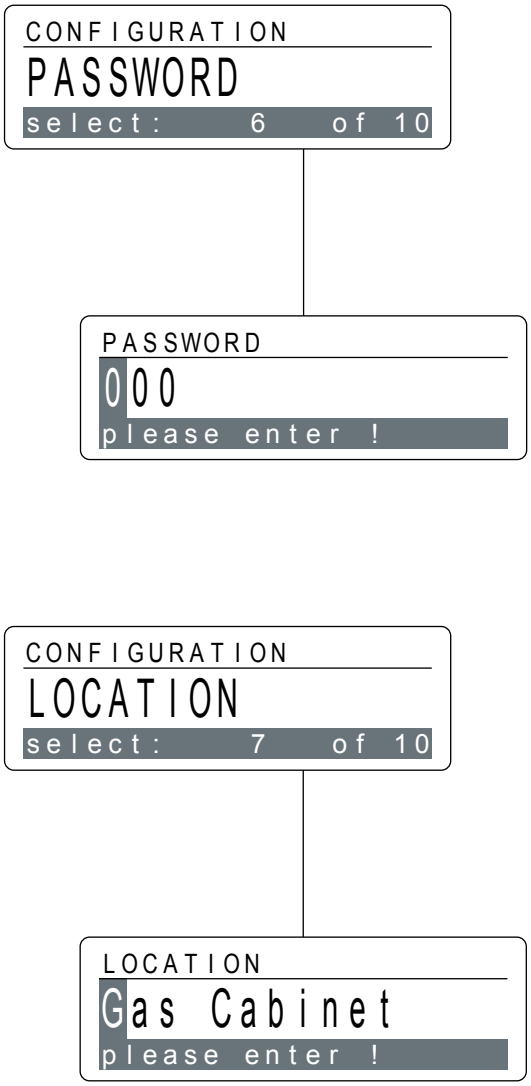


Password On

Allows the user to enable the password protection.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Password Off

Allows the user to disable the password protection.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



Password

Allows the user to enter or change the password. Ex factory the password is <000>.
Use the <set> key to enter. The instrument will display the actual password.

<Actual Password>

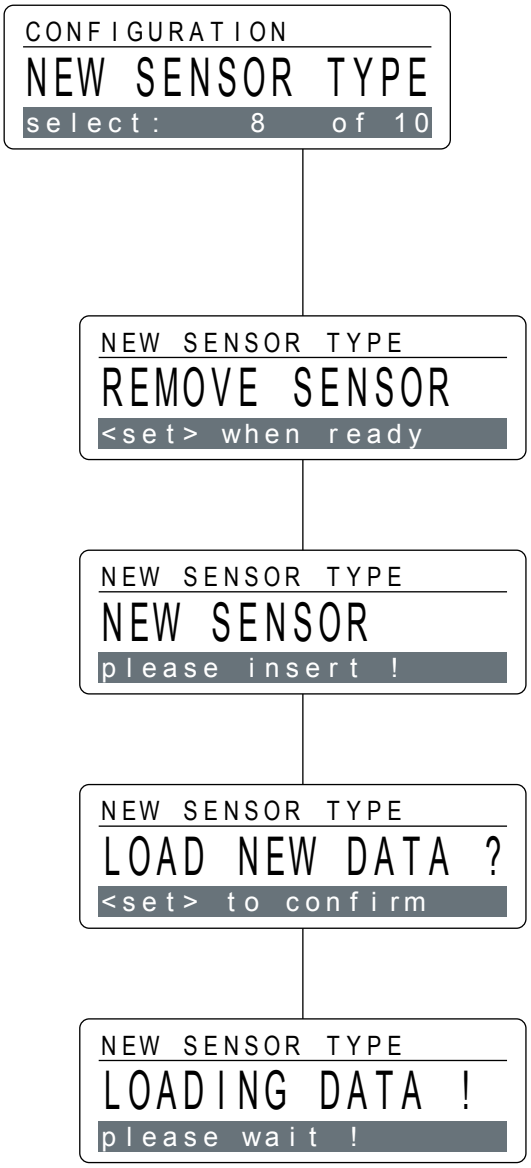
To change the password, use the cursor keys <left> or <right> to reach the desired position. Use the cursor keys <up> and <down> to select the figures you wish to enter. After the new password has been entered, actuate the <set> key to confirm or <esc> to exit.

Location

Allows the user to enter a desciption defining the monitoring point. Ex factory it reads <Sat-Ex>. Up to 13 alphanumeric characters may be entered.
Use the <set> key to enter. The instrument will display the actual location.

<Actual Location>

Use the cursor keys <left> or <right> to reach the desired position. Use the cursor keys <up> and <down> to select the characters you wish to enter. When the new location has been entered completely, actuate the <set> key to confirm or <esc> to exit.



New Sensor Type

Allows the user to configure the instrument for a new sensor type with a part number, which is different from the one presently used. See section 8 for Sensor Information. Actuate the <set> key to enter and follow the dialogue displayed.

Remove Sensor

Remove the sensor presently installed and actuate the <set> key to proceed.

New Sensor

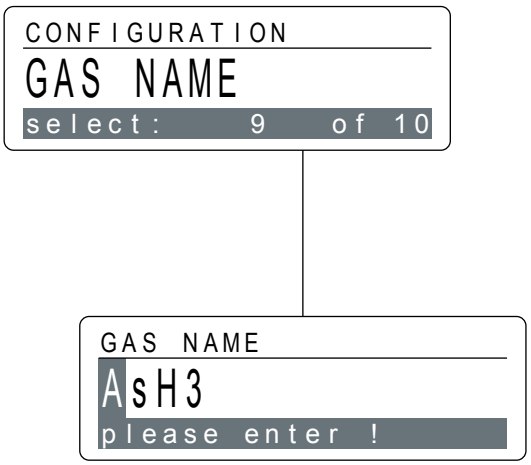
Insert the new sensor and actuate the <set> key to proceed.

Load New Data ?

If you want the data of the new sensor to be loaded, confirm this by actuating the <set> key.

Loading Data !

The instrument is now loading the new data from the sensor into the unit's internal memory.

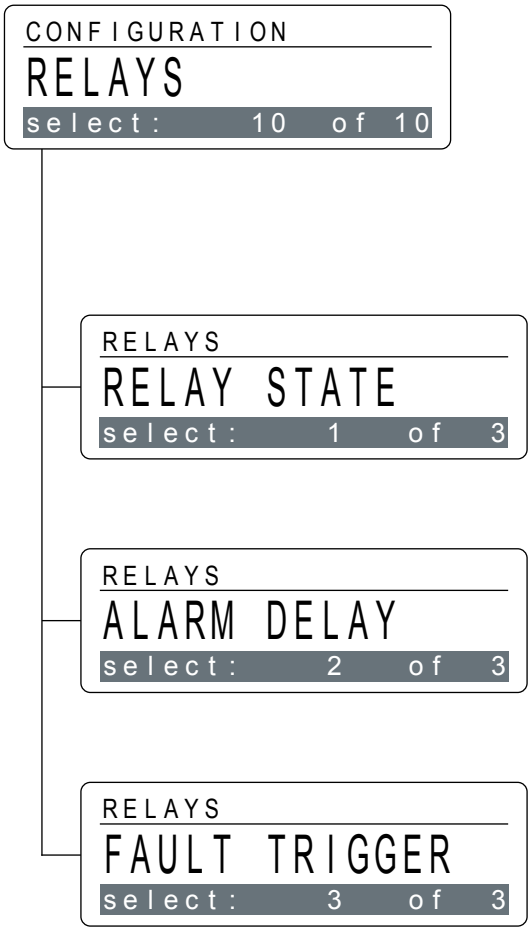


Gas Name

Allows the user to enter a different gas name than the one stored in the sensor's data memory.
Up to 7 alpha-numeric characters may be entered. Use the <set> key to enter. The instrument will display the actual gas name.

<Actual Gas Name>

Use the cursor keys <left> or <right> to reach the desired position. Use the cursor keys <up> and <down> to select the characters you wish to enter. When the new gas name has been entered completely, actuate the <set> key to confirm or <esc> to exit.



Relays

Allows the user to enter or change various settings for the internal relay contacts for Alarm 1, Alarm 2, and Fault. Use the <set> key to enter.

Relay State

Used to individually define the relays to be either deenergized (normally open contact) or energized (normally closed contact). Use the <set> key to enter or continue in the menu with the cursor keys <up> or <down>.

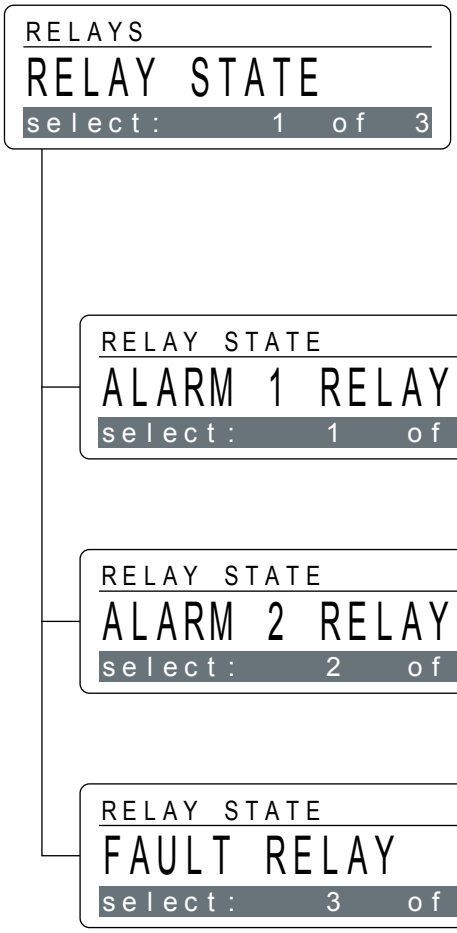
Alarm Delay

Used to set a delay for the relay activation in case of concentration alarms. Use the <set> key to enter or continue in the menu with the cursor keys <up> or <down>.

Fault Trigger

Used to define the trigger conditions for activation of the Fault Relay.
Use the <set> key to enter or continue in the menu with the cursor keys <up> or <down>.

! Note:
The RELAYS menu and all subsequent menu items are only available for instruments with relay option.



Relay State

Used to individually define the Alarm 1, Alarm 2, and Fault Relay to be either deenergized (normally open contact) or energized (normally closed contact).
Ex factory the relays are deenergized (normally open contacts). Use the <set> key to enter.

Alarm 1 Relay

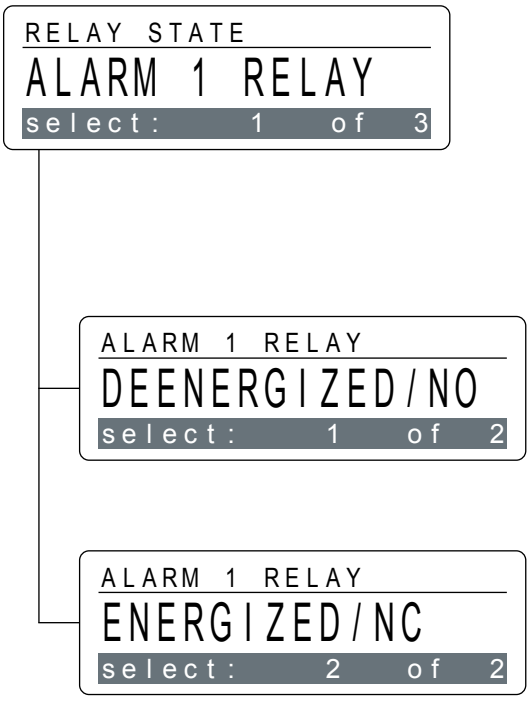
Allows to set the Alarm 1 Relay state.

Alarm 2 Relay

Allows to set the Alarm 2 Relay state.

Fault Relay

Allows to set the Fault Relay state.



Alarm 1 Relay

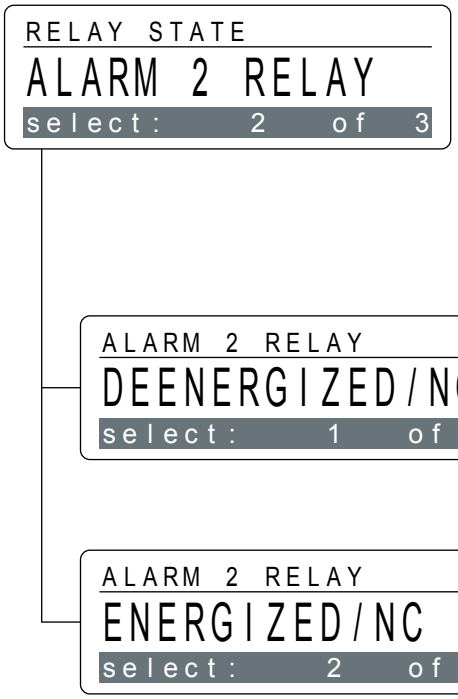
Allows the user to set the Alarm 1 Relay state.
Use the <set> key to enter.
The instrument will show the actual setting.

Deenergized / NO

Defines the Alarm 1 Relay to be deenergized (normally open contact).
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Energized / NC

Defines the Alarm 1 Relay to be energized (normally closed contact).
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



Alarm 2 Relay

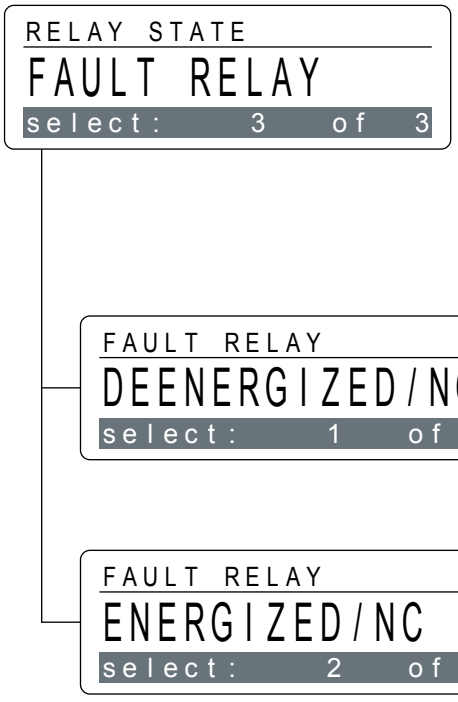
Allows the user to set the Alarm 2 Relay state.
Use the <set> key to enter.
The instrument will show the actual setting.

Deenergized / NO

Defines the Alarm 2 Relay to be deenergized (normally open contact).
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Energized / NC

Defines the Alarm 2 Relay to be energized (normally closed contact).
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.



Fault Relay

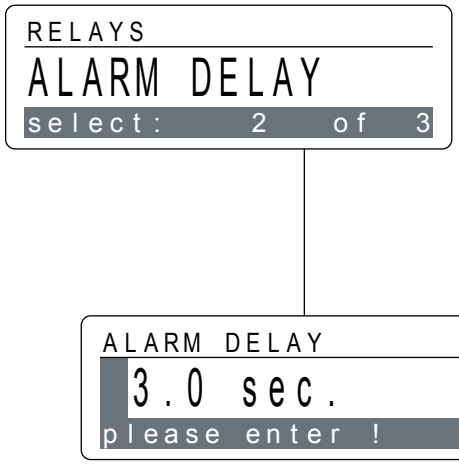
Allows the user to set the Fault Relay state.
Use the <set> key to enter.
The instrument will show the actual setting.

Deenergized / NO

Defines the Fault Relay to be deenergized (normally open contact).
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Energized / NC

Defines the Fault Relay to be energized (normally closed contact).
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

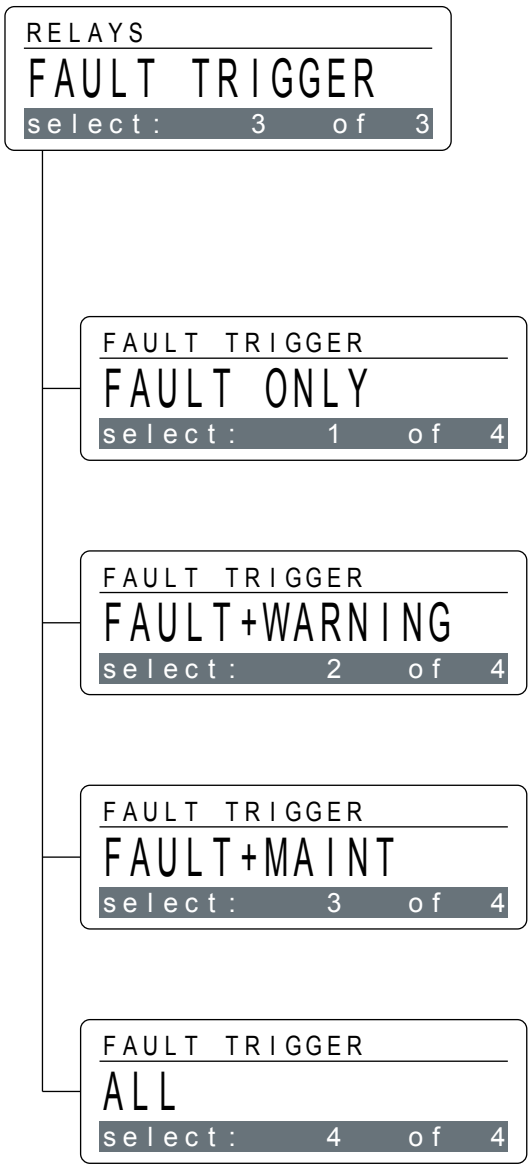


Alarm Delay

Used to define an alarm delay for concentration alarms. Minimum value is 0, maximum setting is 99.9 seconds. Default setting is 3.0 seconds.
Actuate the <set> key to enter and show the actual setting.

<Actual Alarm Delay>

To change the value, use the cursor keys <left> or <right> to reach the desired position.
Use the cursor keys <up> and <down> to select the figures you wish to enter.
After the new value has been entered, actuate the <set> key to confirm or <esc> to exit.



Fault Trigger

Allows the user to define, which fault conditions will activate the Fault Relay.
Ex factory the setting is Fault Only.
Use the <set> key to enter.
The instrument will show the actual setting.

Fault Only

Used to configure the Fault Relay to be activated in case of a fault condition only.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Fault + Warning

Used to configure the Fault Relay to be activated in case of a fault or warning condition only.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

Fault + Maintenance

Used to configure the Fault Relay to be activated in case of a fault or maintenance condition only.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

All

Used to configure the Fault Relay to be activated in case of a fault, warning, or maintenance condition.
Actuate the cursor keys <up> or <down> to change.
Actuate the <set> key to confirm or <esc> to exit.

This section will help to determine the source of a fault or warning condition and will provide a corrective action.

7.1 Warning and Fault Messages

Warning and Fault are two different kinds of messages, which require different attention.
For any message not explained in this section or any other assistance required, please do not hesitate to contact our service department.

7.1.1 Warnings

A warning condition indicates that the instrument requires some attention, but is still able to monitor and operate as programmed.

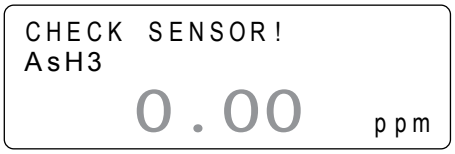
The following will occur when the instrument detected a warning condition:

- the green status LED is flashing
- a warning message is sent to the communication network
- the fault relay is activated, relays and their appropriate configuration provided.

Actuate the <set> key to acknowledge and reset a Warning Condition.

Low Zero !

This message indicates that the zero point of the sensor is out of the optimum range.
To correct this problem, check the zero adjustment and recalibrate, if necessary.



Check Sensor !

This message indicates that the sensor sensitivity does not comply with the specifications.
The sensor must soon be replaced.

Whilst most sensors will work for another 2-6 weeks, there are circumstances that may cause an earlier failure of the sensor cell. Honeywell therefore suggests that customers with more critical needs carry out the replacement of the sensor cell within 3 days (72 hours) of receiving the "check sensor" message.

To receive this message, the function Auto Selftest must be enabled; refer to Section 6, Configuration.
This function is not available for instruments with oxygen sensor or catalytic sensor.

7.1.2 Faults

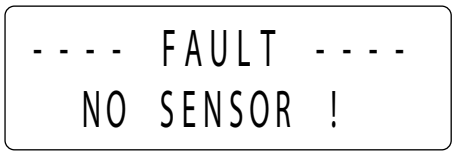
Instrument faults refer to a problem which prevents the instrument from operating properly and interferes with the ability to monitor or document concentration alarms.

When the Sat-Ex has detected an instrument fault, a fault message for each different fault condition is sent to the communication network. The green status LED is off and the fault relay is activated. The LCD display is flashing while indicating the specific fault message.

For instruments with relay option the fault relay is activated additionally.

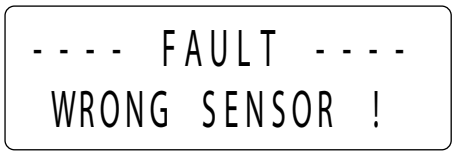
Fault - Electronics !

This indicates that there is a problem with the internal electronics. The AD Converter has failed. Switch power supply for this unit off and on again. If the instrument still shows this message, switch off power supply for this unit and contact our service department for further instructions.



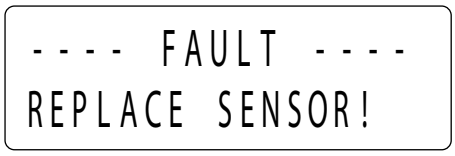
Fault - No Sensor !

This message indicates that no sensor is or a sensor type not suitable for Sat-Ex instruments is fitted.
To eliminate the problem, insert an appropriate sensor.
If the Sat-Ex is operated with a sensor extension, this fault message may also be caused by a bad connection. Make sure all connections are firmly attached.



Fault - Wrong Sensor !

This message indicates that the sensor installed is not the sensor assigned to this particular instrument.
To correct the problem, insert the sensor assigned and documented to this instrument. The data are stated in the test certificate provided with the shipment.



Fault - Replace Sensor !

This message indicates that the sensor presently installed is depleted (the warning CHECK SENSOR ! has been ignored). To correct the problem, replace the old sensor immediately.

This function is not available for instruments with oxygen sensor or catalytic sensor.

8.1 Sensor Order Information (page 1 of 2)

Substance / Sensor		Part No. Sensor	Nominal Range	Unit	Comments
8.1.1 Toxic and Corrosive Gases - not for Sat-Ex C-Versions					
AsH3	Arsine (3 El.)	9602-6004	0 ... 1.00	ppm	
AsH3	Arsine (2 El.)	9602-6000	0 ... 1.00	ppm	special application
AsH3	Arsine (2 El.)	9602-6002	0 ... 10.0	ppm	special application
B2H6	Diborane	9602-6202	0 ... 1.00	ppm	
Br2	Bromine	9602-6800	0 ... 5.00	ppm	
Cl2	Chlorine	9602-5300	0 ... 5.00	ppm	
ClF3	Chlorine Trifluoride	9602-7410	0 ... 1.00	ppm	
ClO2	Chlorine Dioxide	9602-7400	0 ... 1.00	ppm	
CO	Carbon Monoxide	9602-5400	0 ... 500	ppm	
COCl2	Phosgene	9602-6600	0 ... 1.00	ppm	
C2H4O	Ethylene Oxide	9602-8000	0 ... 20.0	ppm	
F2	Fluorine	9602-6400	0 ... 5.00	ppm	
F2	Fluorine	9602-6401	0 ... 30	ppm	
GeH4	Germane	9602-6902	0 ... 5.0	ppm	
H2	Hydrogen (1 %)	9602-5100	0 ... 1.000	% vol.	
H2	Hydrogen (4 %)	9602-5101	0 ... 4.00	% vol.	special range
H2S	Hydrogen Sulfide	9602-5200	0 ... 100	ppm	
H2S	Hydrogen Sulfide (org.)	9602-5201	0 ... 30.0	ppm	special application
H2Se	Hydrogen Selenide	9602-5601	0 ... 5.00	ppm	
HBr	Hydrogen Bromide	9602-7000	0 ... 30.0	ppm	
HCl	Hydrogen Chloride	9602-5800	0 ... 30.0	ppm	
HCl	Hydrogen Chloride	9602-5802	0 ... 15.0	ppm	
HCN	Hydrogen Cyanide	9602-5700	0 ... 30.0	ppm	
HF	Hydrogen Fluoride	9602-6500	0 ... 10.0	ppm	
HMDS	Hexamethyldisilazane	9602-6711	0 ... 0.500	% vol.	
HMDS	Hexamethyldisilazane	9602-6712	0 ... 500	ppm	
N2H4	Hydrazine	9602-7600	0 ... 1.00	ppm	
NH3	Ammonia (1000 ppm)	9602-6705	0 ... 1000	ppm	
NH3	Ammonia (100 ppm)	9602-6704	0 ... 100	ppm	
NO	Nitric Oxide	9602-7200	0 ... 250	ppm	
NO2	Nitrogen Dioxide	9602-7300	0 ... 25.0	ppm	
O3	Ozone	9602-7100	0 ... 1.00	ppm	
O3	Ozone	9602-7101	0 ... 1.00	ppm	
PH3	Phosphine (3 El.)	9602-6102	0 ... 1.00	ppm	
PH3	Phosphine (2 El.)	9602-6100	0 ... 1.00	ppm	special application
SiH4	Silane	9602-6301	0 ... 50.0	ppm	
SO2	Sulfur Dioxide	9602-5900	0 ... 25.0	ppm	
TEOS	Tetraethyl Orthosilicate	9602-7500	0 ... 100	ppm	
TMB	Trimethyl borate	9602-7510	0 ... 500	ppm	
TMP	Trimethyl phosphite	9602-7800	0 ... 30.0	ppm	

8.1 Sensor Order Information (page 2 of 2)

Substance / Sensor		Part No. Sensor	Nominal Range	Unit	Comments
8.1.2 Oxygen - not for Sat-Ex C-Versions					
O2	Oxygen	9602-5500	0 ... 25.0	% vol.	

Substance / Sensor		Part No. Sensor	Nominal Range	Unit	Comments
8.1.3 Combustible Gases - only for Sat-Ex C-Versions					
CH4	Methane	9602-9902	0 ... 100	% LEL	wide-range sensor for combustible gases

8.2 K-Factors for Sat-Ex C-Versions

Catalytic sensors are calibrated for methane. When monitoring for other combustible gases, a specific correction factor must be entered; consult our local representative.

8.3 Spares and Accessories

Part Number	Description
20202-4000	bar magnet, to operate Sat-Ex controls
20202.0090	sensor extension standard, 2 m
20202.0091	sensor extension standard, 3 m
20202.0092	sensor extension standard, 1 m
20202.0093	sensor extension combustible, 2 m (for Sat-Ex C-versions)
20202.0094	sensor extension combustible, 3 m (for Sat-Ex C-versions)
20202.0095	sensor extension combustible, 1 m (for Sat-Ex C-versions)
20230-0100	junction box, protection class "Ex e", 2 nodes
20230-0105	junction box, protection class "Ex e", 1 node, relay version
9602.0095	calibration cap
9630-0441	network terminator for FTT-10
9630-0443	network terminator for FTT-10 Bus Topology
9660-0110	Relay Output Module for DIN-rail mounting
9660-0120	Supervisor and Bus Switch Module for DIN-rail mounting
9660-0220	Digital Input Module for DIN-rail mounting
9660-0330	Analog Input Module for DIN-rail mounting
9660-0440	Programmable Logic Module
9675-0440	router FTT-10 FTT-10, 24 VDC for DIN-rail mounting
9902-4000	duct mounting saddle (assy), 4 inches
9902-4010	duct mounting saddle (assy), 6 inches
9902-4020	duct mounting saddle (assy), 8 inches
9902-4030	duct mounting saddle (assy), 10 inches
9902-4040	duct mounting saddle (assy), 12 inches
9902-4100	duct mounting saddle (assy), 1,5 inches
9902-4110	duct mounting saddle (assy), 2 inches
9902-4120	duct mounting saddle (assy), 2,5 inches
9902-4130	duct mounting saddle (assy), 3 inches
9902-4200	duct mounting saddle (assy), flat

8.4 EC-Type Examination Certificate

EXAM
BBG Prüf- und Zertifizier GmbH

Translation

(1) **EC-Type Examination Certificate**

(2) **- Directive 94/9/EC -**
Equipment and protective systems intended for use in potentially explosive atmospheres

(3) **BVS 04 ATEX E 101 X**

(4) **Equipment:** **Gas monitoring instrument Sat-Ex type 20202-***

(5) **Manufacturer:** **MST Technology GmbH**

(6) **Address:** **D 82069 Hohenschäftlarn**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(8) The certification body of EXAM BBG Prüf- und Zertifizier GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the test and assessment report BVS PP 04.2078 EG.

(9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1997+A1-A2 General requirements
EN 50018:2000 +A1 Flameproof enclosure 'd'
EN 50020:2002 Intrinsic Safety 'i'

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate

(12) The marking of the equipment shall include the following:

II 2G EEx d [ib] IIC T4

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 10. May 2004

Signed: Dr. Jockers
Certification body

Signed: Dr. Eickhoff
Special services unit

This certificate may only be reproduced in its entirety and without change
Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 201 172-3947 Fax +49 201 172-3948
(until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen)

8.4.1 EC-Type Examination Certificate, 1st Supplement

EXAM
BBG Prüf- und Zertifizier GmbH

Translation

1st Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 04 ATEX E 101 X

Equipment: **Gas monitoring instrument Sat-Ex type 20202-***

Manufacturer: **MST Technology GmbH**

Address: **82069 Hohenschäftlarn, Germany**

Description

The instrument can also be manufactured with additional sensor cells.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 50014:1997+A1-A2	General requirements
EN 50018:2000 +A1	Flameproof enclosure 'd'
EN 50020:2002	Intrinsic Safety 'i'

The marking of the equipment shall include the following:

Ex II 2G EEx d [ib] IIC T4

Special conditions for safe use

The measurement function for explosion protection is not the subject of this EC-Type Examination Certificate.

Test and assessment report

BVS PP 04.2078 EG, as of 24.05.2006

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 24. May 2006

Signed: Dr. Jockers — Certification body

Signed: Dr. Eickhoff — Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 24. May 2006
BVS-Ad/Kw A 20060080

EXAM BBG Prüf- und Zertifizier GmbH

Certification body

Special services unit

This certificate may only be reproduced in its entirety and without change.
Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-103 Fax +49 234/3696-110

8.4.2 EC-Type Examination Certificate, 2nd Supplement

DEKRA

Translation

2nd Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 04 ATEX E 101 X

Equipment: **Gas monitoring instrument Sat-Ex type 20202-***

Manufacturer: **MST Technology GmbH**

Address: **82069 Hohenschäftlarn**

Description

The unchanged apparatus was assessed and tested against the current standards.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 60079-0:2006 General requirements
EN 60079-1:2007 Flameproof enclosure 'd'
EN 60079-11:2007 Intrinsic safety 'i'

The marking of the equipment shall include the following:

Ex **II 2G Ex d [ib] IIC T4**

Special conditions for safe use
The measurement function for explosion protection is not subject of this test report.

Test and assessment report
BVS PP 04.2078 EG as of 29.04.2009

DEKRA EXAM GmbH
Bochum, dated 29. April 2009

Signed: Simanski — Certification body

Signed: Dr. Eickhoff — Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 29. April 2009
BVS-Ad/Sz A 20090126

DEKRA EXAM GmbH

Certification body

Special services unit

This certificate may only be reproduced in its entirety and without change.
DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110 E-mail ex-exam@dekra.com
(until 31.03.2007 EXAM BBG Prof- und Zertifizier GmbH)

8.5 Specifications for Network Components

8.5.1 Network Terminators

Network Terminators are designed to provide electrical termination for twisted pair channels. They are passive devices and do not require electrical power.

In a free topology FTT-10 segment, one Network Terminator type 9630-0441 is required and may be located anywhere on the segment.

In a bus topology FTT-10 channel, two Network Terminators type 9630-0443 are required, one located at each end of the bus.

Technical Specifications

Network	Standardized LonTalk™ protocol	
wiring topologies	free, e.g. Bus, Star, Loop, or mixed	
Physical Dimensions		
size	18 x 58 x 60 mm	(W x H x D)
	0.7" x 2.3" x 2.4"	(W x H x D)
weight	40 grams	
	1.4 ounces	
Mounting	DIN rail	
Housing Protection Class	IP 20	
Operating Conditions		
temperature	-20 °C ... +50 °C	
	-4°F ... +122 °F	
humidity	0 ... 95 % r.h.	
Part Number		
FTT-10	9630-0441	
FTT-10 Bus Topology	9630-0443	

8.5.2 Relay Output Module

The Relay Output Module is a generic unit interfacing with LONWORKS™ systems, that use a free topology wiring scheme supporting star, loop, and/or bus wiring.

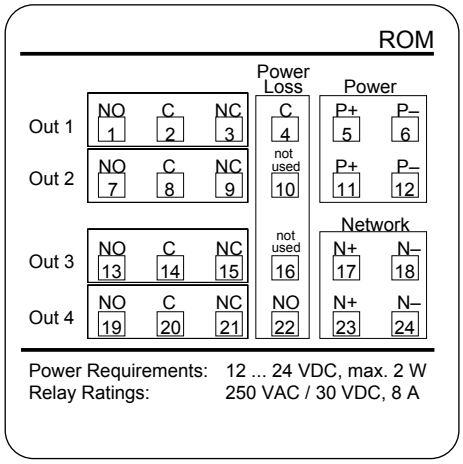
The Relay Output Module contains four relays with SPDT contacts and one dedicated power loss relay with SPST contact for activation of external alarm devices.

The relays can be operated in either energized or deenergized condition. All relay states are indicated by LEDs.

Network configuration data is customer specific and is programmed into nonvolatile memory.

Technical Specifications

Power Requirements		
voltage	12 ... 24 VDC	
consumption	max. 1.9 W	
Network	Standardized LonTalk™ protocol	
data transmission	78 kBit per second	
wiring topologies	free, e.g. Bus, Star, Loop, or mixed	
	4-wire shielded cable 2x2x1.0 mm2 / 17 AWG	
Wiring		
Relay Outputs		
contacts	4 x SPDT (single-pole-double-throw)	
	1 x SPST (single-pole-single-throw	
max. ratings	250 VAC / 30 VDC, 8 A	
Status Indication	4 red relay state LEDs	
	1 green status LED	
	1 yellow service LED	
Physical Dimensions		
size	45 x 80 x 105 mm	(W x H x D)
	1.8" x 3.1" x 4.1"	(W x H x D)
weight	220 grams	
	7.8 ounces	
Mounting	DIN rail	
Housing Protection Class	IP 20	
EMC Directive 2004/108/EC	EN 55022	
	EN 61000-6-2	
Operating Conditions		
temperature	0 °C ... +40 °C	
	+32 °F ... +104 °F	
humidity	20 ... 90 % r.h.	
Part Number	9660-0110	



8.5.3 Supervisor Module

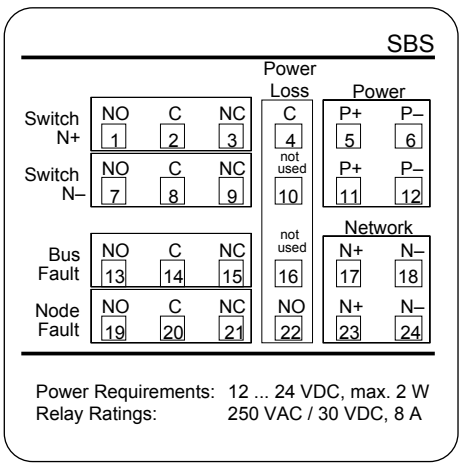
The Supervisor Module is designed to identify a fault condition within a subnet (max. 127 nodes) of a twisted pair LONWORKS™ network. Meaning one or more nodes on the subnet lose the ability to communicate, due to a bad node hardware or a broken wire. In the latter case, the Supervisor Module automatically restores communication by closing the relay bus switch and thus reconnecting the both sides of the open circuit. Either fault condition is indicated by individual fault relays and reported to an optional monitoring station.

The Supervisor Module contains four relays with SPDT contacts and one dedicated power loss relay with SPST contact for activation of external alarm devices.

The relays can be operated in either energized or deenergized condition. All relay states are indicated by LEDs. Network configuration data is customer specific and is programmed into nonvolatile memory.

Technical Specifications

Power Requirements		
voltage	12 ... 24 VDC	
consumption	max. 1.9 W	
Network	Standardized LonTalk™ protocol	
data transmission	78 kBit per second	
wiring topologies	free, e.g. Bus, Star, Loop, or mixed	
Wiring	4-wire shielded cable 2x2x1.0 mm2 / 17 AWG	
Relay Outputs		
contacts	2 x SPDT: Bus Switch 1 x SPDT: Node Failure 1 x SPDT: Broken Wire 1 x SPST: Power Loss (SPDT = single-pole-double-throw) (SPST = single-pole-single-throw)	
max. ratings	250 VAC / 30 VDC, 8 A	
Status Indication	4 red relay state LEDs 1 green status LED 1 yellow service LED	
Physical Dimensions		
size	45 x 80 x 105 mm	(W x H x D)
	1.8" x 3.1" x 4.1"	(W x H x D)
weight	220 grams 7.8 ounces	
Mounting	DIN rail	
Housing Protection Class	IP 20	
EMC Directive 2004/108/EC	EN 55022 EN 61000-6-2	
Operating Conditions		
temperature	0 °C ... +40 °C +32 °F ... +104 °F	
humidity	20 ... 90 % r.h.	
Part Number	9660-0120	



8.5.4 Digital Input Module

The Digital Input Module is a generic unit interfacing with LONWORKS™ systems, that use a free topology wiring scheme supporting star, loop, and/or bus wiring.

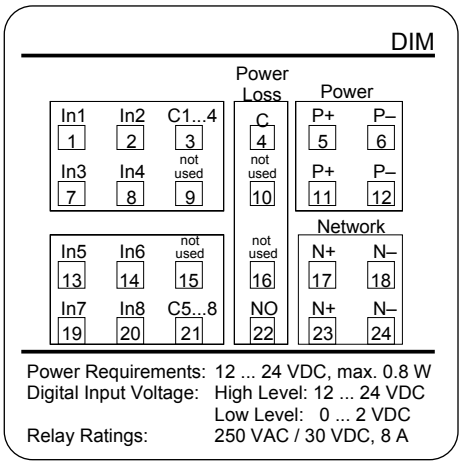
The Digital Input Module contains two groups of four optocoupler isolated digital inputs, each group with separate common signal ground. It is used for processing binary and digital values, e.g. switch signals.

All input states are indicated by LEDs. The module provides one dedicated power loss relay with SPST contact for activation of external alarm devices.

Network configuration data is customer specific and is programmed into nonvolatile memory.

Technical Specifications

Power Requirements		
voltage	12 ... 24 VDC	
consumption	max. 0.8 W	
Network	Standardized LonTalk™ protocol	
data transmission	78 kBit per second	
wiring topologies	free, e.g. Bus, Star, Loop, or mixed	
Wiring	4-wire shielded cable 2x2x1.0 mm2 /17 AWG	
Digital Inputs		
channels	8 (2 groups of 4) optocoupler isolated	
input voltage	High Level 12 ... 24 VDC	
	Low Level 0 ... 2 VDC	
Status Indication	8 red input state LEDs	
	1 green status LED	
	1 yellow service LED	
Relay Output		
contact	1 x SPST (single-pole-single-throw)	
max. ratings	250 VAC / 30 VDC, 8 A	
Physical Dimensions		
size	45 x 80 x 105 mm	(W x H x D)
	1.8" x 3.1" x 4.1"	(W x H x D)
weight	190 grams	
	6.7 ounces	
Mounting	DIN rail	
Housing Protection Class	IP 20	
EMC Directive 2004/108/EC	EN 55022	
	EN 61000-6-2	
O**perating Conditions**		
temperature	0 °C ... +40 °C	
	+32 °F ... +104 °F	
humidity	20 ... 90 % r.h.	
Part Number	9660-0220	



8.5.5 Analog Input Module

The Analog Input Module is a generic unit interfacing with LONWORKS™ systems, that use a free topology wiring scheme supporting star, loop, and/or bus wiring.

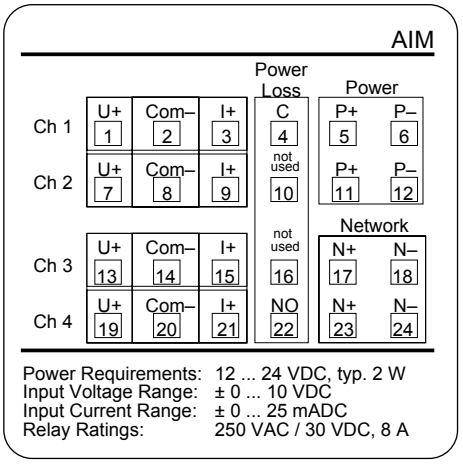
The Analog Input Module contains two isolated groups of each two analog input channels, for processing ± 0-10 VDC or ± 0-25 mA current signals. The analog inputs can be logically connected via a network to different input/output modules and data visualization software. For each channel the module offers two user-settable alarm levels and input scaling.

All states are indicated by LEDs. The module provides one dedicated power loss relay with SPST contact for activation of external alarm devices.

Network configuration data is customer specific and is programmed into nonvolatile memory.

Technical Specifications

Power Requirements		
voltage	12 ... 24 VDC	
consumption	typically 2 W	
Network	Standardized LonTalk™ protocol	
data transmission	78 kBit per second	
wiring topologies	free, e.g. Bus, Star, Loop, or mixed	
Wiring	shielded 4-wire cable 2x2x1.0 mm2 /17 AWG	
Analog Inputs		
channels	2 isolated groups of each 2 inputs with common signal ground	
signal range	± 0 - 10 VDC or ± 0 - 25 mA	
resolution	14-bit, 10 samples per second	
status indication	8 red alarm state LEDs 1 green status LED 1 yellow service LED	
Relay Output		
contact	1 x SPST (single-pole-single-throw)	
max. rating	250 VAC / 30 VDC, 8 A	
Physical Dimensions		
size	45 x 80 x 105 mm	(W x H x D)
	1.8" x 3.1" x 4.1"	(W x H x D)
weight	200 grams	
	7 ounces	
Mounting	DIN rail	
Housing Protection Class	IP 20	
EMC Directive 2004/108/EC	EN 55022 EN 61000-6-2	
Operating Conditions		
temperature	0 °C ... +40 °C +32 °F ... +104 °F	
humidity	20 ... 90 % r.h.	
Part Number	9660-0330	



8.5.6 Router Modules

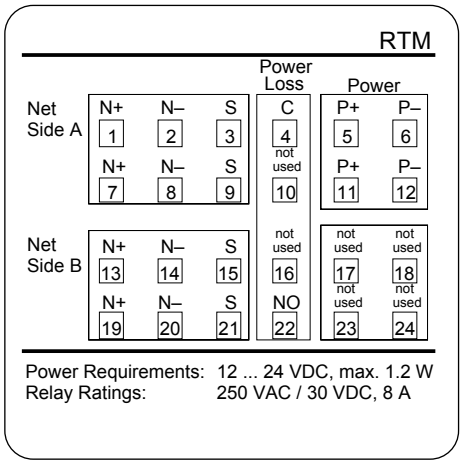
Router Modules connect two communication channels and route LonTalk™ messages between them. These modules interface two different twisted-pair channels, e.g. high speed backbone and a free topology channel. Additionally the routers are used to manage network traffic, increase the total number of nodes, or extend the maximum channel length.

All states are indicated by LEDs. The module provides one dedicated power loss relay with SPST contact for activation of external alarm devices.

Network configuration data is customer specific and is programmed into nonvolatile memory.

Technical Specifications

Power Requirements		
voltage	12 ... 24 VDC	
consumption	max. 1.2 W	
Network	Standardized LonTalk™ protocol	
Wiring	shielded 4-wire cable 2x2x1.0 mm2 /17 AWG	
Transceiver Types	FTT-10A	(78 kBit per second)
	TP/XF-1250	(1.25 MBit per second)
Status Indication	1 red network traffic LED 1 green status LED 2 yellow service LEDs	
Relay Output		
contact	1 x SPST (single-pole-single-throw)	
max. rating	250 VAC / 30 VDC, 8 A	
Physical Dimensions		
size	45 x 80 x 105 mm	(W x H x D)
	1.8" x 3.1" x 4.1"	(W x H x D)
weight	220 grams 7.8 ounces	
Mounting	DIN rail	
Housing Protection Class	IP 20	
EMC Directive 2004/108/EC	EN 55022 EN 61000-6-2	
Operating Conditions		
temperature	0 °C ... +40 °C +32 °F ... +104 °F	
humidity	20 ... 90 % r.h.	
Part Numbers		
FTT-10 FTT-10	9675-0440	



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