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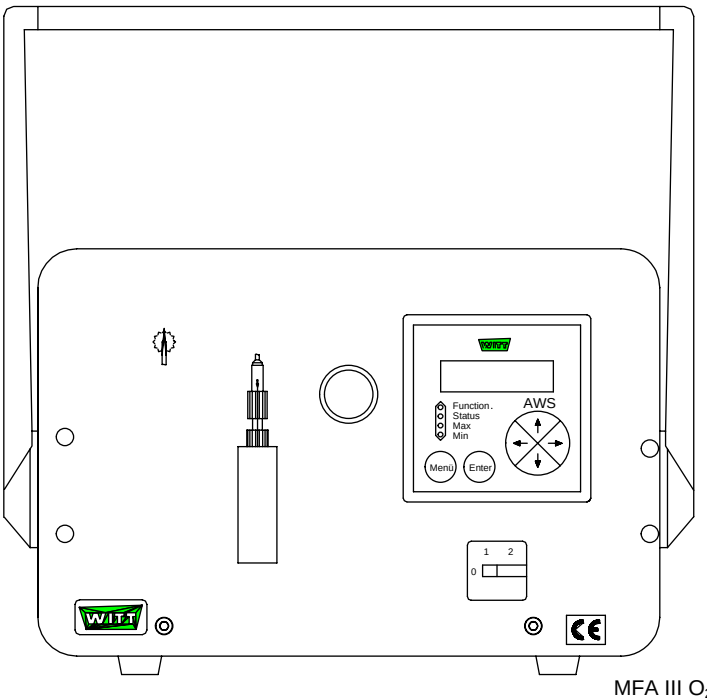
Operating Instructions for WITT-Analyser

MFA III SL O_2 - O_2

Part number: 59033-014-449V



MFA III O_2 – O_2

Issue: 02.04.2008
This issue is not subject to change management

WITT-TECHNOLOGY FOR GASES

1 Table of contents

2 Notes on these operating instructions

Thank you for having chosen a gas analyser from WITT-Gasetechnik! We are sure that you have made the right choice.

With these operating instructions we would like to provide you with all information necessary for the safe intended use of the equipment and to provide instruction for safe, correct setting up and installation, operation and checking of your analyser.

2.1 Scope

This document provides all instructions necessary for operation and maintenance of the WITT-analyser.
Observation of the instructions given herein helps to maintain safe operating conditions, minimise downtime through incorrect equipment operation and to ensure the service life and reliability of the gas analyser.

Handling gases, in particular combustible and / or toxic gases, requires greatest care. For this reason it is imperative that all personnel concerned read these operating instructions carefully and completely before the gas mixer is installed and started-up so that problems / hazards during operation can be prevented.
A legible copy of these operating instructions shall be maintained at operating locations.
Employees designated to operate the gas mixer shall be familiar with operating this equipment or shall have been properly instructed to operate such equipment.

If unexpected malfunctions occur that you cannot rectify even with the assistance of these operating instructions, please contact your local service agent, or call WITT-Gasetechnik at the telephone number given below to receive additional instruction on operation. Please state the serial number of the analyser. The serial number is printed on the first page of these operating instructions or can be read on the nameplate of the unit. Alternatively you can fax us a copy of the first page of these operating instruction, together with a short problem description. Please make sure that you advise of your company's name and telephone number.
Our address is:

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Alternatively you can also contact us via e-mail (**service@wittgas.com**) or visit our homepage a **http://www.wittgas.com**.

In the case of modification to the gas analyser these operating instructions cease to be applicable!

2.2 Structure

These operating instructions are sub-divided into several sections:

- In the section „**Notes on these operating instructions**“ the layout of the instructions manual is explained and the terms and symbols used are explained.
- In section „**Safety instructions and precautionary measures**“ suggestions for safe usage of the gas analyser are listed. You should pay particular attention to this sections as failure to observe the information given here can result in equipment damage and physical injury .
- In section „**Equipment description**“ the functions of the WITT analyser is explained based on the functional scheme.
  The operation of the build-in control system (AWS) is addressed in the „Functional description of the AWS“ section.
- In section „**Set up and installation**“ you will find information on the correct location for setting up the analyser and notes on both the gas and the electrical installation.

- In section „**Start-up and operation**“ you will learn how to proceed to perform a continuous or a spot-check analysis of your gas sample. Further you will learn how you can take the gas analyser out of operation e.g. for service tasks.
- Information on servicing tasks that you can perform yourself is given in the „**Servicing and maintenance**“ section. Here you will also find a failure location and correction table which will help trouble-shooting in the event that any problems may occur.
- The section “**Operation of the AWS**” provides instruction on the operation of the control unit (AWS). It further offers an overview chart of the AWS menu structure.
- As an appendix to these operating instructions you will find the technical data on the WITT gas analyser, the schemes given in the technical data, along with drawings and a list of symbols. This provides a short overview on the function and the controls of the gas analyser. You will also find the numbers for the symbols on the function scheme and on the components themselves. With the aid of the list of symbols and the function scheme, you can identify components in the gas analyser.

2.3 Rights to this manual

2.4 What symbols are used?

The warning symbol indicated hazards for personnel or the equipment.
It is imperative that these instructions are observed and followed..
The word “Warning” is placed in front of information indicating risk of personal injury or potentially fatal hazards.
The word „Caution“ is placed in front of information indication potential equipment damage.

☞ ***Note!***
The pointing had marks general notes that explain operating procedures.

- The „dot“ marks actions to be performed.
- The „square“ is used to identify a list.

This symbol indicates that you should turn the page.

3 Safety instructions and precautionary measures

It is imperative to follow and observe the following safety instructions and precautionary measures. They are intended to prevent hazards which might occur if the analyser is not operated properly. In addition, all applicable national health and safety regulations and standards must be observed. For example, on usage in Germany the „Unfallverhütungsvorschriften (UVV)“ and the safety regulations issued by the “Berufsgenossenschaften” shall be observed, e.g.:

- Unfallverhütungsvorschriften der gewerblichen Berufsgenossenschaften (safety regulations issued by the german tradel associations)

  a) BGV A1 Allgemeine Vorschriften (General regulations)
  b) BGV A3 Elektrische Anlagen und Betriebsmittel (Electrical systems and equipment)
  c) BGR 500 Kap. 2.33 Gase (Gases)
  d) BGR 500 Kap. 2.32 Sauerstoff (Oxygen)

No claim is made to the completeness of this list!

When handling the equipment the following shall be observed:
- The operating instructions
- All health and safety regulations and standards applicable in the country and the place of use.
- All engineering rules and guidelines for safety and good workmanship.

The owner or user of the equipment should ensure that the gas mixer is operated by authorised personnel only. All employees designated to handle the gas mixer shall be properly instructed and advised of the applicable safety and health precautions. The WITT-analyser has been designed and built according to the state of the art. It shall only be used for its intended purpose. Any operation not conforming to the intended use or operation by inadequately trained personnel may result in hazardous operating conditions.

3.1 General safety guidelines

Warning !
The equipment is only permitted to be operated by personnel who has properly instructed to operate such equipment and who has read and understood these operating instructions.

- Please ensure that all applicable national health and safety regulations and standards for the safe handling of gases are observed (e.g. UVV’s (Unfallverhütungsvorschriften) = German health and safety regulations).
- For safety reasons all unauthorised modifications, or addition or removal of parts onto the product are not permitted.
- Any malfunction occurring during the operating of the analyser shall be corrected adequately trained and qualified personnel only.
- All maintenance and repair of the equipment shall be performed by adequately trained and qualified personnel only.
- During all maintenance and repair it must be ensured that the equipment is un-pressurised and disconnected from electrical mains.
- All gas supply lines to the analyser (MFA-P model only) must be suitable for the maximum allowable inlet pressures. If that proves to be impracticable, suitable pressure regulators or safety relief devices should be installed in the gas supply lines to make sure that the maximum allowable gas inlet pressures cannot be exceeded..
- The material of piping, tubing, fittings, gaskets, and gasket and thread sealants, as well as the material of all valves, gauges, regulators, and other accessories installed in the gas lines to the analyser shall be suitable for service of the particular gas at the pressures and temperatures involved.

- The maximum allowable gas inlet pressures must not be exceeded. If necessary, safety relief devices should be installed in the gas supply lines.
- All electrical wiring to and from the analyser shall be visually inspected for external defects and for evidence of possible internal damage. All gas lines hall be inspected for evidence of possible internal or external damage and for leak tightness.
- All piping, tubing, and fittings shall be tested and proved leak tight on a regular schedule (e.g. during every start-up) with inert gas (document this check) to prevent the intake of ambient air during the measurement. If a leak is detected, the defective item shall be immediately removed from service and no employee may use it until repairs and tests necessary to render the equipment safe and completely operative have been made. All repair shall be performed by personnel familiar with proper practices only. When performing repair on the equipment the applicable national safety and health regulations must be observed.
  Please check also the sample gas supply lines.

Any operation not conforming to the intended purpose can result in hazardous operating conditions which may lead to serious personal injury and / or loss or damage of equipment. Examples for operation not conforming to the intended purpose are given below:

- Use of the analyser with flammable or any other gases than those expressively listed in the Technical Data.
- Use of the analyser with liquids.
- Use of the analyser at ambient temperatures exceeding the temperature range specified in the Technical Data.
- Use of the analyser at gas inlet temperatures exceeding the temperature range specified in the Technical.
- Installation and operation of the analyser in locations with a prevailing explosive atmosphere. Explosion hazard!

The warranty granted for the gas analyser shall be invalidated in case of any unauthorised or improper modifications, or addition or removal of parts onto the product, without expressive written authorisation from WITT-GASETECHNIK.

3.2 Liability for proper function or damage

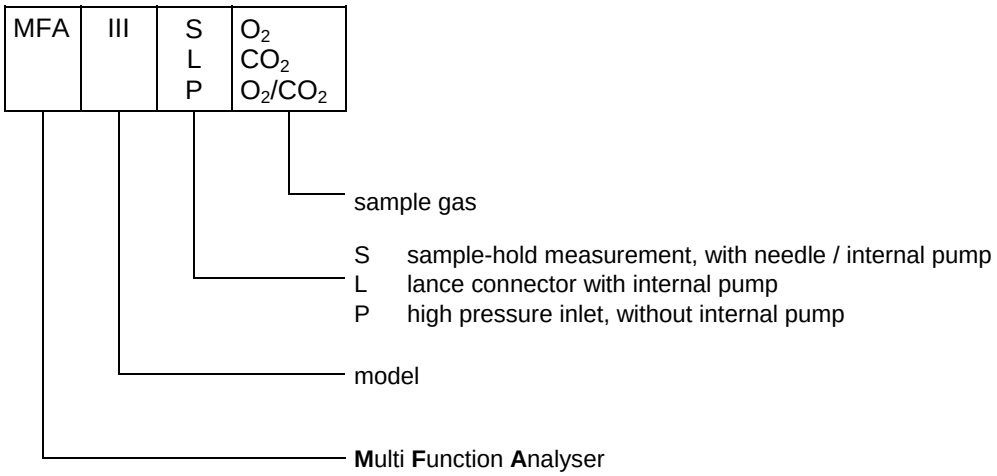
The liability for the proper function of the instrument is irrevocably transferred to the owner or operating organisation to the extent the instrument has been serviced or repaired by personnel not employed or authorised by WITT-Service or when the instrument was used in a manner not conforming to its intended use, or if the operation did not follow the applicable national health and safety regulations.

WITT-Gasetechnik GmbH & Co KG cannot be held responsible for damages arising from failure to observe these operating instructions.

4 Equipment description

4.1 Identification of analyser model

The different MFA models are distinguished by the extensions listed below. The specification on your particular model is given in the Technical Data (chapter 9).



4.2 Intended use of the analyser

The analyser is intended to measure the concentration of one or two non combustible gases in a mixture of non combustible, non-corrosive, and non-toxic gases.

The gas analysis can be performed either in spot-test mode (Sample-Hold) through the gas sample needle located at the front of the analyser, or in a permanent analysing mode through the analysis gas connectors (lance / analysis gas) located at the rear of the unit.

The analyser is only suitable to be operated at the conditions specified in the Technical Data (chapter 9). All information given in chapter 3 of these operating instructions as well as the safety precautions shall be observed.

4.3 Functional description

☞ ***Please note !***
The functional description is given with the aid of the enclosed functional schemes (please refer to section 9). You will also find the numbers for the symbols on the function scheme on the components themselves. With the aid of the list of symbols and the function scheme, you can identify components in the gas analyser.

The gas analyser is intended to be used for measuring the oxygen concentration in the sample gas supplied to the instrument. The sample gas can be supplied to the analyser

- unpressurised with aid of a pump via an injection needle located on the front of the unit for spot-tests (Sample-Hold)
- unpressurised with aid of a pump via an inlet port (lance inlet) on the rear for permanent analysing.

The measurement of the oxygen concentration is performed by an electrochemical sensor element.

All controls and connectors are located in or on the housing of the analyser. All controls necessary to operate the analyser (e.g. switches, buttons, indicators) are located on the front of the equipment. The injection needle necessary to perform a sample gas analysis is also located on the front of the analyser. The sample gas inlets for continuous sampling mode are located on the equipment rear. Also located on the equipment rear are all electrical connectors, as well as the nameplate which carries all data necessary to unambiguously identify the instrument.

For the measurement range of the analyser see the Technical Data. The resolution is 0.1 Vol%, each.

The central control element of the instrument is the control system (AWS). The AWS processes the sensor signals and shows the measured concentrations in Vol% onto the two-line display.

☞ ***Please note !***
Operating instructions for the control unit (AWS) are given in a separate section of these operating instructions.

When operated in one of the permanent analysis modes the analyser features a min./max. concentration alarm for each of the gases. If the respective concentration in the sample gas falls below or exceeds the user defined alarm threshold limits this is recognised as a failure and will be indicated by illumination of the corresponding LED.
On pressing the button ➔ failures (if a failure occurs) will be shown on the display. Switching between different failure messages (if any faults are present) is accomplished by pressing the buttons ↑ and ↓. After termination of the failure condition the failure message can be acknowledged by pressing the <**Enter**>-button.
The alarm signal will be exported through the volt free contacts located on connector X1.

The MFA also provides standardised output signals, 0-10 V respectively 4-20 mA (factory setting: 4-20 mA) corresponding to the measured gas concentrations. The respective electrical interface is located at connector X2.

The measured gas concentrations can be recorded through the RS 232 C interface (connector X3). It is possible to either address an external printer, or the WITT-Logger PC programme developed by WITT-GASETECHNIK which is delivered with the gas analyser as an accessory.

When operated in the sample mode (needle) the measured concentrations are automatically recorded after the analysis has been finished.
In the permanent operation mode (analysis gas) the measured concentrations are automatically recorded following the time schedule set on the AWS, or on pressing the <**Enter**>-button during the measurement.

4.3.1 Technical data of the analyser

The technical data of the gas analyser are specified in the attached Technical Data sheets (please refer to section 9).

5 Set up and installation

In this section you will find information on the proper location for setting up the gas analyser, and notes on both the gas and the electrical installations.

5.1 Checking for transport damage

☞ ***Please note !***
Never transport the system in a tilted position. Perform a visual inspection for external damage and damage to cables (nicks, damage to the insulation).

- The gas analyser is supplied ready to use. It must be correctly transported.

5.2 Location for setting up

☞ ***Please note !***
Never expose the instrument to direct sunlight or large amounts of heat.

☞ ***Please note !***
Do not operate the instrument in an environment with increased electromagnetic activity (outside the standardised limits).

☞ ***Please note !***
Observe safety distances when setting up.
The analyser should remain accessible for servicing.

- Place the undamaged instrument on a solid surface in a place protected from the weather and secured against accidents.
- during setting up observe the ambient conditions specified in the Technical Data (section 9) (e.g., ambient temperature, humidity, dust, altitude).

5.3 Safety instructions for installation

Warning !
Prior to initial commissioning and after modification, repairs, or expansion of the system / unit, the safety checks required by BGV A3 (reference to DIN VDE 0100, DIN VDE 0701, DIN VDE 0702, etc.) are to be performed and logged. The checks encompass the inspection, testing, and measuring of the effectiveness of protective measures (e.g. emergency stop devices, interlocks, pressure switches, etc.).
If the operating organisation is not in a position to perform a check, a check in accordance with DIN VDE 0702 can be performed by WITT Service.

Warning !
In accordance with BGV A3 a protective earth connection (PE connection) of protection class 1 must be provided.

Warning !
Following initial commissioning and after modification, repair, or expansion of a system / unit, the connections and joints are to be checked for leaks to the atmosphere with inert gas (document this check). For this process only use suitable leak testing procedures (never test with a naked flame). If you find leaks, rectify them immediately; the applicable safety regulations are to be observed during this process.

Warning !
All supply pipes to and from the gas analyser (P model only) are to be designed for the maximum permitted gas pressure. If this is not possible for the system following the gas mixer, then it must be ensured that the maximum permitted pressure for the following system cannot be exceeded by means of the installation of suitable fittings, e.g., burst discs or safety relief valves.

Warning !
The material for the gas pipes (pipes from the gas supply to the inlets on the gas analyser), all fittings installed there (e.g. shut-off valves, manometers, etc.) and all sealing elements there must be designed for the related type of gas.

Warning !
The gases to be analysed are only permitted to be supplied via the gas inlet connections with the corresponding markings.

Warning !
The maximum permitted gas inlet pressures in the technical data must not be exceeded. If necessary this is to be ensured by, e.g., the installation of safety relief valves or burst discs.

5.4 Installation of gas pipes

- Install the pipes necessary for the gas supply in a correct manner. Observe following safety instructions:

Warning !
The pipes must be un-pressurised during connection.

Warning !
It is to be ensured the pipes upstream of the system are appropriately sized to ensure the adequate supply of the individual gases to be mixed (inner diameter at least as large as the connections, see technical data Section 9) .

Warning !
It must be possible to shut oft the gas supply pipes upstream of the gas analyser.

Warning !
All supply pipes must be free of oil and grease, and free of other contaminants (e.g. dust, etc.). ft necessary all pipes are to be blown out using nitrogen or clean, oil- free air prior to connection to the gas analyser.

- The supply of suitable zero- and calibration gases to the analyser is a customer responsibility.

5.5 Electrical installation

- Establish the connection to the mains using the plug.
- The installation of the electrical connections as per the electrical circuit diagram must be performed in accordance with VDE 0100. The electrical installations shall be performed only by adequately trained personnel.
  Please observe the following instructions:

☞ ***Important note!***
For cable connections (eg. RS232, potential free contact, ...) on the rearside of your analyse device use only shielded socket contacts/ jacks (available from WITT-Gasetechnik).
Use only shielded connection cables (min. type LINCY, n x 0,75 mm^2).
Connect the shielding of your shielded connection cables to the shielded socket contacts/ jacks according to the state of the art. The shielding is to be applied only on the delivered device.

☞ ***Please note !***
The usage of cables that are not approved can result in irreparable damage to the cables in the case oft heavy mechanical loading. In the case of cables that are not twisted or screened, signal processing may be inaccurate.

☞ ***Please note !***
Protect the cables from mechanical loads (e.g. using a suitable cable duct).
Excessive mechanical loads can result In irreparable damage to the cable.

☞ ***Please note !***
It is imperative that the supply voltage in the technical data is provided.

☞ ***Please note !***
Do not yet switch on the power supply.

6 Commissioning and operation

Here you will learn how you must proceed to measure the gas concentration in the gas mixture to be analysed. You will also learn here how you can take the gas analyser out of operation, e.g., for servicing tasks.

The gas analysis can be performed either in spot-test mode (Sample-Hold) through the gas sample needle located at the front of the analyser, or in a permanent analysing mode through the lance connector located at the rear of the unit.

☞ ***Please note !***
If malfunctions occur during commissioning or operation, try to rectify the fault with the aid of the malfunction table (section 6.6.1).
If it is not possible to rectify the fault, please take the system out of operation and inform the responsible customer service department at the manufacturer.

6.1 Safety instructions for commissioning and operation

Warning !
The analyser may only be operated by personnel who have been instructed on the operation of the system and who have read and understood these operating instructions.

☞ ***Please note !***
Also observe the general safety instructions in Section 3.

6.2 Commissioning of the analyser

- Switch on power supply and turn selector switch into position **1** "**Needle**".
- During the initialising of the system control software, the software version number will be shown on the display. The operator should wait until the initialising of the system has been finished. After display of the software version, a countdown (hexadecimal format) will appear on the display. Subsequently the remaining initialising time will be displayed (please refer also to section 8).
  Simultaneously, the green sample-hold button will be illuminated and the internal gas paths of the analyser will be flushed with air.
- Then the desired analysing mode can be selected by putting the selector switch in the corresponding position.
  Spot-check analysing mode (Sample-Hold) through the **Needle** located on the front of the unit.
  Permanent analysing mode through the analysis gas connectors (**Lance** / **Analysis gas**) located at the rear of the unit.

☞ ***Please note !***
The analyser has been calibrated when delivered from factory. The calibration accuracy can depend on a number of ambient conditions. Therefore, it is imperative that the analyser is calibrated during the initial commissioning at the location where the equipment is set up.

☞ ***Please note !***
You get the information of the factory set calibration from the technical data.
For special requirements you have to adjust adequate the calibration gas (see chapter 6.5).

Caution, it is imperative that the following is observed !
Check the connections and joints for leaks to atmosphere after commissioning and at regular intervals with inert gas (document this check). For this process only use suitable leak testing procedures (never test with a naked flame). If you find leaks, rectify them immediately; the applicable safety regulations are to be observed during this procedure.

6.3 Calibration for spot-check analysis (Sample-Hold) through the needle

6.3.1 Zero setting O_2

☞ ***Please note !***
To ensure that the calibration gas does not contain any oxygen, only a suitable "zero-gas" shall be used; e.g., pure nitrogen, argon, carbon dioxide or mixtures of these gases.

- A suitable calibration gas cylinder, equipped with a pressure reducer shall be used as calibration gas source.
- Turn selector switch into position **1** "**Needle**" to select sample gas supply through the injection needle located on the front of the unit.
- Connect a flexible hose to the outlet of the pressure reducer installed on the calibration gas cylinder. Adjust calibration gas outlet pressure to max. 0.3 bar(g) and discharge the gas through the hose unobstructed.
- Place the injection needle into the aperture of the tube. (Caution: Do not obstruct gas flow!).
- Press green **Sample-Hold-Start** button.
  The internal pump will be started and the green button will be illuminated while the analysis is being performed.
- Wait until the analysis has been finished and the illumination of the green button extinguishes. The oxygen concentration in the display should read „**0,0**". In this case the zero setting of the analyser is correct and you can proceed with the O_2 "range" calibration.

If the display **does not** read „**0,0**", proceed as follows:

- Repeatedly press key ↑ or ↓ until „Configuration" appears in the display.
- Press <**Enter**>, the display will then show „chose your language". Press ↓ 5 times. You will then read "Calibration Sensor O2" in the display. Press <**Enter**> to confirm. Now the first line in the display will show "Cal.-Point 1"gezeigt.
  The left-hand value in the bottom line is the actual measured O_2-concentration, the right-hand value is the set-point concentration (i.e. 0,0%).
- Press <**Enter**> again to start adjustment of the zero setting. Now the arrow is flashing and zero gas is drawn into the analyser through the sample needle.
- Wait 10 seconds at least, until the left reading (actual measured value) is steady.
- Press <**Enter**>, to store the new zero setting. Storing the adjusted setting may take several seconds. During this time period the Status-LED will flash with higher and lower brightness. After the storing operation has been finished the actual measured concentration reading (left hand) will be corrected to 0,0%. Adjustment of the zero setting has now been completed.
- Press <**Menu**> repeatedly, until you return to the standard display mode.

6.3.2 Range calibration O_2

☞ ***Please note !***
The range calibration should be checked / performed prior to each putting into service. The range calibration can be done using ambient air as calibration gas. Ambient air contains 20,9 Vol% O_2.

- Turn selector switch into position **1** "**Needle**" .
- Press green button **Sample-Hold-Start**.
  The internal pump will be started and the green button will be illuminated while the analysis is being performed.
- Wait until the analysis has been finished and the illumination of the green button extinguishes. The oxygen concentration in the display should read „**20,9**". In this case the range calibration of the analyser is correct and you can start analysing your gas samples.

If the display **does not** read „**20,9**", proceed as follows:

- Repeatedly press button ↑ or ↓ until „Configuration" appears in the display.
- Press <**Enter**>, the display will then show „chose your language". Press ↓ 5 times. You will then read "Calibration Sensor O2" in the display. Press <**Enter**> to confirm. Then press key ➔ once. Now the first line in the display will show "Cal.-Point 2".
  The left-hand value in the bottom line is the actual measured O_2-concentration, the right-hand value is the set-point concentration (i.e. ambient air oxygen concentration ; 20,9%).
- Press <**Enter**> again to start adjustment of the range calibration. Now the arrow is flashing and zero gas is drawn into the analyser through the sample needle.
- Wait 10 seconds at least, until the left reading (actual measured value) is steady.
- Press <**Enter**>, to store the new range calibration setting. Storing the adjusted setting may take several seconds. During this time period the Status-LED will flash with higher and lower brightness. After the storing operation has been finished the actual measured concentration reading (left hand) will be corrected to 20,9%. Adjustment of the range calibration has now been completed.
- Press <**Menu**> repeatedly, until you return to the standard display mode.

6.4 Calibration for permanent analysis through the lances gas connector

Please note !

☞ ***Use the calibration gas inlet at the rear of your analysator to supply the lance O_2-sensor with calibration gas. Don't supply the lance inlet of your analysator with calibration gas . Never use this calibration gas inlet to supply the needle O_2-sensor with calibration gas.***

6.4.1 Zero setting O_2

☞ ***Please note !***
To ensure that the calibration gas does not contain any oxygen, only a suitable "zero-gas" shall be used; e.g., pure nitrogen, argon, carbon dioxide or mixtures of these gases.

- A suitable calibration gas cylinder, equipped with a pressure reducer shall be used as calibration gas source.
- By turning the selector switch into position **3** "**Calibration gas/Zero gas**" the calibration gas supply for the lance O_2-sensor/lance connector located on the rear of the unit is selected.
- Connect a flexible hose between the outlet of the pressure reducer installed on the calibration gas cylinder and the "gas inlet" connector located on the rear of the analyser. Adjust pressure regulator to **max. 0.3 bar(g)** (recommendation 0.1 – 0.2 bar(g).
- Wait until the left display reading (actual measured value) is steady.
  The display should read „**0.0**".In this case the zero setting of the analyser is correct and you can proceed with the O_2 range calibration.

If the display **does not** read "**0.0**", proceed as follows:

- Repeatedly press **button** ↑ or ↓ until "Configuration" appears in the display.
- Press <**Enter**>, the display will then show „choose your language". Press ↓ 5 times. You will then read "Calibration Sensor O2" in the display. Press <**Enter**> to confirm. Now the display will show you "Cal.-Point 1".
  The left-hand value in the bottom line is the actual measured O_2-concentration, the right-hand value is the set-point concentration (i.e. O_2 concentration of zerogas, 0.0%).
- Press <**Enter**> again to start adjustment of the zero setting. Now the arrow is flashing and zero gas is drawn into the analyser through the lance connector.
- Wait 10 seconds at least, until the left reading (actual measured value) is steady.
- Press <**Enter**>, to store the new zero setting. Storing the adjusted setting may take several seconds. During this time period the Status-LED will flash with higher and lower brightness. After the storing operation has been finished the actual measured concentration reading (left hand) will be corrected to 0.0%. Adjustment of the zero setting has now been completed.
- Press <**Menu**> repeatedly, until you return to the standard display mode.

6.4.2 Range calibration O_2

☞ ***Please note !***
The range calibration should be checked / performed prior to each putting into service. The range calibration can only be done using a suitable calibration gas. For example 20,9 vol% O_2 in carrier gas.

- A suitable calibration gas cylinder, equipped with a pressure reducer shall be used as calibration gas source.
- By turning the selector switch into position **3** " **Calibration gas/Zero gas**" the calibration gas supply for the lance sensor / lance connector located on the rear of the unit is selected.
- Connect a flexible hose between the outlet of the pressure reducer installed on the calibration gas cylinder and the "calibration gas/zero gas" inlet connector located on the rear of the analyser. Adjust the unloaded pressure regulator to **max. 0.3 bar(g)** (recommendation 0.100 – 0.200 bar(g).
- Wait until the left display reading (actual measured value) is steady.The display should show „**20.9**".In this case the range calibration setting of the analyser is correct and you can you can start analysing your gas samples

If the display **does not** read „**20.9**", proceed as follows:

- Repeatedly press key 🡅 or 🡇 until "Configuration" appears in the display.
- Press <**Enter**>, the display will then show "chose your language". Press 🡇 5 times. You will then read "Calibration Sensor O2" in the display. Press <**Enter**> to confirm.
  Then press key 🡆 once. Now the first line in the display will show "Cal.-Point 2".
  The left-hand value in the bottom line is the actual measured O_2-concentration, the right-hand value is the set-point concentration (i.e. oxygen concentration in carrier gas; 20,9%).
- Press <**Enter**> again to start re-adjustment of the range calibration. Now the arrow is flashing and air is drawn into the analyser through the lance connection.
- Wait 10 seconds at least, until the left reading (actual measured value) is steady.
- Press <**Enter**>, to store the new range calibration setting. Storing the adjusted setting may take several seconds. During this time period the Status-LED will flash with higher and lower brightness. After the storing operation has been finished the actual measured concentration reading (left hand) will be corrected to 20,9%. Adjustment of the range calibration has now been completed.
- Press <**Menu**> repeatedly, until you return to the standard display mode.

6.5 Operation of the analyser

After having completed the following: Putting into operation, check for leak tightness, calibration (procedures given in sections 6.2-6.4), you are ready to proceed with analysing the gas concentrations in a gas mixture following the instructions given below:

Choose gas inlet port by turning the selector switch into the corresponding position.
The following positions can be selected:

0 OFF:
The MFA is switched off.

1 Sample Hold:
The sample gas will be drawn into the analyser through the injection needle (Sample-Hold) on the front side.

2 Permanent Modus:
The sample gas will be drawn into the analyser through the lance connector on the rear of the analyser.

3 Calibration gas / zero gas:
The sample gas will be feeded into the analyser through the calibration gas connector on the rear of the analyser. The sample gas pressure is reduced by a pressure regulator.

Caution !
The analyser may only be used if appropriate filters are connected (please refer to the accessories list). Operation of the analyser without the filters can result in equipment damage!

6.5.1 Spot-check analysis (Sample-Hold) of O_2 concentration in a packaging

☞ ***Please note !***
Use the injection needle located on the front of the MFA to perform O_2 concentration analysis in a packaging.

- Turn selector switch into position **1** "**Sample Hold**" .
- Wait until the warm-up time (please refer to Technical Data) has passed.
- Place rubber septum on the packaging film. Push needle through the septum and through the packaging film into the packaging.

☞ ***Please note!***
Please make sure not to insert the needle into the packed goods but only into the gas space of the packing volume.

- Press green button **Sample-Hold-Start**.
  The internal pump will be started and the green button will be illuminated while the analysis is being performed.
- Sample gas is drawn from the packaging. Please watch the reading of the display.
- Wait until the analysis has been finished and the illumination of the green button extinguishes before removing the needle from the packaging.
- The reading in the display corresponds to the measured concentration of the respective gas in the packaging.

☞ ***Please note !***
The analyser will be automatically flushed with ambient air, 5 minutes after the last analysis was taken.
During flushing, the pump is activated and the green "Sample Hold Start" button is illuminated.
If no further analyses are made the flushing cycle will re repeated in one hour intervals.

6.5.2 Permanent analysis of the O_2 concentration in a bag packing

☞ ***Please note!***
To perform gas concentration analysis in a bag packing, the sample gas will be supplied through the lance gas connector located on the rear of the equipment.

- Turn selector switch into position **1** " **Sample Hold**" .
- Wait until the warm-up time (please refer to Technical Data) has passed.
- Connect to the Lance gas connection port located on the rear of the MFA.
- Turn selector switch into position **2** "**Permanent Modus**".

☞ ***Please note!***
The needle will be automatically flushed with ambient air.
During flushing, the pump is activated and the button is illuminated.

- The gas concentration inside the bag packing is continuously being analysed. The corresponding gas concentrations can be read on the display.
- The reading in the display corresponds to the measured concentration of the respective gas inside the bag packing.

6.6 Malfunctions and rectification

6.6.1 Malfunction table

Malfunction	Cause	Remedy
• The result of the analysis does not match with the expected values	• Ambient atmosphere is drawn into the analyser through a leak	• Contact WITT-GASETECHNIK
	• The concentration in the sample gas is not as it was expected	• Change composition of the gas mixture
	• Analyser not correctly calibrated	• Calibrate analyser
	• Calibration gas setting in the AWS does not match with the calibration gas concentration	• Adjust AWS setting for calibration gas concentration
	• O_2-analysis: Sensor depleted	• Contact WITT-GASETECHNIK
	• Inlet filter clogged	• Replace filter
	• Instrument internally contaminated by liquid	• Contact WITT-GASETECHNIK, have analyser checked
• Red min. respectively max. LED is illuminated; the following fault message is shown in the display „Min-Alarm“ resp. „Max-Alarm“, and the alarm message cannot be acknowledged / terminated	• Adjustment of alarm threshold limits is not correct	• Adjust alarm threshold limits
• Red max. LED is illuminated; , the following fault message is shown in the display „MAX O2“ respectively „MAX CO2“	• Upper threshold limit of the respective gas is exceeded	• Check adjustment of gas mixer • Check gas supply • Check threshold limit • Rectify fault and acknowledge alarm message
• Red min. LED is illuminated; , the following fault message is shown in the display „MIN O2“ respectively „MIN CO2“	• Concentration falls below lower threshold limit of the respective gas	• Check adjustment of gas mixer • Check gas supply • Check threshold limit • Rectify fault and acknowledge alarm message

Malfunction	Cause	Remedy
• Devices with manual calibration: During calibration the following message appears in the display: „concentration low“	• No zero gas or calibration gas connected to the analyser • Inlet pressure too low • O_2 concentration in the calibration gas is too low. • O_2-analysis: Sensor depleted	• Connect zero gas respectively calibration gas to the analyser • Adjust inlet pressures (please refer to Technical Data) • Use different calibration gas (please refer to Technical Data) • Contact WITT-GASETECHNIK
• The following fault message is shown in the display „warning zero gas conc. high“	• Ambient atmosphere is drawn into the analyser through a leak • No suitable zero gas	• Contact WITT-GASETECHNIK • Use different zero gas (please refer to Technical Data)
• After switching power on, the display is not illuminated and the pump does not work	• Instrument is not connected to main power supply • Defective fuse	• Check connection to mains and rectify, as applicable • Contact WITT-GASETECHNIK
• AWS display not illuminated	• AWS defective	• Contact WITT-GASETECHNIK
• Incorrect messages are shown on the AWS display, e.g. incorrect type of gas	• AWS defective	• Contact WITT-GASETECHNIK
• The calibration is not possible	• An alarm message was triggered	• Rectify fault and acknowledge alarm message • Start calibration again

☞ ***Please note !***
In the case of other malfunctions contact us or an authorised service centre to have the unit checked.
The gas analyser may only be returned into operation after it has been checked and repaired by us or an authorised service centre.

6.8 Taking out of operation

On taking the instrument out of operation, please proceed as follows:

- In **spot-check mode** (Sample-Hold) through the needle:
  - Turn selector switch into **0** "**Off**".
  - The analyser is now switched off.

- In **permanent analysing** mode through one of the connectors located at the instrument rear:
  - Stop gas mixing process.
  - Turn selector switch into **0** "**Off**".
  - The analyser is now switched off.

7 Servicing and maintenance

These maintenance instructions are intended to answer questions on care and maintenance in a clearly laid out form.

If servicing is not performed correctly, the guarantee is void for damage to the product caused by incorrect maintenance.
In this case there is also no liability for damage caused by the product.

7.1 Safety instructions for servicing and maintenance

Warning !
The gas analyser may only be opened by authorised, trained personnel.

Warning !
During all maintenance- and repair work the applicable national health and safety regulations are to be observed and appropriate safety equipment worn.

Warning !
During all maintenance- and repair tasks, ensure that the gas analyser is isolated from mains electricity and un-pressurised.

Warning !
Prior to initial commissioning and after changes, repair, or extensions to the system / unit, the connections and joints are to be checked for leaks to atmosphere with inert gas (document this check). For this process only use suitable leak testing procedures (never test with a naked flame). If you find leaks, rectify them immediately; the applicable safety regulations are to be observed during this process. If the leaks cannot be rectified, the unit must be taken out of operation without delay.
Please send the unit with a short description of the fault to us or a centre authorised by us. The gas analyser may only be returned into operation after it has been checked and repaired by us or an authorised service centre.

7.2 Repair advise

Repairs may only to be performed after prior consultation with the manufacturer.

In the case of repairs modifications, or conversions that have not been authorised by the manufacturer in advance, the guarantee is void in its entirety.

WITT-GASETECHNIK GmbH & Co KG is not liable for damages arising from failure to observe the instructions given above.

7.3 Inspection and maintenance

The gas analyser operates very reliably and needs only minimum maintenance. To ensure safe and trouble free operating conditions the following tests and inspections should be performed on a regular schedule (at least monthly):

- Perform a visual inspection for external damage and damage to cables (nicks, damage to the insulation).
- Check whether gas supply is sufficient and whether the gas supply pressure is within the limits specified in the Technical Data. Adjust if necessary.
- Check whether the filters in the gas inlets are contaminated or clogged (refer to section 7.4). Replace as applicable.
- Clean the analyser with a damp cloth. Do never use solvents or a pressure cleaner.
- Is a suitable calibration gas cylinder available for calibration (please refer to the Technical Data)?
- To maintain the accuracy of the analyser, the instrument should be calibrated at least once a week.
- All piping, tubing, and fittings shall be tested and proved leak tight with inert gas (document this check) to prevent the intake of ambient air during the measurement. If a leak is detected, the defective item shall be immediately removed from service and no employee may use it until repairs and tests necessary to render the equipment safe and completely operative have been made.
  All repair shall be performed by personnel familiar with proper practices only. When performing repair on the equipment the applicable national safety and health regulations must be observed (Please refer to the general safety guidelines).
  If the leak cannot be rectified, the instrument must be immediately taken out of operation. Please send the unit with a short description of the fault to us or a centre authorised by us. The gas analyser may only be returned into operation after it has been checked and repaired by us or an authorised service centre.
- Please have the instrument checked for internal leak tightness at least once every year. This inspection may only be performed by us or one or our authorised service centres..

If unexpected malfunctions occur please contact your local service agent, or call WITT-Gasetechnik to have the analyser checked. The instrument may only be returned into operation after it has been checked and repaired by us or an authorised service centre.

7.4 Check / replace filter in the gas inlet

7.4.1 Check filter in needle inlet for clogging

To check the filter for clogging / contamination, please proceed as follows:

- Take the analyser out of operation.
- Pull off needle form the filter.
- Turn filter clockwise to remove filter from handle.
- Replace filter by a new one. Turn filter anti-clockwise to screw it tight to the handle.
- Put needle on filter.

7.4.2 Check filter in lance inlet for clogging

To check the filter for clogging / contamination, please proceed as follows:

- Take the analyser out of operation.
- Dis isconnect gas supply pipe from gas inlet connector.
- Remove transparent filter bulb by turning it anti-clockwise.
- Remove filter-holder with attached filter element by turning it anti-clockwise.
- Pull off the upper plug and replace filter element by a new one.
- Put upper plug back in position and screw in filter-holder with attached filter element.
- Re-install transparent filter bulb.

Inlet “Calibration Gas”

- Remove screw anti-clockwise.
- Replace filter element by a new one.
- Screw in new filter.

8 Operation of the control system (AWS)

8.1 General information

On switching on the power supply of the AWS, the initialising phase is started. During initialising the configuration parameters are loaded into in the memory.

The AWS will automatically switch back to the normal operating condition "Display Analysis Values" from all menu items if the operator does not press a key for about three minutes, with the exception of the calibration menu and if a failure message is displayed. From the calibration menu the unit will return to the normal operating condition "Display Analysis Values" after one hour.

In the case that a failure has occurred, the unit will remain in it's current mode and will not return to the normal operating menu.

Controls of the AWS

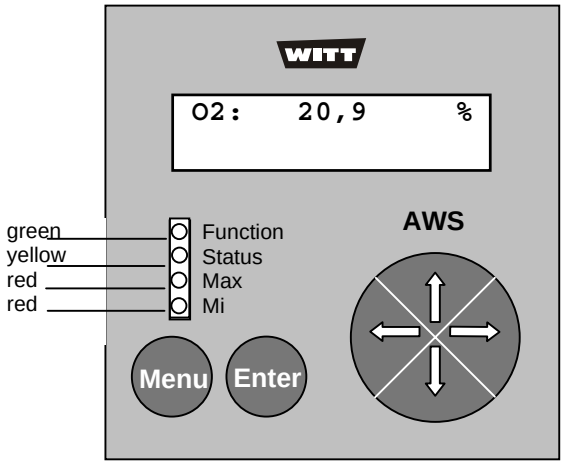


Figure: Front view of the control unit (AWS)

The AWS is operated using the keys <**Menu**> and <**Enter**> and the four arrow keys ←, →, ↑, ↓ located on the front of the device.

The sensor analysis values are displayed, and the configuration parameters are shown and edited in the two-line LCD display, each with 16 characters.

Operational status of the AWS is indicated through the four LED located on the front of the unit. The different operating status are explained below.

8.3 LED status information

Function-LED (green)

After the units has been switched on and during initialising phase the Function-LED is flashing until the normal operating mode has been established.

The normal operating mode of the unit is indicated by continuous illumination of the LED.

If the unit is in the configuration sub-menu the LED flashes.

Status-LED (yellow)

The status LED indicates the editing mode in which parameter alterations are enabled by continuous illumination at half brightness..

On leaving the editing mode by pressing <**Enter**> the status LED will be illuminated at full brightness while storing of the modified data, minimum duration of the illumination is one second.

Flashing of the LED at half brightness indicates one or several fault conditions:

EEPROM system failure, failure of the internal I2C-Bus, or RAM failure. The failures are displayed with the following failure codes:

101	Failure in writing to EEPROM
201	Failure of I2C-Bus communication
301	defective RAM

If one of these messages should occur, please contact:

WITT-GASETECHNIK GmbH & Co KG
Salinger Feld 4-8
D-58454 Witten
Germany
Tel.: +49 (0)2302 89010
Fax: +49 (0)2302 89013

A failure message is shown in the display

Min-Alarm	Min-Alarm measured value falls below threshold limit
Max-Alarm	Max-Alarm threshold limit is exceeded
Cable failure	Cable failure between AWS and sensor
Measurement range	Input range of the analogue board is exceeded ⇒ Hardware failure, wrong sensor, sensor defective
Shortage	Shortage, transistor output

If more than one fault is present, switch over between the fault messages is possible by pressing buttons ↑ and ↓ .

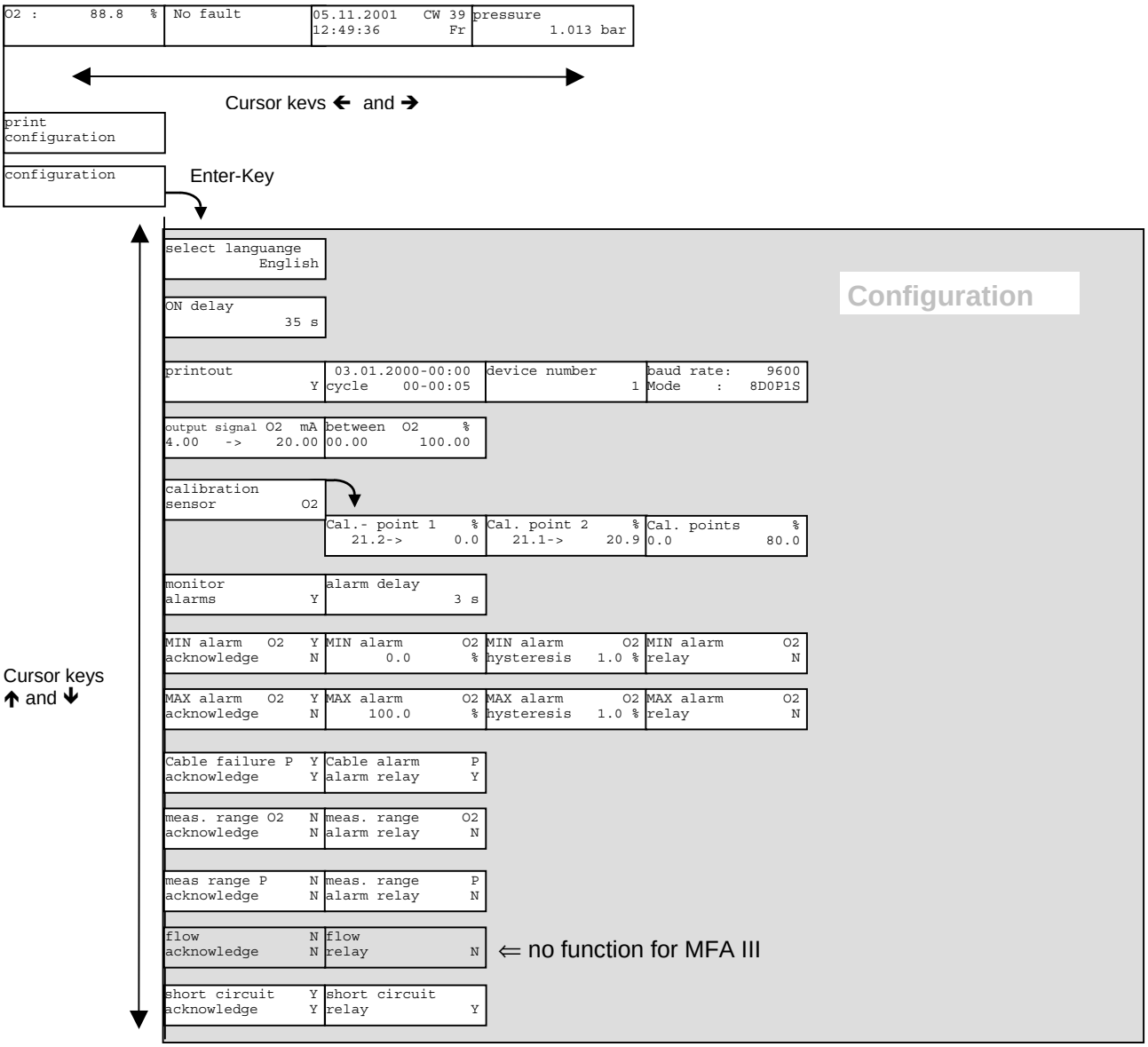
Max/Min -LED (red)

The Max/Min-LED is illuminated at half brightness if the measured value exceeds / falls below set threshold limits.

8.4 Operation of the arrow keys

Arrow keys ← and →	 Navigating in the display mode	Press the arrow keys ← and → to select a menu item in the current menu level. Each level has a ring-type structure. I.e. the successor of the last menu item in one level is the first menu item of the same level, and the successor of the first menu item in one level is the last menu item in the same level.
	Editing mode	Press ← and → to select the proceeding or succeeding parameter of the current menu item for modification. The selected parameter is shown in the display in a flashing mode.
Arrow keys ↑ and ↓	Navigating in the display mode 	Press the arrow keys ↑ and ↓ to move up and down in the menu structure. A ring type structure is used here as well.
	Editing mode	Press the arrow keys ↑ and ↓ to alter the selected parameter. The type of the alteration depends on the data type of the selected parameter.
The <**Menu**> key	Display mode	Within a menu level, press the <**Menu**> key to move to the first item in the menu level. If you are already in the first item of a menu level, press the <**Menu**> key to move to the higher-level menu. If you are already at the highest menu level, press the <**Menu**> key to move to the status "Display Analysis Values".
	Editing mode	Press the <**Menu**> key to move at any time from editing mode to the appropriate display mode. Any parameter changes will <u>not</u> be stored.
The <**Enter**> key	Display mode	Press the <**Enter**> key in the display mode to move to the editing mode of the current menu item, if this provides an editing mode.
		In contrast to the normal display menu this sign indicates a sub-menu. Branch-off into the sub-menu is accomplished by pressing <**Enter**>. Use : Branch off in the configuration menu and in the configuration of sensor specific parameters. Pressing <**Enter**> while in the „display analysis values“ mode will initiate printing of the analysis values. While in the „print configuration“ mode, pressing <**Enter**> will initiate the printing of the current configuration data set.
	Editing mode	By pressing <**Enter**> while in the editing mode, the selected parameters are stored to the RAM and to the EEPROM.

8.5 AWS menu structure, overview



8.6 LED mode overview and adjustable parameters

This section explains the various LED modes and the different types of AWS modes. The message in the display and the LED mode are illustrated by a corresponding figure.

The LED can have four modes to which the following symbols have been allocated :

LED ○ off

LED ✸ flashing

LED ◎ illuminated, half brightness

LED ● illuminated, full brightness

A flashing parameter shown in the display indicates that this particular parameter can be modified. An illustration is given below:

Example: Adjustment of year in the date display

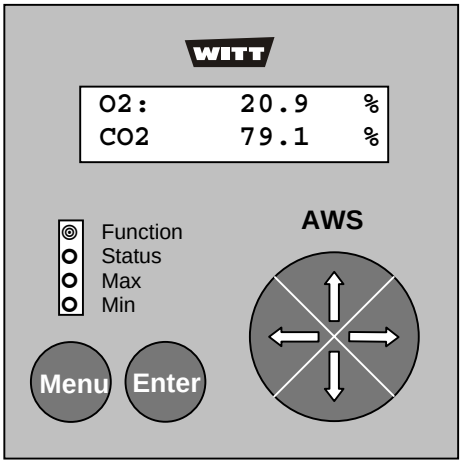
01.01. **2002**

8.7 The user menu

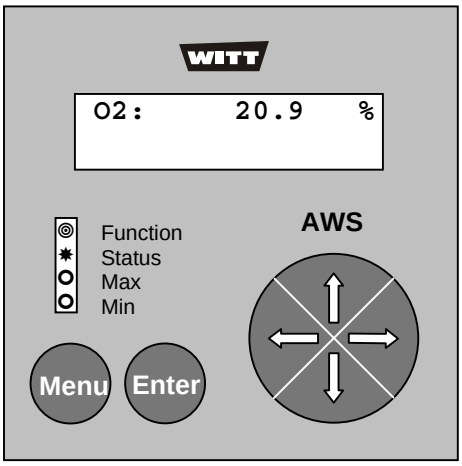
The following chapters provide explanations of those levels in the menu structure which can be selected with the arrow keys ← or →.

8.7.1 Display mode

The AWS is in normal operating mode. You can select all submenu items .



8.7.2 Fault messages



One or more faults have occurred. Occurrence of a fault is indicated by illumination of the yellow Status LED:

Fault messages:

Display	**Explanation**
Min-Alarm	Min-Alarm measured value falls below threshold limit
Max-Alarm	Max-Alarm measured value exceeds threshold limit
Cable failure	Failure in electrical path between sensor and AWS
Range	Input range of analogue boards exceeded ⇒ Hardware fault incorrect type of sensor sensor defective
Short circuit	Short circuit transistor output

System faults:

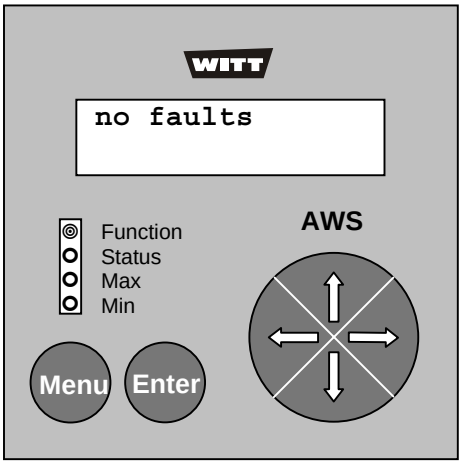
101	Failure in writing to EEPROM
201	Failure of I2C-Bus communication
301	defective RAM

If one of these messages should occur, please contact:

WITT-GASETECHNIK GmbH & Co KG
Salinger Feld 4-8
D-58454 Witten
Germany
Tel.: +49 (0)2302 89010
Fax: +49 (0)2302 89013

Press ➔ to enter / display the fault menu.

8.7.3 Fault menu



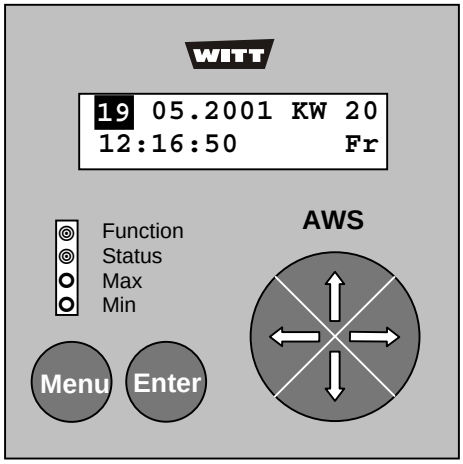
When in this menu, all faults will be displayed.

Press keys ↑ and ↓ to switch over between the various fault messages.

The selected fault can be acknowledged by pressing <**Enter**> after the failure condition has been rectified.

For failure modes please refer to section 8.7.2

8.7.4 Set date, calendar week, time and day of week



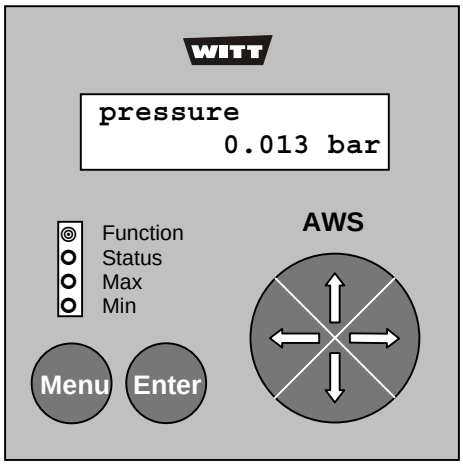
Press <**Enter**> to access to the editing menu. The first digit of the date is flashing. Press ↑ and ↓ to set the correct date.

Other adjustable parameters of the date and time setting can be selected by pressing keys ← and ➔. To adjust date and time setting follow the procedure above.

After having completed the date and time adjustments the modified data must be stored by pressing <**Enter**>. If the <**Enter**>key is not pressed, all modifications will be rejected.

8.7.5 Display gas outlet pressure

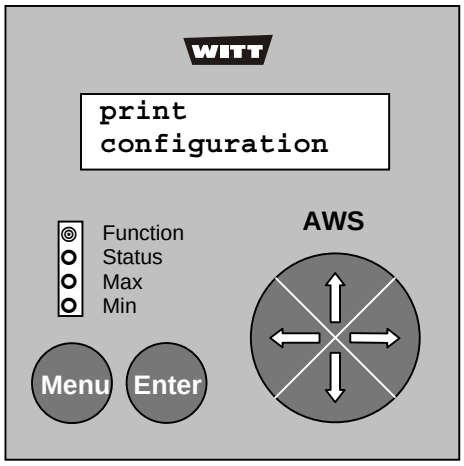
The actual measured gas outlet pressure (p_{abs}) is displayed.



The menu items explained in the following can be selected by pressing arrow keys ↑ and ↓.

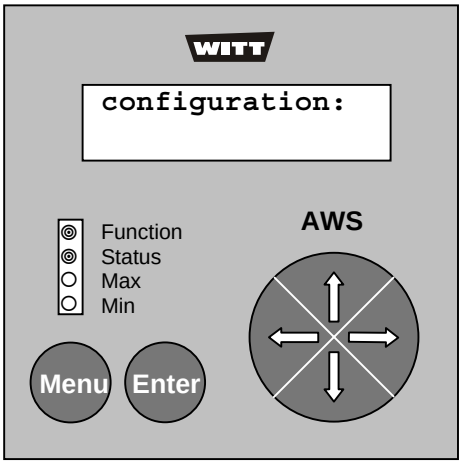
8.7.6 Print configuration

Press <**Enter**> to print the currently adjusted configuration via the RS 232-C interface e.g. to a printer or a PC .



8.7.7 Select configuration menu

Press <**Enter**> to enter the configuration menu.

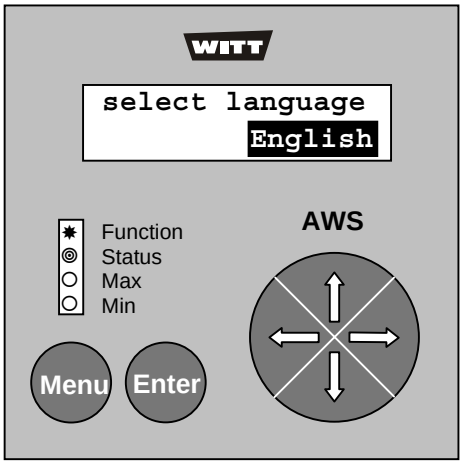


8.8 The configuration menu

8.8.1 Select items from the configuration menu

To navigate through this menu, press keys ↑, ↓, ←, →. Sub-menus are accessible by pressing <**Enter**>.

8.8.2 Select language

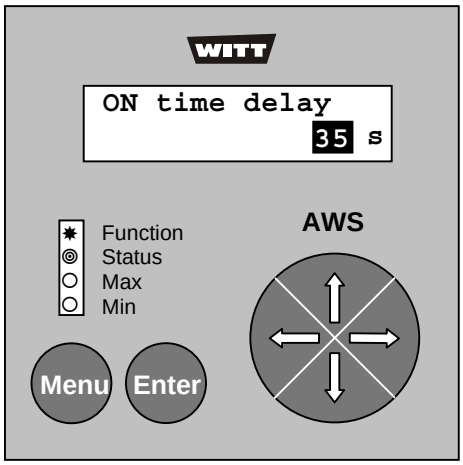


Possible selections are English and German.

To change the selected language, press <**Enter**> to access the editing mode. The adjustable parameter is flashing. To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.3 ON time delay



The AWS' starting operation can be influenced by changing the delay time in intervals of 50 to 3600 seconds.

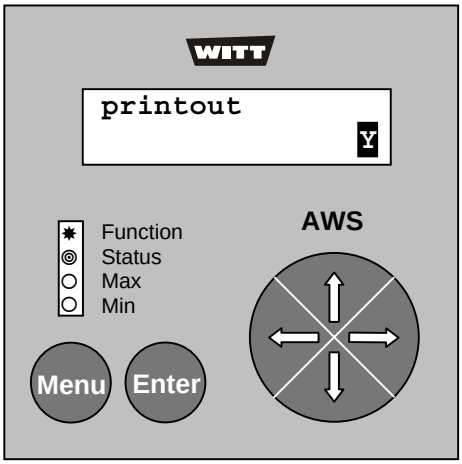
The ON time delay is intended to keep the AWS inactive until an installation has been completed and the corresponding system is in operative condition. This measure will suppress e.g. alarms which can occur during the start-up phase in connected systems.

To modify, press <**Enter**> to access the editing mode. The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection,
press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.4 Printer adaption

8.8.4.1 Activate printer



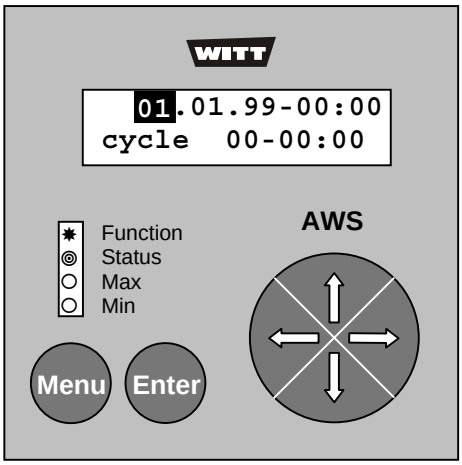
Activation **Y** respectively inactivation **N** of the online printout function can be selected in this menu. If the printout function is active, the printout is initiated on the following occurrences:

- Cyclic printout of analysis results if a corresponding print cycle has been set.
- Press <Enter> to print currently measured values from normal operating mode.
- Printout of alarm messages with time imprint.

To modify printout activation, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.4.2 Set printout cycle



Use this menu to set an interval for cyclical printing.

Define the print start in the top line. Enter the date for the start at the left and set the time at the right.
Define the cycle in the second line:

0 0 - 0 0 . 0 0

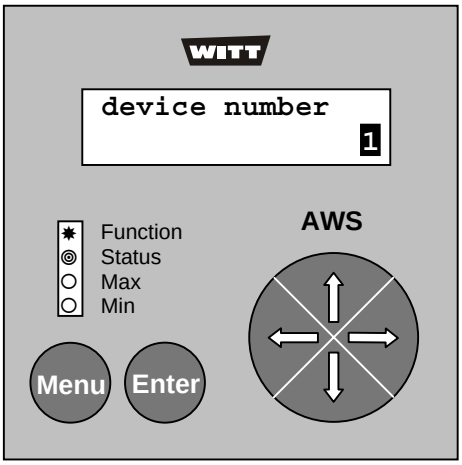
Days Hours Minutes

Days can be set from 0 – 99,
hours from 0 – 23,
minutes from 0 – 59.

To modify printout activation, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.4.3 Set device number



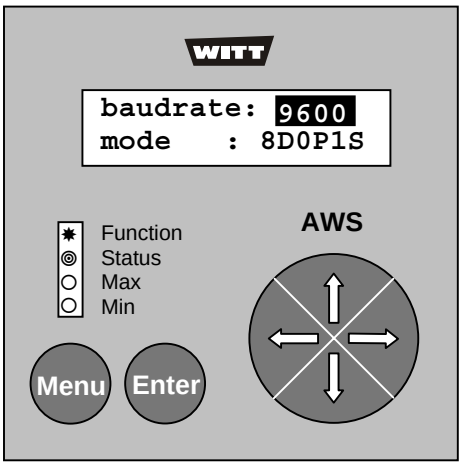
When several devices are used, this function can used to allocate a device number to a particular device which will then be shown in the last column of the printout.

The device number can be set from 0 to 99.

To modify printout activation, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.4.4 Adjust printer interface



Depending on the printer, the baud rate can be set at:

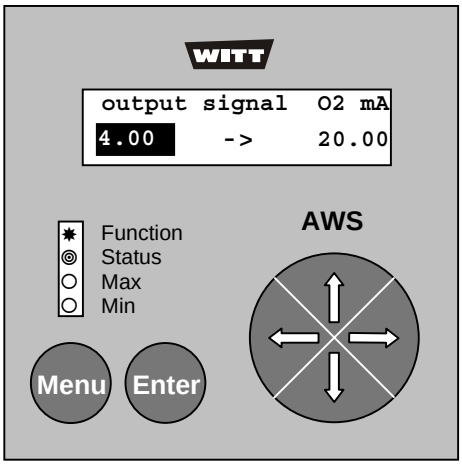
1200, 2400, 4800, 9600 or 19200 Bit/s.

To modify printer interface, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.5 Analogue output

8.8.5.1 Adjust analogue output signal



An analogue output signal can be transmitted to an external device, like e.g. a chart recorder or an instrument which will further process the signal (e.g. an SPS).

To modify the analogue output setting, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

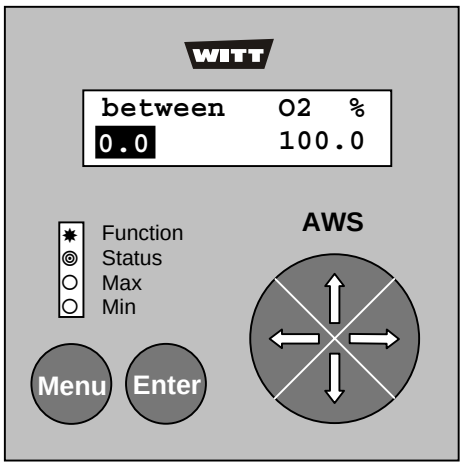
The analogue output signals can be adjusted within a range of 0 to 10 V DC or 0 to 20 mA, respectively.

To skip modifications: Press <**Menu**> key to return to the display mode.

Both the respective analogue output signals are simultaneously available at different terminal pins of the AWS. They cannot be adjusted independently of each other. The feature to switch over between the units V and mA shown in the display is only provided for the convenience of the operator when editing the parameter setting of the analogue output.

Example: 2-10.0 V ⇔ 4-20 mA
5 - 7.5 V ⇔ 10-15 mA

8.8.5.2 Menu item „between“



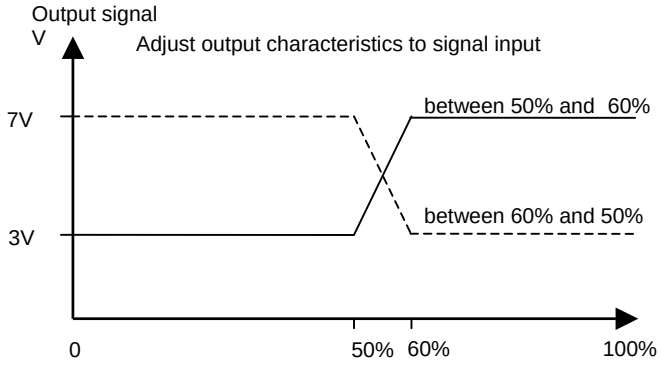
This menu item provides the feature to adjust the output range.

To modify the output range, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

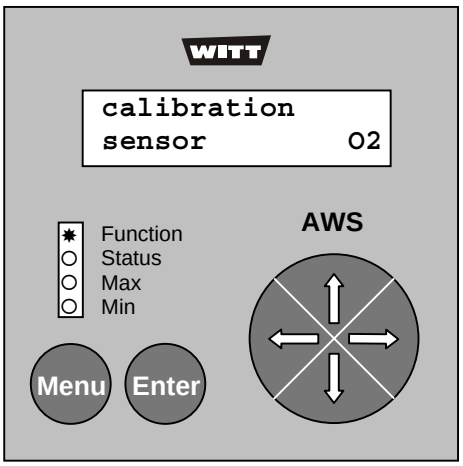
To skip modifications: Press <**Menu**> key to return to the display mode.

Example:
If the output signal is set to 3-7 V and if the working range is set to 50-60%, then an output voltage of 3 V will correspond to an input value of 50%, and an output voltage of 7 V will correspond to an input value equal or above 60%.
The slope of the output signal is linear within the working range of 50-60% .

The control characteristics can be inverted, as demonstrated in the figure below (dotted line).



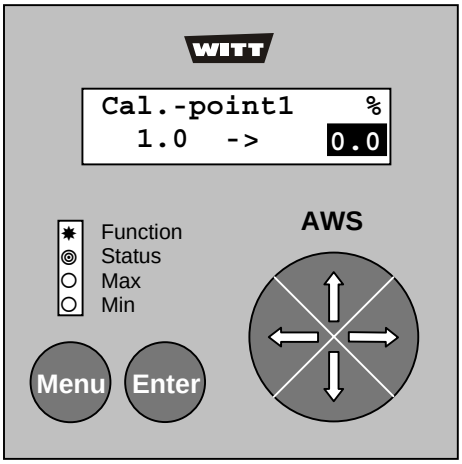
8.8.6 Calibration mode



Press <**Enter**> to access the calibration mode.

To switch between the various menu items, press keys ← and →.

8.8.6.1 Automatic calibration



The general mode of operation is explained using Cal.-point 1 as an example.

The left-hand value in the bottom line is the actual measured concentration, the right-hand value is the set-point concentration.

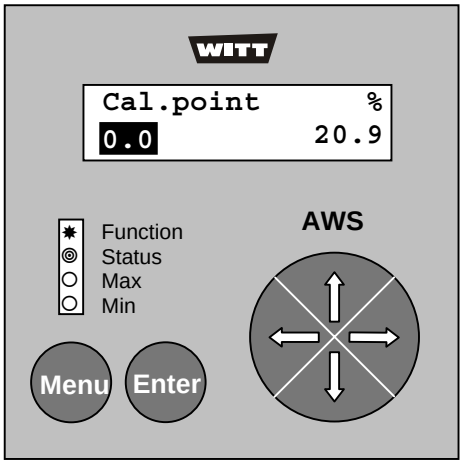
Press <**Enter**> to start calibration.
The arrow shown in the display is flashing, i.e. you may only utilise a calibration gas with the specified gas concentration.

Example: For zero calibration use a gas which does not contain oxygen, e.g. 100% N_2.

Once the left hand value is steady, press <**Enter**> to terminate calibration and store calibration data.

Please note:
The predefined settings for alternative zero and calibration gases cannot be affected (please refer to section 8.8.6.2).

8.8.6.2 Calibration points



Adjustment of the calibration points for sensor calibration.

Please note:
If you wish to use the automatic calibration option, this option provides the only feature to adjust the calibration points!

To adjust the calibration point setting, press <**Enter**>. The adjustable parameter flashes.

The left had parameter corresponds to the zero gas concentration, the right hand parameter corresponds to the calibration gas concentration. Switch over between the two parameters by pressing keys ← and →.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

Please note:
The concentration selected for the upper calibration point (Cal. point 2) must be at least 10% of the upper concentration input limit.

Example: Upper input limit, e.g. 100 → 10%
80 → 8%

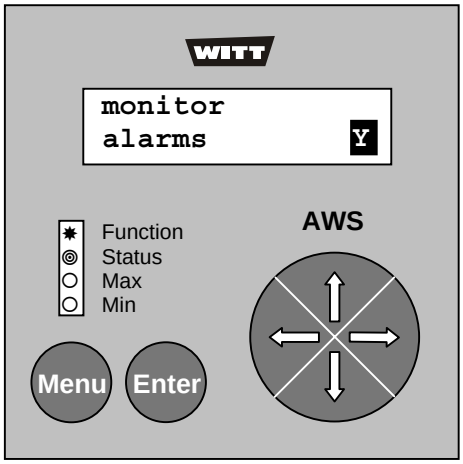
8.8.7 Monitor alarms

This menu item can be used to deactivate monitoring for all alarms. For this reason, operators should switch off the alarm monitor only during start-up and shutting down and for trouble-shooting.

Press keys ↑ and ↓ to select the required operating mode (i.e. Y= active; N = inactive).

Press <**Enter**> to confirm selection and store data.

To skip modifications: Press <**Menu**> key to return to the display mode.

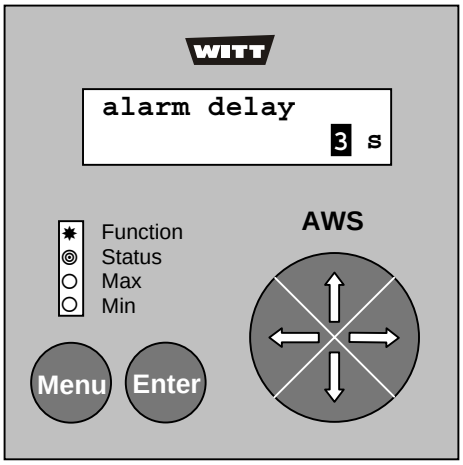


8.8.8 Set alarm delay

The alarm delay can only be set for MIN and MAX alarms, at intervals of 3 to 30 seconds.
This will enable brief fluctuations with MIN / MAX alarms to be compensated.

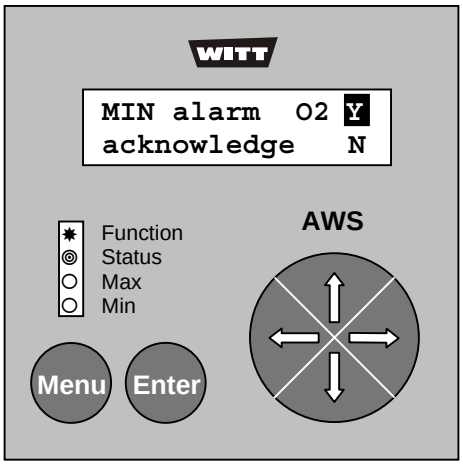
Press the ↑ and ↓ keys to adjust the delay time. Press <**Enter**> to confirm the selection.

To skip modifications: Press <**Menu**> key to return to the display mode.



8.8.9 Set MIN threshold limits

8.8.9.1 Transmission of alarms



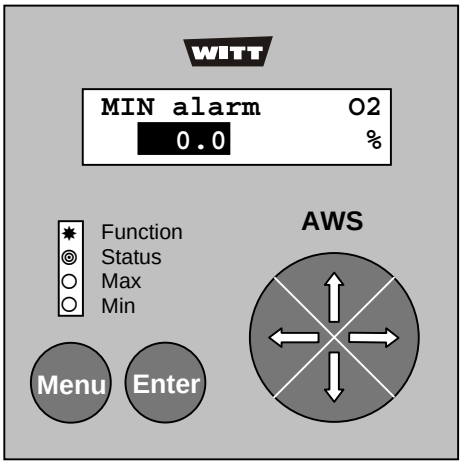
The upper line in the display defines whether a MIN alarm shall be monitored or not, and if a corresponding indication shall be provided in the fault menu, through illumination of the LED and switching of the voltfree MIN contact.

The lower line defines whether this fault shall be acknowledged by the operator. I.e. the fault message will appear in the fault menu and the corresponding LED will be illuminated even if the measure value did already exceed the threshold limit. The message will only be cancelled after pressing the <**Enter**>-key.

To modify the setting, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection (**Y** or **N**) press ↑ or ↓.
To confirm selection and store modified setting,
press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.9.2 Set MIN alarm threshold limit

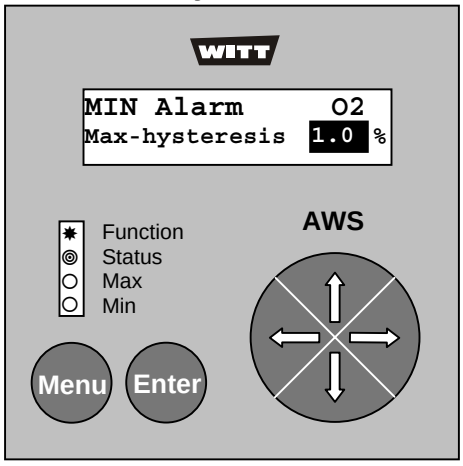


The min. alarm threshold limit is adjustable.

To modify the min alarm threshold limit, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
To alter the selection press ↑ or ↓.
To confirm selection and store modified selection, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.9.3 Set hysteresis



The hysteresis is used to define the tripping threshold for the set threshold limit. The input is a percentage of the pre-set threshold limit and can be set between 0.0 and 10.0 %.

To modify the hysteresis, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
Press keys ↑ and ↓ to modify the %-value.
Press <**Enter**>-to confirm and store your setting.

To skip modifications: Press <**Menu**> key to return to the display mode.

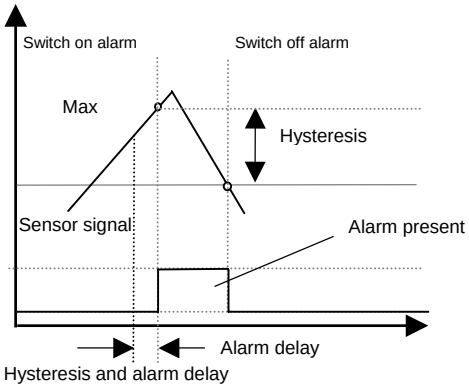
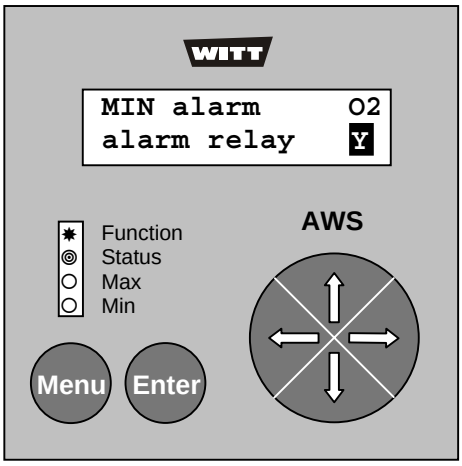


Figure: Hysteresis and alarm delay

8.8.9.4 Signal output to alarm relay



The signal can be transmitted to an alarm relay (multiplex relay), to trigger an alarm light or a hooter, or a SPS connected to the system.

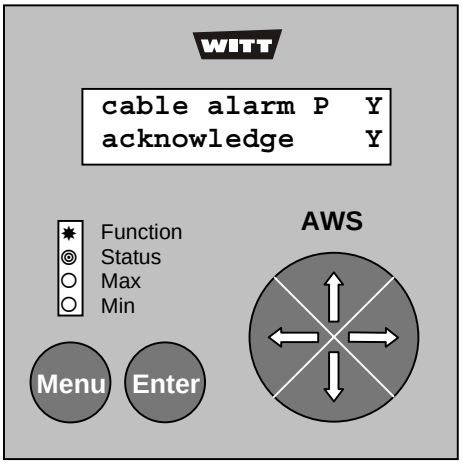
To modify the selection, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
Press keys ↑ and ↓ to modify setting (**Y** or **N**).
To confirm selection and store modified setting, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.10 Set MAX threshold limit

For setting the MAX alarm threshold limit please follow the procedure given for the MIN alarm threshold limit (please refer to section 8.8.9).

8.8.11 Cable failure P



A cable failure can only be identified for sensors providing a 4 to 20 mA output signal. If the current measured at the corresponding AWS inlet connector is less than 2 mA, then this will be interpreted as a cable failure.

The lower line defines whether this fault shall be acknowledged by the operator. I.e. the fault message will appear in the fault menu and the corresponding LED will be illuminated even if the measure value did already exceed the threshold limit. The message will only be cancelled after pressing the <**Enter**>-key.

To modify the setting, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
Press keys ← and → to switch between adjustable parameters („cable failure“ and acknowledge).
To alter the selection (**Y** or **N**) press ↑ or ↓.
To confirm selection and store modified setting, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

Signal output to alarm relay (multiplex relay)

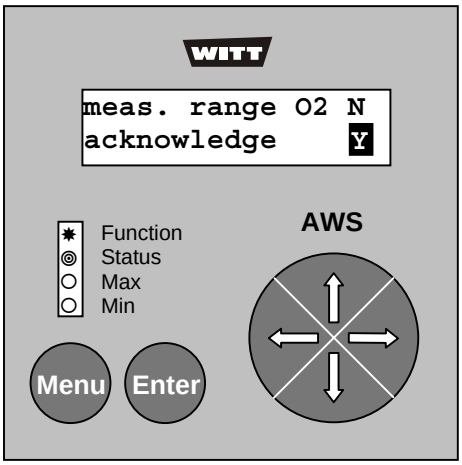
Press → to select menu item cable failure / alarm relay.

The signal can be transmitted to an alarm relay (multiplex relay), to trigger an alarm light or a hooter, or a SPS connected to the system.

To modify the selection, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
Press keys ↑ and ↓ to modify setting (**Y** or **N**).
To confirm selection and store modified setting, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.12 Exceeding the measurement range O_2 or P



An alarm condition indicating that the measurement range is exceeded can be defined for all sensors. If the current or voltage signal measured at the corresponding inlet connectors of the AWS is in excess 80 mV respectively 20, this will be interpreted as a measurement range transgression.

Example: O_2 concentration in the calibration gas is too high.
– Measurement range of the sensor is 30-Vol.% O_2
– Calibration gas concentration is 36-Vol.% O_2

The lower line defines whether this fault shall be acknowledged by the operator. I.e. the fault message will appear in the fault menu and the corresponding LED will be illuminated even if the measure value did already underrun the threshold limit. The message will only be cancelled after pressing the <**Enter**>-key.

To modify the setting, press <**Enter**> to select the editing mode.

The adjustable parameter is flashing.
Press keys ← and → to switch between adjustable parameters („cable failure“ and acknowledge).
To alter the selection (**Y** or **N**) press ↑ or ↓.
To confirm selection and store modified setting, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

Signal output to alarm relay (multiplex relay)

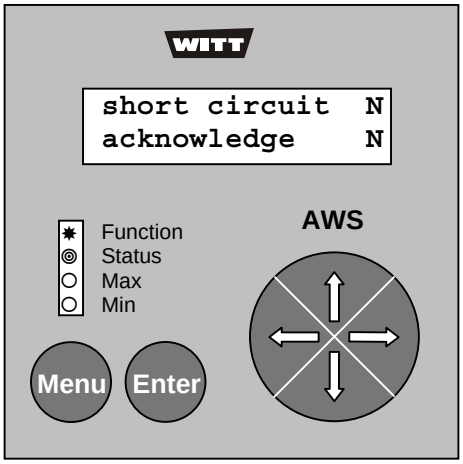
Press → to select menu item meas. range / alarm relay.

The signal can be transmitted to an alarm relay (multiplex relay), to trigger an alarm light or a hooter, or a SPS connected to the system.

To modify the selection, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
Press keys ↑ and ↓ to modify setting (**Y** or **N**).
To confirm selection and store modified setting, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.8.13 Set monitoring of short circuit alarm



The short circuit monitoring function can be used to monitor the external wiring for short circuits, e.g. the transistor output of the AWS, to ensure that these are operational.

The following options can be set: Short circuit monitoring, acknowledgement.

The lower line defines whether this fault shall be acknowledged by the operator. I.e. the fault message will appear in the fault menu and the corresponding LED will be illuminated even if the measure value did already exceed the threshold limit. The message will only be cancelled after pressing the <**Enter**>-key.

To modify the setting, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
Press keys ← and → to switch between adjustable parameters („cable failure“ and acknowledge).
To alter the selection (**Y** or **N**) press ↑ or ↓.
To confirm selection and store modified setting, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

Signal output to alarm relay (multiplex relay)

Press → to select menu item short circuit / alarm relay.

The signal can be transmitted to an alarm relay (multiplex relay), to trigger an alarm light or a hooter, or a SPS connected to the system.

To modify the selection, press <**Enter**> to select the editing mode.
The adjustable parameter is flashing.
Press keys ↑ and ↓ to modify setting (**Y** or **N**).
To confirm selection and store modified setting, press <**Enter**>.

To skip modifications: Press <**Menu**> key to return to the display mode.

8.9 Readout data from your MFA III

8.9.1 Software

The record your analysis data you are encouraged to use the WITT-Logger, a software program specifically developed by WITT-GASETECHNIK. The WITT-Logger provides a simple, reliable and comfortable user interface for data recording.

You will find further information on the WITT-Logger, like e.g., system requirements, installation and operation, on the CD delivered with your MFA III.

☞ ***Please note !***
The WITT-Logger PC program delivered on the CD is partly operational.
5 analysis results will be recorded per session, subsequently the program will automatically be switched into the demo-mode.
Please contact WITT-GASETECHNIK to receive a release code which will provide full operability of the program.

8.9.2 Hardware

You will need a special interface cable to establish an electrical connection between the MFA III and your PC. The interface cable can be ordered from WITT-GASETECHNIK or your responsible sales representative.

8.9.2.1 Connector assignment of RS 232 interface

WITT connector X3	9-pin sub D connector	25-pin sub D connector	Signal	Description
Pin 1	Pin 2	Pin 3	RxD	Import data (data transfer for peripheral unit to the computer)
Pin 2	Pin 3	Pin 2	TxD	Export data (data transfer from the computer to the peripheral unit)
Pin 3	Pin 5	Pin 7	GND	Common ground for all signal

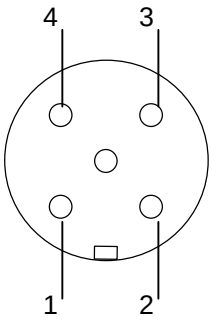


Figure: Connector assignment of the WITT-connector

9 Attachment

- Technical Data
- Parts list , enclosing list and spare parts / accessories
- Projection drawing
- Functional scheme
- Electrical circuit diagram
- List of symbols used in functional scheme
- Configuration record of the control system (AWS)
- WITT-Logger
- Interface cable (if ordered)