

ANALYZER MEASURING MODULE AT508



USER MANUAL

V1.5



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AT508 User Manual

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1. Introduction

1.1 Purpose of the analyzer

The AT508 analyzer measuring module (hereinafter referred to as AT508)

The principle of measuring CO, HC, CO₂, O₂, and NO_x complies with the requirements of OIML R 99 class 00. In the case of CO, HC, and CO₂, this involves non-dispersive infrared (NDIR) light attenuation measurement. The concentrations of these three components are measured in a single cuvette. The signals obtained from selective detectors are then compared with a reference signal. The measurement results are corrected for changes in temperature and barometric pressure.

The same applies to the O₂ and NO_x volume concentration measurement system, which is, however, implemented by an electrochemical cell. The sensor's service life is limited and depends on the duration and magnitude of the concentrations of HC and Pb (from leaded gasoline detergents) to which it is exposed. Under normal operating conditions, the service life should be at least 6 months. The device reports the end of the sensor's service life in the form of an error message.

1.2 Scope of use

The AT508, including the PC procedure, is suitable for use in the automotive industry to ensure compliance with emission standards.

1.3 Safety precautions

Read this manual thoroughly before starting the AT508. Follow all safety warnings and instructions. Use the device only for its intended purpose. Keep the AT508 dry, away from direct sunlight, and in as clean an environment as possible. Follow local safety regulations during installation and operation.

Removing the covers from the device is prohibited due to the risk of electric shock.

The relevant safety regulations apply to emission testing stations and service stations. In this spirit, the operator must ensure that the measuring device operators are trained. From the point of view of vehicle measurements, these are routine service tasks, but they are performed during operation. It is necessary to comply with the safety measures specified by the vehicle and engine manufacturer, which apply to engine tests while the engine is running. It is necessary to ensure adequate extraction of exhaust gases and to vent the gases emitted from the AT508 outside the measuring workplace.

2. Getting started

2.1 Unpacking and inspection

Upon receipt of the AT508, carefully inspect the packaging for damage. Verify that all components and accessories are in accordance with the delivery list.

2.2 Installation

Place the AT508 in a suitable location where it will not fall and will be protected from the weather.

2.3 Switching on/off

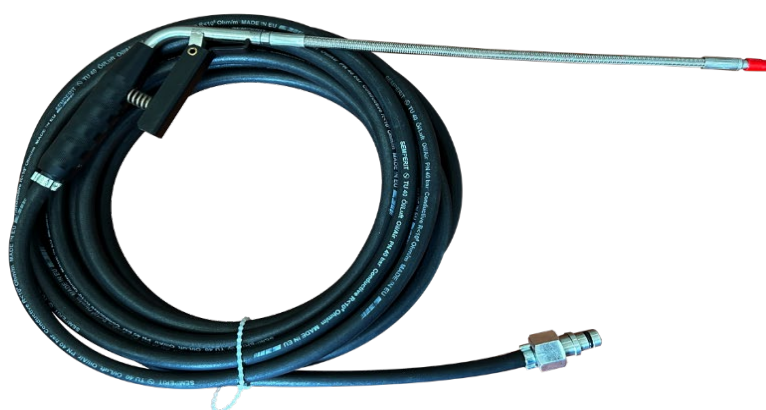
To switch on the AT508, connect the power cable to the rear of the device (=24 V). Connect the power cable with the power supply to the mains (~230 V). The AT508 will start up the welcome screen on the display and will soon be ready for use. This time is needed to warm up and prepare the device for measurement.

3. Device overview

The device housing is made of steel and coated with a two-component acrylic paint. This provides good shielding for the sampling unit's electronics. The sampling probe is made of a flexible stainless steel hose with protective braiding. The probe extension hose is made of NBR material and is resistant to petroleum products and elevated temperatures.

3.1 Main components





1	Display and buttons for controlling the device
2	O ₂ sensor (NOx sensor optional)
3	Probe input (input of measured exhaust gases into the bench)
4	Zeroing input
5	Device power supply connector (=24V)
6	Calibration input
7	Output (measured exhaust gas output from the bench, input to ventilation)
8	RS232 interface (currently not used)
9	USB A input for Bluetooth dongle (communication with PC)
10	USB B input for direct connection of the analyzer to a PC (WINUSB interface)
11	WELMEC button (calibration and service, for calibration service only)
12	Power supply ~230V/=24V
13	Fine filter
14	Coarse filter
15	Water detector

* Connecting the AT508 to a PC via a USB cable has higher priority than connecting via Bluetooth. Connecting the AT508 to a PC (USB cable or Bluetooth) has higher priority than controlling it via the AT608 using a keyboard.

3.2 Control panel

The AT508 is controlled, if not via a PC, using four buttons located directly below the display and marked with symbols. The symbols are back, down, up, and confirm.

3.3 Display

The device is equipped with a display for ease of use. The buttons below the display are used to select and navigate the menu.

There are four buttons below the display for controlling the AT608.

The first button from the left is used to return BACK to the previous menu.

The second button is used to navigate DOWN in the menu.

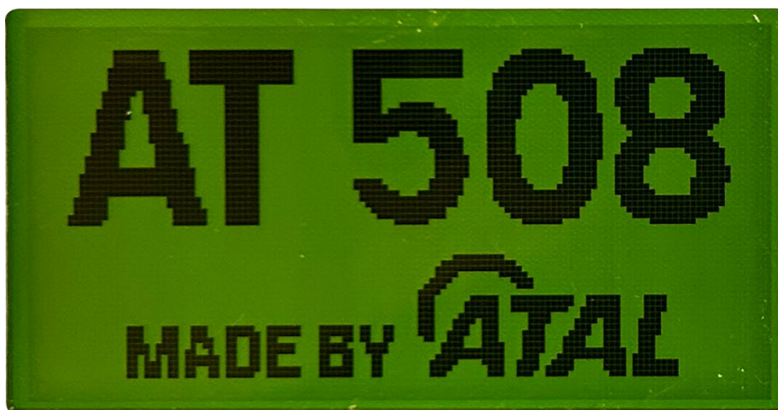
The third button is used to navigate UP in the menu.

The fourth button is used to CONFIRM the current selection.



2) device welcome screen





3) basic information about the device



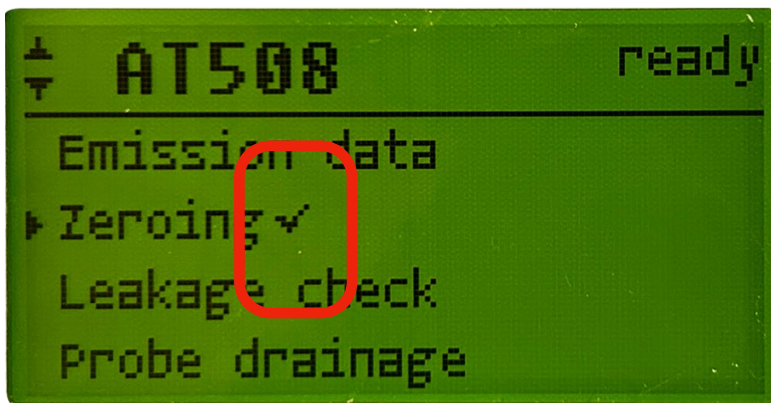
4) The display shows the current status in the upper right corner.



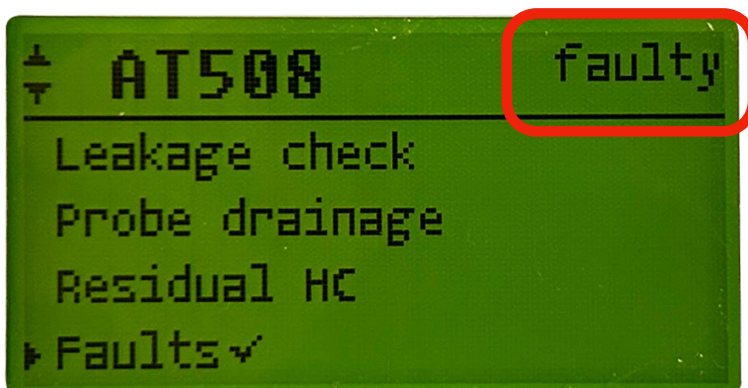
5) The arrows show where you are in the menu and where you can go.

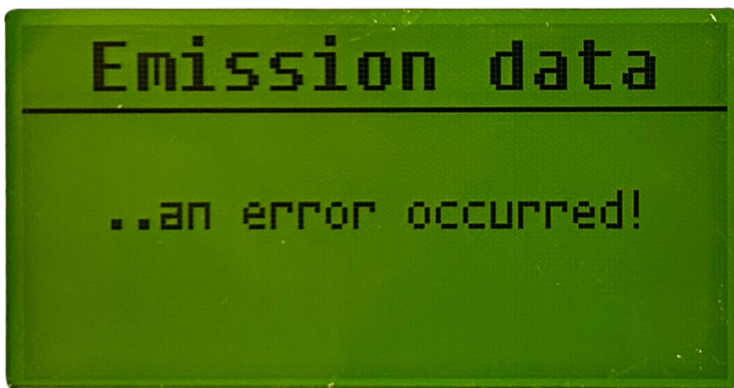


6) To ensure accurate measurements, the device must undergo calibration and zeroing. Once completed, the symbol "done" will appear next to the line in the menu.

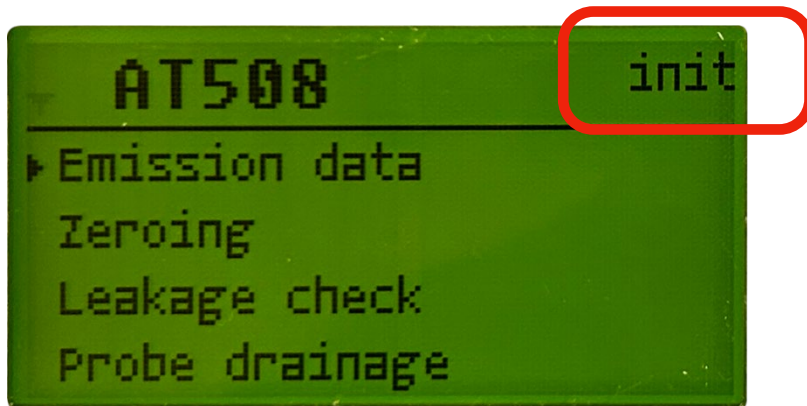


7) If the device detects an error or measurement inaccuracy, the AT508 status reports an error.

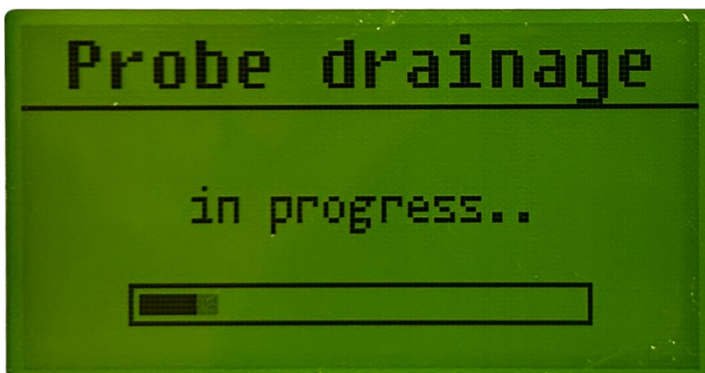
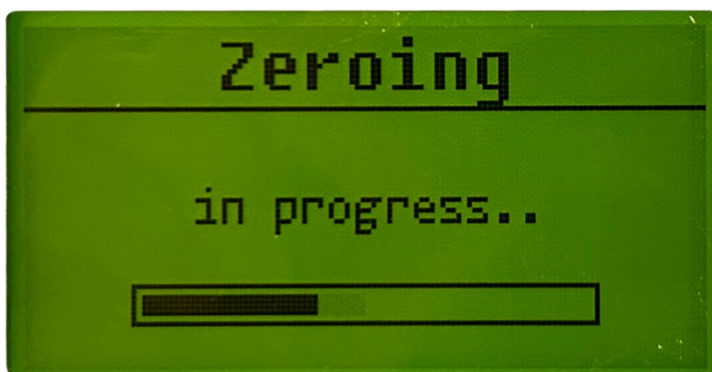




8) After starting, the device heats up.



9) We will perform zeroing, drainage, and leak testing by selecting from the menu.

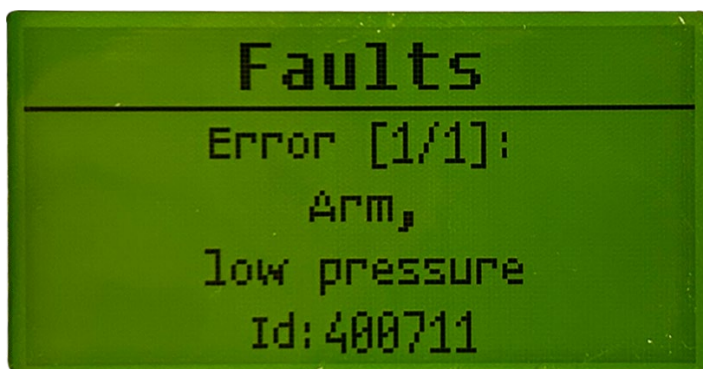




10) you can start measuring (if zeroing and draining have not been performed, the device will perform these operations automatically)



11) You will also find a report on errors and information about them in the device.



3.4 Accessories

- 7 m sampling probe
- Power supply module ~230 V/=24 V Meanwell GST120A24-R7B
- Optional Bluetooth USB interface
- Optional USB cable

4. Operating instructions

The AT508 exhaust gas measurement method complies with the requirements specified in OIML R 99.

The device can be in one of the following states:

Init The optical bench is warming up and initialization is in progress. (zeroing)

Ready the device is ready to perform an emission test

Faulty a fault has occurred, read the error message in section 4.6

After connecting the device to the power supply for the first time, the device requires a leak test in accordance with section 4.3 Leak test.

Individual menu items

4.1. Emission test

4.2. Zeroing

4.3. Leak check

4.4. Probe cleaning

4.5. Residual hydrocarbons

4.6. Errors

4.7. About the device

4.1 Emission test

Before performing the emission test, remove the plug from the sampling probe inlet. The emission test can be performed if the optical bench is warmed up and if a leak test has been performed after starting the device. The device must be in Ready mode. If the leak test has not been performed, a leak test will now be performed according to point 4.3 and the device will return to the main menu. Otherwise, the pump will start and the individual gas components will be displayed. The test can be terminated by pressing any key. If water is sucked in from the exhaust during the emission test, the pump will automatically start to pump the water out of the device and the sampling probe according to section 4.4. After the water has been pumped out, the device will return to the emission test. If the sampling probe becomes clogged during the emission test, an error is reported. This error can only be cleared by performing step 4.4 Cleaning the probe.

4.2 Zeroing

Zeroing is performed by connecting clean air to the device inlet. It is not necessary to remove the sampling probe from the exhaust to zero the device. If the device is in the main menu, zeroing occurs automatically once every 60 minutes. During zeroing, the optical bench, O₂ sensor, and NO_x sensor are zeroed.

4.3 Leak test

After starting the leak test, you will be prompted to insert the seal into the sampling probe inlet. After inserting the seal, press the CONFIRM key. The device will then perform a leak test. A progress indicator is displayed during the leak test. If the test is successful, you will be prompted to remove the plug from the sampling probe inlet. After removing the plug, press any key. At the same time, the Done symbol will be displayed in the main menu under the Leak Test menu. If the test is unsuccessful, an error message will be displayed and you will return to the main menu without the Done symbol in the Leak Test menu. The leak test is always performed when the device is started for the first time, i.e. after connecting the device to the power supply.

4.4 Probe cleaning

Water can be removed from the device and the sampling probe cleaned by selecting this menu. In this case, the water is blown out through the sampling probe. Therefore, care must be taken to avoid splashing from the water blown out of the end of the sampling probe.

4.5 Residual hydrocarbons

Residual hydrocarbons are checked by feeding clean air into the instrument inlet. It is not necessary to remove the sampling probe from the exhaust to check residual hydrocarbons. If residual hydrocarbons do not fall below 20 ppm Vol within 5 minutes, an error is reported.

4.6 Errors

The AT508 continuously stores errors and warnings, which can be read in this mode.

Error evaluation

Each error consists of three parts. The first part indicates the error group, such as hardware, control, actuator, or other. The second part indicates the source of the error, and the third part indicates the type of error.

HARDWARE group – 80:

- 01 – Temperature [detector side]
- 02 – Detector [detector side]
- 03 – Temperature [LED side]
- 04 – Detector [LED side]
- 05 – ADC [microcontroller]
- 06 – Cell temperature [T1]
- 07 – Probe temperature [T2]
- 08 – Exhaust gas temperature [T3]
- 09 – Oil temperature [T4]
- 0a – Pressure [P1]
- 0b – Pressure [P2]
- 0c – Pressure [P3]
- 0d – Probe current
- 0e – USB voltage
- 0f – High-frequency buzzer (not used)
- 10 – Low-frequency buzzer (not used)
- 11 – Fan

- 12 – I2C1 bus
- 13 – I2C4 bus
- 14 – Accelerometer
- 15 – Humidity
- 16 – EEPROM
- 17 – ADC 24-bit [external]
- 18 – NO_x
- 19 – O₂

REGULATION group – 40:

- 01 – Light regulation on the detector side
- 02 – Cuvette heating
- 03 – Probe heating
- 04 – Light regulation on the LED side
- 05 – Fan regulation
- 06 – Pump regulation
- 07 – Probe cleaning
- 08 – Zeroing
- 09 – Linearity
- 0a – Fan acceleration readiness control
- 0b – Opacity data collection

ACTUATOR GROUP – 20:

- 01 – Cuvette heating
- 02 – Probe heating
- 03 – LED transmitter
- 04 – Cuvette
- 05 – Valve V1
- 06 – Valve V2

OTHER group – 10:

- 0x01 – Bluetooth
- 0x02 – Bootloader

Error types

- 00 – undefined
- 01 – sporadic
- 02 – persistent
- 03 – less than minimum
- 04 – greater than maximum
- 05 – high pressure
- 06 – time exceeded
- 07 – value out of range
- 08 – reset error
- 09 – application CRC error
- 0a – application crashed
- 0b – WELMEC button pressed
- 0c – system reset called
- 0d – CRC initialization error

EPROM – AT508 analyzer

Errors:

00000001 – PERIODIC_SERVICE
00000002 – APPL_CRC_CHECK
00000004 – SER_NUM
00000008 – RESERVED
00000010 – INIT_READ
00000020 – INIT_CRC
00000040 – INIT_VERSION
00000080 – INIT_RESERVED
00000100 – REG_CAL_READ
00000200 – REG_CAL_CRC
00000400 – REG_CAL_VERSION
00000800 – REG_CAL_RESERVED
00001000 – REG_Ids_CAL_READ
00002000 – REG_Ids_CAL_CRC
00004000 – REG_Ids_CAL_VERSION
00008000 – REG_Ids_CAL_RESERVED
00010000 – HW_CAL_READ
00020000 – HW_CAL_CRC
00040000 – HW_CAL_VERSION
00080000 – HW_CAL_RESERVED
00100000 – HW_Ids_CAL_READ
00200000 – HW_Ids_CAL_CRC
00400000 – HW_Ids_CAL_VERSION
00800000 – HW_Ids_CAL_RESERVED
01000000 – GLASS_CAL_READ
02000000 – GLASS_CAL_CRC
04000000 – GLASS_CAL_WRITE
08000000 – GLASS_CAL_RESERVED

4.7 About the device

This section contains important information about the AT508, such as the device serial number, firmware version, checksums, part number, required bench temperature, etc.

5. Calibration

Calibration may only be performed by an authorized person (calibration service) from a PC, and the WELMEC button must be pressed. Instructions for calibrating the AT508 are not included in this description but are part of the service documentation. The AT508 operator is not permitted to perform this calibration due to technical security measures.

6. Maintenance

The following instructions must be followed to ensure the correct operation of the AT508: The AT508 must only be operated in a vertical position. If the AT508 is tilted from this position, an error is indicated by a double audible signal. The prescribed and approved Meanwell GST120A24-R7B power supply must be used.

7. Safety guidelines

7.1 General safety instructions

The AT508 is equipped with a tilt sensor that interrupts measurement if the device is tilted and this could affect the accuracy of the measurement. If the sensor detects a tilt, the device stops measurement and emits a double beep. In this case, the AT508 must be returned to the correct position and the measurement repeated. Care must be taken to avoid splashing from water blown out of the end of the sampling probe when cleaning the probe, see section 4.4.

7. Technical Specifications

According to OIML R 99

8.1 Measurement Accuracy and Measurement Range

CO % vol	CO ₂ % vol	O ₂ % vol	HC ppm vol
0 to 5	0 to 16	0 to 21	0 to 2 000

8.2 Minimum resolution

CO % vol	CO ₂ % vol	O ₂ % vol ≤ 4 % vol	O ₂ % vol > 4 % vol	HC ppm vol
0.01	0,1	0.001	0,1	1

8.3 Maximum permissible error

The maximum permissible error corresponds to class 00 according to OIML R 99

8.4 Optical bench

Temperature 50 °C
Flow rate 4 l/min

9. Customer support

9.1 Contact information

info line: 381 410 100 email: info@atal.cz

9.2 Online sources

www.atal.cz

10. Conclusion

Thank you for choosing the ATAL AT508 Analyzer Measurement Module. This comprehensive user manual should help you install, operate, and maintain the device correctly. If you have any further questions or need assistance, please refer to the customer support section or contact our technical support team.

*Note: This manual may be subject to updates. Please check the manufacturer's website for the latest version.