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Operating Instructions

VICOTEC320

Gas Adjustment Kit

Endress+Hauser

Described Product
Product name: VICOTEC320 Gas Adjustment Kit

Manufacturer
Endress+Hauser SICK GmbH+Co. KG
Bergener Ring 27
01458 Ottendorf-Okrilla
Germany

Legal information

Original document
This document is an original document of Endress+Hauser SICK GmbH+Co. KG.

Contents

1. General

1.1 Safety

The user manual must be carefully read, understood and followed by all persons who install, use, maintain and check the product.
The product can fulfil its intended functions only if it is installed, used, maintained, cared for and checked in accordance with the instructions provided by Endress+Hauser.

1.2 Installer and Operator's Responsibilities

It is the installer and operator's responsibility to ensure that all VICOTEC320 devices are installed and used in compliance with all international, national and local regulations and requirements. The gas warning device must be checked by an expert for correct installation and functioning before starting the measuring operation.
The installation should only be carried out by trained installation technicians, taking into account the current safety procedures for control installations.
The required equipotential bonding connections (also e.g. secondary potential to earth) or earthing measures are to be carried out according to the respective project regulations. Make sure that no earthing loops are created in order to avoid undesired interference in the measurement electronics.
It is necessary to follow all instructions as well as the user documentation.

1.3 Maintenance

It is recommended that the equipment is to be inspected on a regular basis. Performance deviations can be corrected based on regular maintenance. Recalibration and parts replacement can be performed in the field by a qualified technician using the appropriate tools.
Regular maintenance is to be carried out according to the instructions.

1.4 Limited Warranty

Endress+Hauser accepts no liability in the event of improper or incorrect use of the device. The installer and operator are solely responsible for the design and use of the product. If the product is not used, maintained or repaired in accordance with the instructions for use, warranty and product liability claims as well as claims arising from any guarantees assumed by Endress+Hauser for the product will be forfeited.

1.5 Part Disposal

The appliance can be disassembled into its components, which can be recycled as raw materials.

- Dispose of electronic components as electronic waste.
- Batteries must not be disposed of with household waste. The battery and the appliance must be disposed of separately in accordance with local waste disposal regulations.

2. Intended Use

The Adjustment Tool is used as a calibration unit.

3. Product description

3.1 Product identification

Product name	VICOTEC320 Gas Adjustment Kit
Manufacturer	Endress+Hauser SICK GmbH+Co. KG Bergener Ring 27 · 01458 Ottendorf-Okrilla · Germany
Type plate	On the lid of the case, right bottom

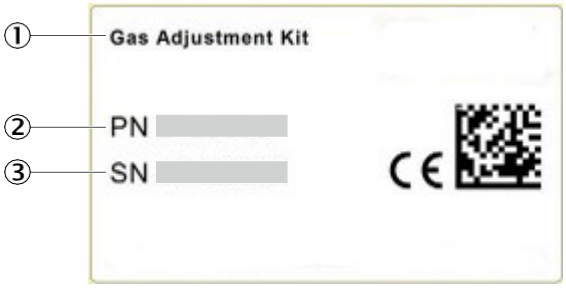


Figure 1: Type plate, Gas Adjustment Kit

① Designation
② Part number
③ Serial number

3.2 Layout and function

The Gas Adjustment Kit continuously checks the gas type and measuring range set for agreement with gas type and measuring range of the connected gas sensor and outputs an error if there is an inconsistency.

3.2.1 Gas Adjustment Kit

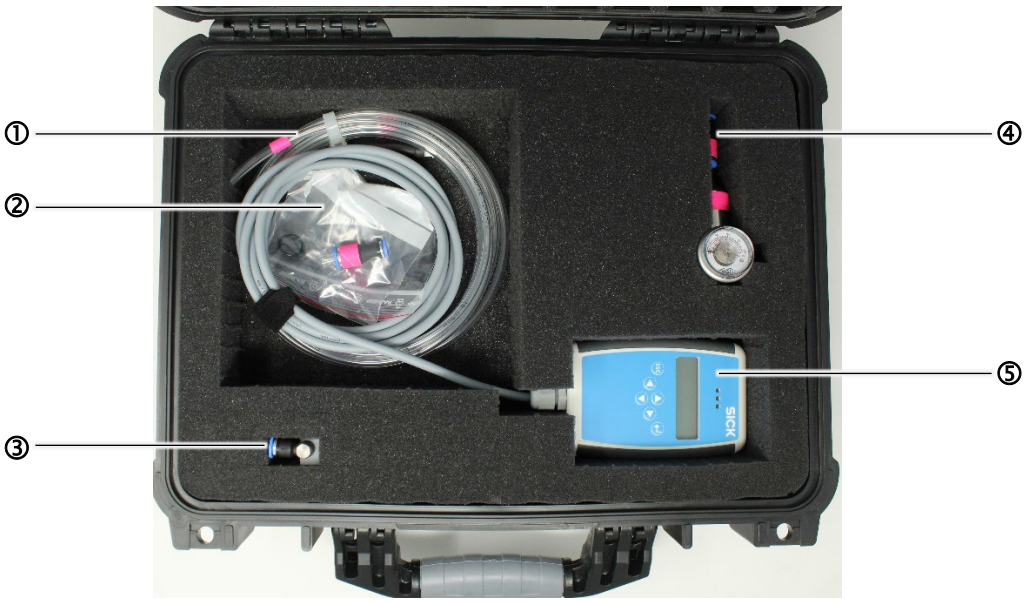


Figure 2: Contents, Gas Adjustment Kit

	Designation
1	Hose, transparent (marked pink), 3 m for carbon monoxide (CO) and synthetic air
2	Accessories: 1× hose adapter and transition piece, 1× replacement seals (O-ring) for tapping valve
3	Adapter for sampling valve
4	Brass sampling valve (marked pink) for CO and synthetic air, flow rate: 0.5 l/min
5	Adjustment tool
	Operating Instructions

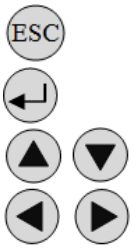
Table 1: Designation contents Gas Adjustment Kit

4. Operation

4.1 Operating Keys

The complete configuration and service are made via operating keys in combination with the LC display screen.

Operation is via 6 buttons:



Exits programming, returns to the previous menu level.

Enters sub menus and saves parameter settings

Navigates within a menu, changes values

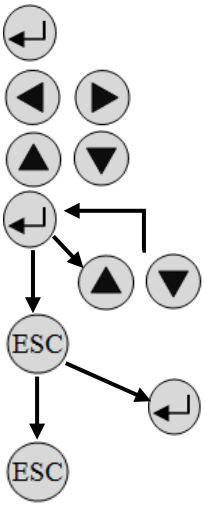
Changes cursor position

4.2 Status LED

The status LEDs indicate the operating state.

Green	Continuous	= Operating voltage
Yellow	Continuous	= Failure
	Slowly flashing	= Warming-up
	Fast flashing	= Special mode
Red	Alarm	= Alarm

4.2.1 Setting / Changing of Parameters and Set Points



Open desired menu window.

Push the cursor onto the position segment, which is to be changed.

Set the desired parameter / set point with the keys.

Input of value finished.

Change further parameters in the same menu.

Save the changed value?

YES, and back to higher menu level.

NO, (previous value is not overwritten) and back to higher menu level.

4.3 Measuring Point

The term Measuring Point (MP refers to a sensor connected to the VICOTEC320.
For a sensor with analog 4–20 mA signal the display shows **AP = Analog measuring Point.**

With AP, the subsequent number indicates the number of the analog input used.
AP11: This is the measured value of the analog sensor head connected to analog input 11.

5. Code Level

All inputs and changes are protected by a 4-digit numeric code (= password) against unauthorised intervention according to the regulations of all national and international standards for gas warning systems. The menu windows of status messages and measured values are visible without entering a code.
The access to a code level is cancelled if no button is pushed within 15 minutes or if you return to start menu.

The Adjustment Tool is only protected by code level 4.

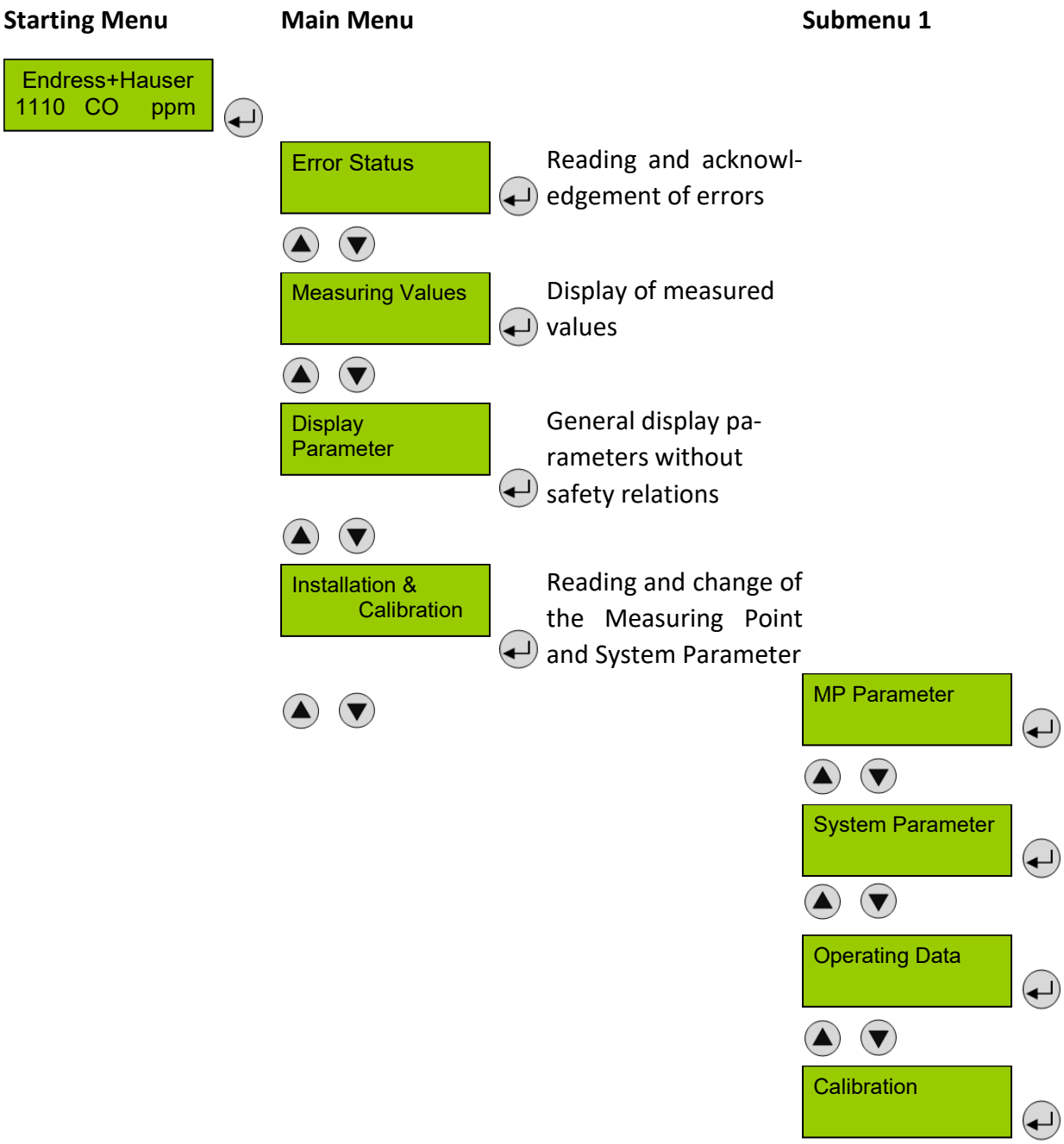
Code level 4 (password 1234, code not changeable)

Code level 4 allows the **operator** after activation of the operation mode “Service Mode” to read all parameters as well as all test functions of the alarm relays, analog outputs and LCD.

- Manual test function of the alarm relays (functional test of the connected actuators),
- Manual test function of the analog outputs (functional test of the connected actuators),
- Manual test function of the LCD (functional test of the LCD display and the LEDs).

6. Menu Overview

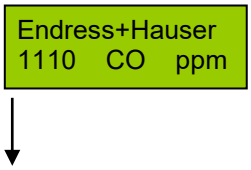
Start menu with display of the company name and the CO sensor by default. The tool automatically tries to communicate with the CO sensor.
After starting, the Adjustment Tool automatically searches for the connected sensor. In the process, the gas types are scrolled through. If the connected sensor is found, the display stops with the nomenclature, gas type and unit. If the data connection to the sensor is lost, the automatic search starts again.



Menu operation is done via a clear, intuitive and logical menu structure. The operating menu contains the following levels:

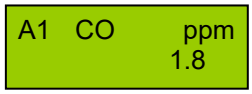
- Main menu
- Submenu 1–3

Starting Menu



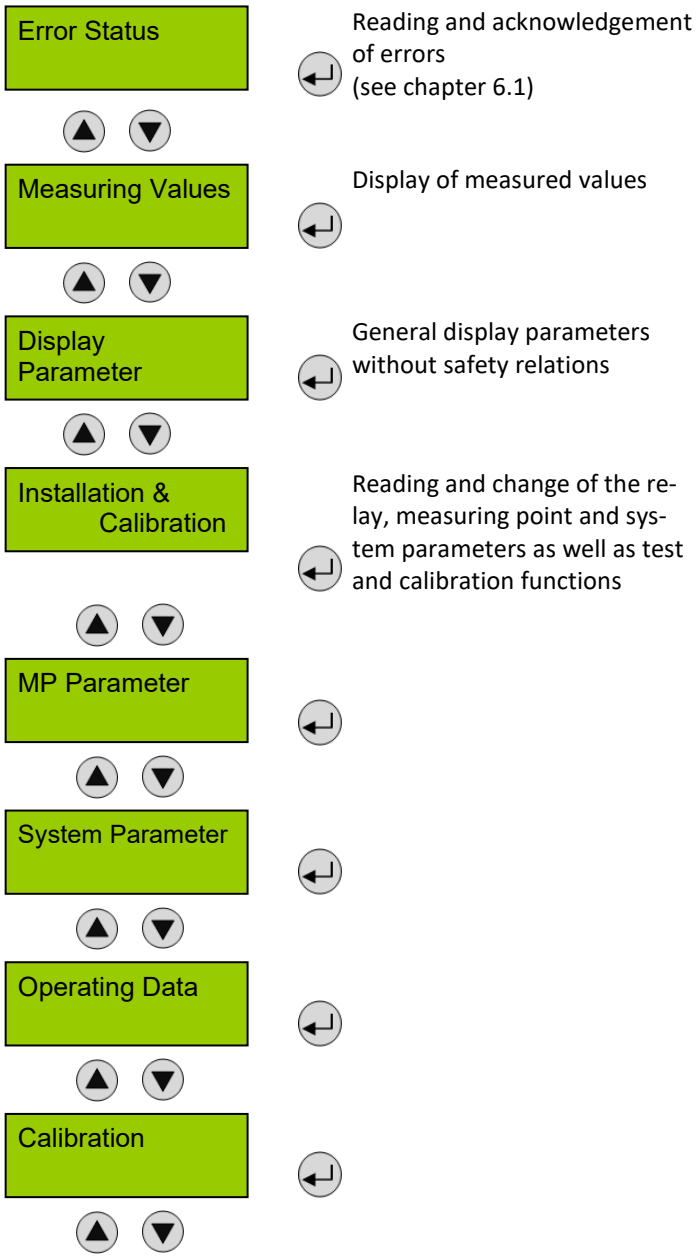
After starting, the Adjustment Tool automatically searches for the connected sensor. The gas types are scrolled through. If the connected sensor is found, the display stops with the nomenclature, gas type and unit. If the data connection to the sensor is lost, the automatic search starts again.

After about 10 sec. “Warm-up Time” is displayed. As soon as the sensor warm-up period has expired, the measured value is displayed = measuring mode.



Selection Main Menu

Starting Menu **Main Menu** **Submenu 1**



6.1 Error Status

A pending fault activates the yellow LED (Fault).
The currently pending faults are displayed without a time stamp. If the cause of the fault is eliminated, the fault message is automatically acknowledged.

The first 50 automatically acknowledged fault messages are logged in the fault memory of the displays.

6.2 Measuring Values

n this menu, the display shows the measured value with gas type and unit.

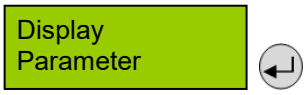
Symbol	Description	Function
A1[1]	Meas. Point No.	Analog measuring point 1 = 1–X
D1[2]	Meas. Point No.	Digital measuring point 1 = 1–X
CH4	Gas type	Display of gas type (must comply with gas type of sensor head)
% LEL	Gas unit	Unit (depending on gas type)
51,0 C 48,0 A	Measured value	C = Current measured value (current value) of the gas concentration A = Arithmetic average of the gas concentr. (only if average is active)
A!	Alarm indication	At least one alarm has been released at this MP.
#	Maint. info	Sensor head: maintenance due (maintenance date exceeded)
Comm. err.	Fault MP	Communication error, sensor head <> I/O board
Underrange	Measuring range monitoring	Meas. signal < admissible range (< zero point - 4,5 % for toxic gases, - 1,125 vol % for oxygen), hysteresis 2.3 % of range Meas. signal < admissible range (< zero point - 10 % of range combustible gases), hysteresis 2 % of range
Overrange[3]		Meas. signal > admissible range (> full scale value + 6 %)
Warm-up	Warm-up time	Warm-up period of the sensor active

Table 1: Measured Value Display

[1] Analog input number in the measuring point where the analog sensor head is connected to.
[2] Display of the address number the sensor head is registered under in the field bus.
[3] Acknowledgement in the menu Alarm Status.

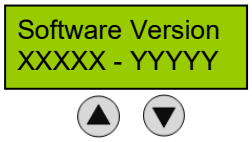
6.3 Display Parameter

In the menu Display Parameters, you can find the general, security irrelevant parameters in the display device. These parameters can be changed during operating mode.



6.3.1 Software Version

Software Version of the display (factory set)

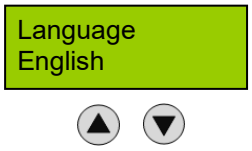


Symbol	Description	Function
XXXXX YYYYY	Software version of display Software version of connected basic board	XXXXX Software Version YYYYY Software Version

Table 2: Software Display

6.3.2 Language

Selection of the menu language (only code level 1 and 3)



Symbol	Description	Default	Function
English	Language	German	German English USA English French Italian

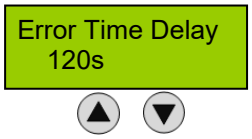
Table 3: Language Selection

6.3.3 Customer Password

Storage of an individual customer password for changing parameters (Code Level 4). Changing the password only via code level 1. This menu item will only appear after having entered the password of code level 1.

Code Level 1 Enter new customer password

6.3.4 Error Time Delay

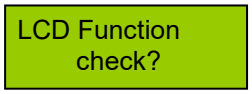


Symbol	Description	Default	Function
s	Delay	0s	(Only code levels 1 and 3) Definition of a delay time after an error reported by the basic board has occurred (only fault indication on the display, no effect on the function or outputs) Entry is 4-digit in the range of 0–9999 seconds.

Table 4: Error Time Delay

6.3.5 LCD Function

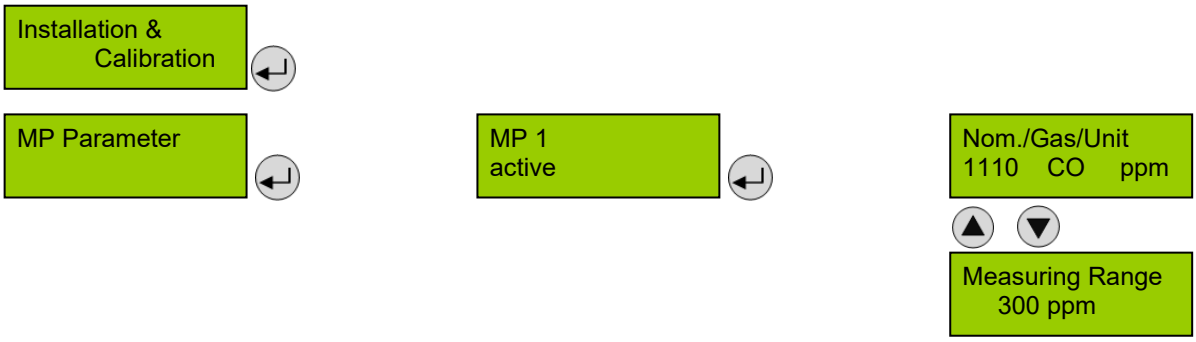
Testing the LCD hardware via code levels 1, 3 and 4. All LEDs light up for about 2 seconds. The backlight is yellow (green and red are activated at the same time). All points are displayed on the LCD.



6.4 MP Parameter

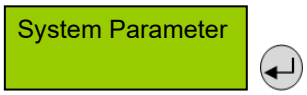
Reading out the parameters for each Measuring Point (NOT CHANGEABLE).

Measuring Point selection (1)



6.5 System Parameter

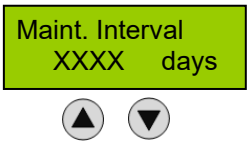
The system parameters maintenance interval and error time can be changed, all other parameters of the sensor head can only be read.



6.5.1 Maintenance Interval

Input of the maintenance interval in days. If you enter < 10 days, the function is not active.

Sensor head maintenance interval:
A standard maintenance interval (maximum value) is stored in each sensor head (e.g. flammable gases 200 days, see data sheet). This value can be reduced to a minimum of 30 days. A pending maintenance message can only be acknowledged by a calibration at the sensor head.



Symbol	Description	Default	Function
XXXX	Days	0	Maintenance interval

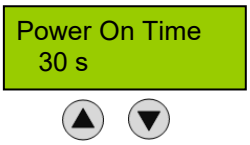
Table 5: Maintenance Interval

6.5.2 Average Function

Info: The alarm function is not set in the sensor, but in the VICOTEC320 (see operating manual). The average function is therefore not supported in the VICOTEC320.

6.5.3 Power-On Time

Electrochemical cells need a warm-up period, until the measuring process reaches stable conditions. During this warm-up period the sensor signal can lead to an unwanted triggering of a pseudo alarm. Therefore, the Power On Time is started at each basic unit and each sensor head after power-on or voltage recovery. While this time is running out, the device is in special mode and does not activate alarms. Power On Time appears in the starting menu. During this phase, the sensor head transmits "Warm-up time" instead of the measured value.
The Power On Time of the individual components may be different. Only when the longest time has expired, the system starts the measuring operation.



Symbol	Description	Default	Function
XX	Seconds	30	Power-On time

Table 6: Power-On Time

6.5.4 Error Time of the Sensor

Allows you to set the error time for a sensor via the Adjustment Tool.
The error time value represents an interval in days. This interval is maintained between the occurrence of the maintenance message (maintenance remaining days = 0) and the output of 19 mA (maintenance message) at the analog output of the sensor.

6.6 Operating Data

This menu is for retrieving relevant operational data of the sensor head and the basic unit. No changes or interventions are possible

Note: The operating data is transferred to the non-volatile data memory EEPROM once a week and saved. In the event of a power failure, information may therefore be missing for up to 7 days.

Press the ↵ key to read in the operating data. The text 'Please wait...' appears during the read-in process. If the operating data could not be read in, the display returns to the previous menu item. As soon as the operating data could be read in, the first subordinate menu item is displayed.

Software Version XXXXX	Software-Version serves as info for support
Days of Operation X Days	Current operating days, counts continuously how many days the unit has been operated on voltage → serves as info for support
Gas Conc. Counter 0 10%MR/Day	Gas concentration counter* Unit: 10 % of measuring range per day Continuously counts the amount of gas measured per unit of time → serves as info for support.

* Determination of the pending gas concentration as a function of the time per day (daily quantity):

(gas concentration x time unit) / 24

The total gas concentrates result from the addition of 10 % of all calculated daily quantities.

Gas concentration = % of measuring range

Time unit = Duration of exposure in h

24 = factor conversion into days

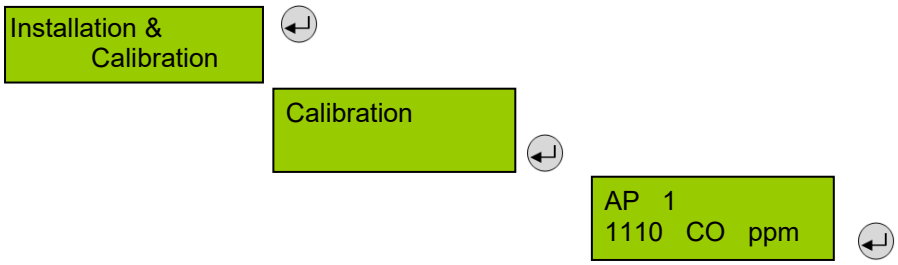
Days of Operation expected XXXX	Expected life time of the sensor head. Is continuouously recalculated on the basis of calibrations and concentrations counter. Customer info to be able to plan exchange.
Min. Temperature 25 °C	Peak hold value of the lowest temperature measured (initial value = 70°C) is updated only after 7 days when restarting.
Max. Temperature	Peak hold value of the highest temperature measured (initial value = -35°C) is updated only after 7 days when restarting.
Last Tool No.	Displays the tool number the last access was performed with → serves as info for support to localise operating errors.
Analoge Output 1 Offset 295	Display of zero offset of analog output 1 (non-standardised value)

Number of Calibr. 1	Number of gain calibrations performed on the device since factory initiation → serves as info for support.
	
Zero Gain xxxxx yyyyy	Current zero offset and gain value (not standardized) → serves as info for support.
	
Sensitivity 100%	Sensitivity of the sensor at the last calibration compared to the new sensor (1st factory calibration) = ageing info.
	
Maintenance Days Last xxx	Display of remaining maintenance days of the last gain calibration → serves as info for support for determining the regular calibration.
	
Days of operation Last xxx	Counted days of operation during the last gain calibration → serves as info for support. for determining the regular calibration.
	
Maintenance Days Currently xxx	Current remaining days until next maintenance date (down counter) is set to calibration interval value again during gain calibration → info for customers when (in how many days) to calibrate.
	
Max. Current Value 0	Peak hold for the highest current value measured of the sensor head→ serves as info for support.

6.7 Calibration

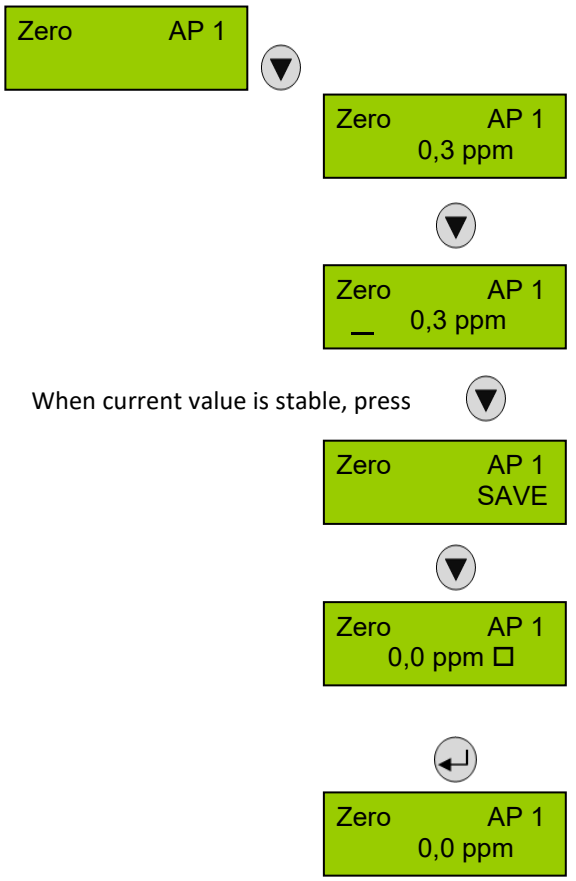
After connecting the Adjustment Tool, the following display appears:

Press the key ↵ and use the keys to scroll down ▲ ▼ in the main menu to the menu item “Installation & Calibration”.



6.7.1 Zero Point Calibration

Use the calibration adapter from the gas adjustment kit for the gas feed. The correct flow rate is already preset.



Step 1: Display of the current value.
Apply zero gas according to instructions. (No calculation/adjustment is made here yet.)

Start calibration process

Step 2: Calculation of the new zero offset.
During calculation an underscore in the 2nd line runs from left to right and the current value drops to 0.

When current value is stable, press = terminating the calculation of the new value

Step 3: Save the newly calculated zero offset
”SAVE“ is displayed, as long as the function is executed.

After the value has been successfully stored, a square appears on the right for a short time = Zero point calibration is finished and new zero offset has been stored with success.

The display automatically goes to step 1: Display of new zero point

During the calculation phase, the following messages may occur:

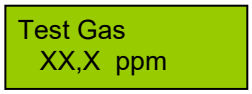
Message	Description
Current value too small	Sensor element defective, replace sensor head.
Current value too high	Wrong gas for zero point calibration Message appears if current zero point measurement value is too high (> 10 % of the AD transducer range, denpendent on gain, not on measurement range).
Current value unstable	Is displayed as long as the deviation between 2 measuring cycles (100 ms) is > 3 %. It automatically extinguishes when the sensor signal becomes stable.
Internal error	Is displayed if calibration is not possible, e.g. in the event of serious sensor errors (replace sensor element) or during the burning-clean process.
Time too short	Message appears if the change in the calibration factor is so great that a stabilisation time must be waited for. An internal timer (20 s) starts. If the timer expires and the actual value is still unstable, the text continues to be displayed. The process starts again. If the value is stable, the actual value is displayed again and the calibration process continues. If this cycle is repeated several times, there is an internal error. The calibration process must be cancelled (exit calibration menu) and the sensor head replaced.

Table 7: Possible Messages during Zero Point Calibration

If the zero offset calibration is aborted, the offset value is not updated. The sensor head continues to use the “old” zero offset.

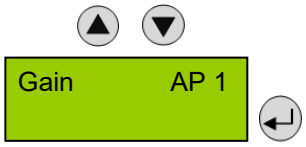
6.7.2 Gain Calibration

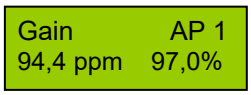
After the zero calibration has been carried out, the gain calibration is carried out.
The specified warm-up times etc. must be strictly observed.



Enter the concentration of the target or test gas currently being used (test gas concentration must be between 30 and 90 % of the measuring range).

Caution:
The test gas value is not deleted even when leaving the menu, therefore the value must be checked for correctness before each new calibration.

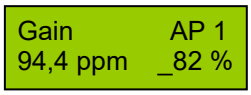




Step 1: Display of the current value and of the sensitivity from the last calibration
Apply test gas according to instructions.

Check that the hose is correctly plugged into the calibration adapter and connected to the corresponding gas cylinder. Open the valve of the flow regulator. Observe the permissible pressure, flow rate and admission time.

Start calibration process

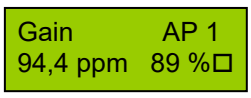


Step 2: Calculation of the new gain.
During calculation an underscore in line 2 runs from left to right and the current value adapts to the set test gas concentration. The sensitivity is recalculated.

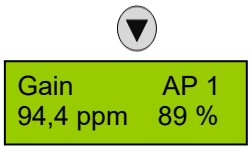
When current value is stable, press,

= terminating the calculation of the new value

Step 3: Save the newly calculated gain
"SAVE" is displayed as long as the function is executed.



After the value has been successfully stored, a square appears on the right for a short time. = Gain calibration is finished new gain offset has been stored with success.



The display automatically goes to step 1: Display

During the calculation phase, the following messages may occur:

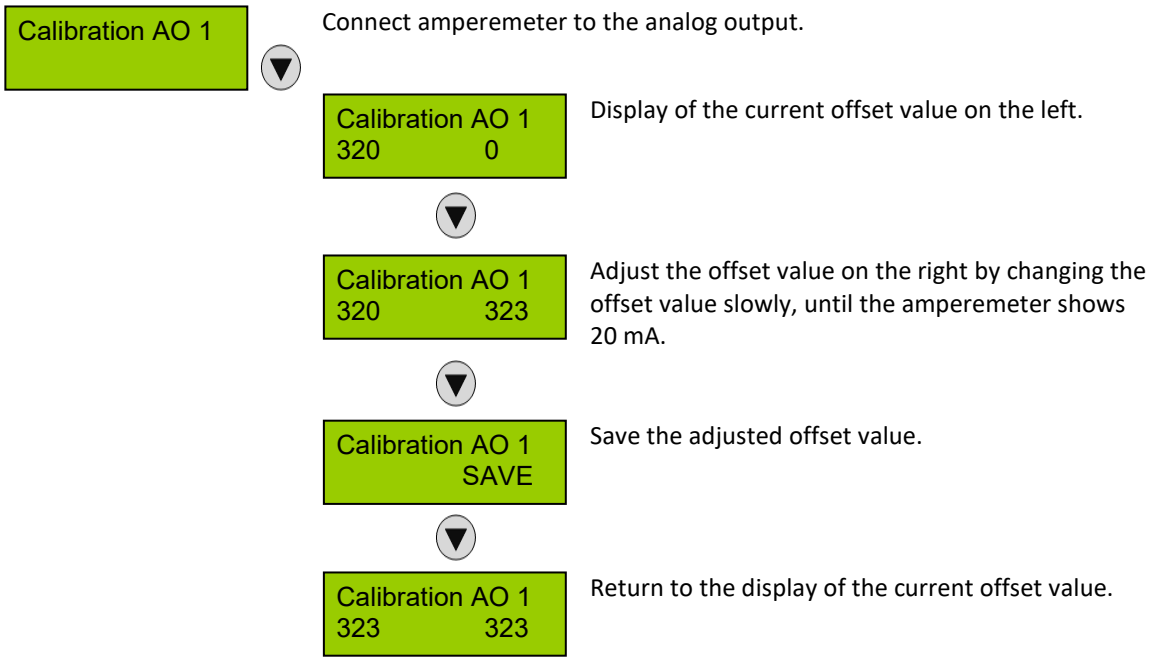
Message	Description
Current value too high	Test gas concentration > than set value Internal error → Replace sensor head.
Current value too low	No test gas or wrong test gas applied to the sensor
Test gas too high	The set test gas concentration must be between 30 % and 90 % of the measuring range.
Test gas too low	
Current value unstable	Appears when the sensor signal does not reach the zero point within the target time (20 sec.). Disappears automatically when the sensor signal is stable.
Time too short	The message "value unstable" starts an internal timer. Once the timer has run out and the current value is still unstable, the text is displayed. The process starts over again. If the value is stable, the current value is displayed and the calibration procedure is continued. If the cycle is repeated several times, an internal error is present. Stop the calibration process and replace the sensor head.
Sensitivity <	Sensitivity of the sensor head < 30 %, calibration no longer possible → Replace sensor head.
Internal error	Is displayed if calibration is not possible, e.g. during the burning-clean process or in case of serious sensor errors. Internal , unrecoverable error → Replace sensor head.

Table 8: Possible Messages during Gain Calibration

6.7.3 Zero Point Calibration of Analog Output

In this menu, you can correct the accuracy of the analog output signal at the 4 mA point and, from version 1.02.16 of the basic units, also at the 20 mA point. The correction is only possible when the analog output is in active mode.

The error message of the output signal monitoring is suppressed as long as the menu Calibration AO is open. For measuring the actual current, connect an amperemeter (measuring range > 20 mA DC) or voltmeter (via shunt resistor) to the analog output.



List of Abbreviations

Units

mA	Milliampere
ppm	Parts per million
s, sec.	Second
% vol	Volume percent
% LEL	Lower Explosion Limit
°C	Degree Celsius

Other

AO	Analog Output
AP	Analog Measuring Point
C	Current value
DIN	Deutsches Institut für Normung (German Institute for Standards)
DP	Digital Measuring Point
EN	European standard
EU	European Union
SIL	Safety Integrity Level
MR	Measuring Range
MP	Measuring Point
max.	Maximum
min.	Minimum
RS-485	Standard defining electrical characteristics of interfaces for serial data transfer

Glossary

Zero Gas
Gas recommended by the manufacturer for the purpose of calibration/adjustment of the instrument zero point, which does not contain the target gas or interfering impurities

Test Gas
Gas (mixture) of known composition used for testing and/or calibrating the equipment

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