

LABORATORY FERMENTER  
AWILAB DIGESTER  
SERIES 01  
PART B: OPERATION OF THE  
LABORATORY FERMENTER SYSTEM



Original Instruction Manual  
(Version 00.01)

## Contact and Imprint

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## 1 Preface



**PLEASE READ THE INSTRUCTION MANUAL AND SAFETY INSTRUCTIONS CAREFULLY  
BEFORE INSTALLATION AND OPERATION!**

This Instruction Manual provides you with information to assist you in using the AwiLAB Digester. The Instruction Manual is part of the product and has to be kept throughout the service life of the product. When subsequently passing on the system or components of it to a third party, the customer has to provide the Instruction Manual along with it. The new owner of the system has to be trained with regard to the respective regulations. If you receive an amendment to the instruction manual at a later stage, such amendment will also be part of the Instruction Manual.

The system may only be used in a technically perfect condition and for its intended use, with awareness of safety aspects and possible hazards and in full adherence with the Instruction Manual. Please operate and maintain the AwiLAB Digester based on the information in this Instruction Manual.

The instruction manual for the AwiLAB Digester consists of three parts:

Part A: Product Description, Installation and Operation

Part B: Operation

Part C: Operating Instructions

## 2 Safety Instructions

Errors can occur where the integrated gas analysis system device is set to STOP for safety reasons (dangerous atmosphere in the interior). If the gas analysis system is stopped and the error still persists, the cause of error has to be eliminated and acknowledged before the gas analysis system is activated again. The stop state may only be released if the operator of the plant has verified that there is no more safety risk (gas leakage, explosive atmosphere).

Monitoring can be disabled by manual operation. The laboratory fermenter system should therefore be operated in automatic mode. The system operator himself is responsible for all manually effected settings, specifically for adhering to the upper oxygen limit.

*Please also refer to the safety instructions in Part A & Part C!*

### 3 Operation of the AwiLAB Digester

To turn on the AwiLAB Digester and the gas analysis system, set the main switch at the casing to the “On” position. The system will now start up. After approx. one minute, the system will be ready.

The integrated panel PC with touch-screen allows reading off the measured values and the operating modes directly and configure the system. The individual menus can be selected by means of tabs on the touch-screen (Illustration 1). Touch the tabs slightly for 1 to 2 seconds with your fingertip or with a special touch-screen pen in order to do this.

Please refer to chapter 3.1.6.4 for information on shutting down the system.

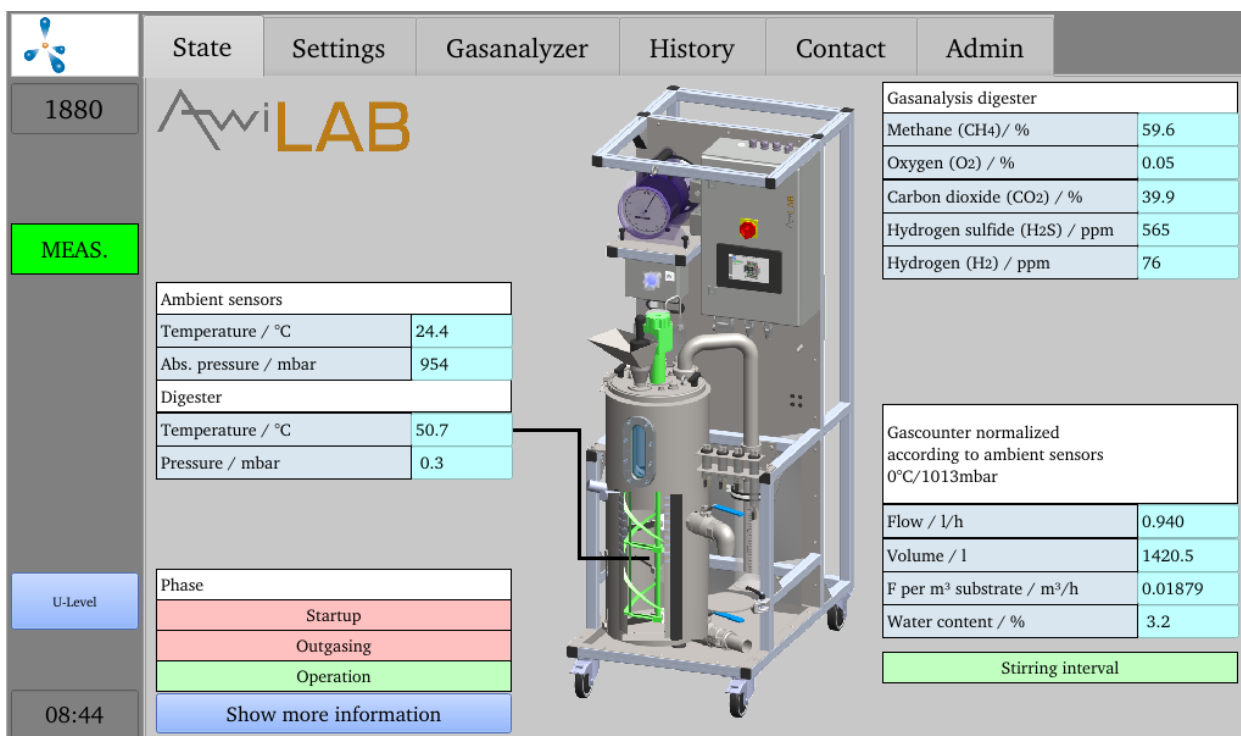


Illustration 1: Home Screen

## 3.1 Menu Navigation

The dark grey bar on the left side of the screen indicates the status of the system and is visible in all menus (exception: some sub-menus under the "Admin" tab). A pulsating methane molecule, the AwiLAB logo, indicates that the system is operating. The serial number of the laboratory fermenter system is visible below the methane molecule. You get directly to the menu "Change Userlevel" via the button "U-Level" under "Admin", where you can change the level of the user. At the bottom of the column, the current time is indicated. During the measurement process of the gas analysis system, a green field "Meas." is displayed. In case of an error, a red (or yellow or orange) button is displayed (see chapter 3.2.2).

The following chapters sequentially describe the various tabs in the menu of the laboratory fermenter system.

### 3.1.1 Status Tab

Is accessed via the "Status" tab.

The current operation status and various parameters are displayed.

#### Sensors

Overview of the most important sensors and measured quantities.

#### Phase

The three phases of heating, outgassing and operation are highlighted in red in the inactive state. An "active" phase is highlighted in green. Other parameters can be accessed via the button "show more information".



# Operation of the AwiLAB Digester

## More information

	State	Settings	Gas analyzer	History	Contact	Admin
1880	Other		Gascounter		Gasanalysis	
	Stirrer		Normalized according to ambient sensors 0°C/1013mbar		Digester	
	Setpoint / %	50.0			Methane (CH <sub>4</sub> ) / %	59.6
	Current / A	0.53			Oxygen (O <sub>2</sub> ) / %	0.05
	Ambient sensors		Flow / l/h	2.170	Carbon dioxide (CO <sub>2</sub> ) / %	39.9
	Temperature / °C	24.5	Volume / l	1420.7	Hydrogen sulfide (H <sub>2</sub> S) / ppm	565
	Abs. pressure / mbar	955	F per m <sup>3</sup> substrate / m <sup>3</sup> /h	0.04349	Hydrogen (H <sub>2</sub> ) / ppm	76
	Digester		Water content / %	3.2	Ambient air	
	Temperature / °C	50.7	Not normalized		Methane (CH <sub>4</sub> ) / %	0.0
	Pressure / mbar	0.3	Raw data		Oxygen (O <sub>2</sub> ) / %	20.48
	Collecting/Measuring gas		Flow / l/h	2.592	Carbon dioxide (CO <sub>2</sub> ) / %	0.0
	Active		Volume / l	1685.3	Hydrogen sulfide (H <sub>2</sub> S) / ppm	23
			F per m <sup>3</sup> substrate m <sup>3</sup> /h	0.05195	Hydrogen (H <sub>2</sub> ) / ppm	0
			Gasbag (set value 4,2 l)		Actuators	
			Volume / l	0.4	Stirrer	
U-Level	Phase				Stirring interval	
	Startup				Heater	
	Outgasing					
	Operation					
08:50	Show less information					

Illustration 2: Status Tab, sub-menu "Show More Information"

Further information can be found in this tab, such as setpoint [%] or current consumption [A] of the stirrer, as well as information on ambient and fermenter conditions (temperature, air pressure, other sensors).

The colour coding of the phases (see "Settings" → "Experiment") is given as follows:

Grey: phase is finished, red: phase was skipped, green: active phase

Under gas meter, one can find the amount of biogas produced per hour [l/h], as well as the total amount of biogas produced [l]. Information on standard conditions (standardized) and raw data (not standardized), respectively. The current volume in the gas storage bag [l] is also included in the overview. The last measured values of the gas composition [% , ppm] of the air measurement or of the fermenter are listed in the last column.

Under "Actuators", the colours indicate whether the stirrer or the heater is switched on (green = active, grey = inactive).

"Show less information" takes one back to the original screen.

### 3.1.2 Settings Tab

The selection of the operating states and the settings can be adjusted from user level 300 (see chapter 3.1.6.2).

#### 3.1.2.1 Experiment

State	Settings	Gas analyzer	History	Contact	Admin
1880	Experiment	Stirrer	Gascounter	Other	
	Experiment		Startup	Outgasing	Operation
	Start	Stop	Use	Skip	Use
	Stirring	Interval	On	Off	
	Interval runtime / min		2	2	2
	Interval pausetime / min		2	2	2
	Setpoint (0..100) / %		50	50	50
	Inactivity alarm after / min		5	5	5
	Heating	Auto	Off		
	Set temperature / °C		39.0	42.0	50.5
	Hysteresis / °C		0.2		
	Increase by / °C		2.0		
	Increase within / h		24.0		
	Max. deviation alarm +/- / °C		2.0	1.0	1.0
	Activity alarm after / min		120	120	120
U-Level	Other			96.0	120 13 55
	Duration / h m s	0 00 00		1 56 14	
	Countdown / h m s	0 00 00			
08:53	Analyze Gas?		Yes	No	Yes

Illustration 3: "Settings" Tab, sub-menu "Experiment" shows settings for the phases

Under this tab, settings can be made for the three phases heating, outgasing, and operation. The phases are activated via the "Use" button. This can be skipped via the "Skip" button in the respective phase.

The background colour of the phase indicates whether a phase is completed ("use", highlighted in grey), skipped ("skip", highlighted in red) or active ("use", highlighted in green). A green phase does not necessarily have to be active at the moment.

Example:

Heating up *highlighted in grey*, Outgasing and Operation *in green* → Heating up phase is over, outgasing phase is currently active, operating phase is started subsequently

The three phases of "heating, outgasing and operation" always run in succession for each experiment.

## Operation of the AwiLAB Digester

The current settings, such as for the stirrer or heater, are highlighted in green. The values highlighted in light blue can be changed from the user level "300" on. The dark grey fields cannot be set, some of them are calculated values.

The main settings to stirrer and heater under "Settings" → "Experiment" are the highest-ranking. All other "commands" are subordinate to this.

**Stirrer:** It is possible to select whether the stirrer is to be operated in interval mode, continuous mode ("on") or switched off ("off"). The interval times and pause times must be specified individually for each phase. For each phase a separate setpoint can be specified for the stirrer [%] as well as an alarm time which specifies after how many minutes of inactivity of the stirrer an error should be output.

**Heater:** The heating can be set to automatic mode or switched off. In automatic mode, the heating output depends on the entered values for hysteresis [° C] and temperature increase / setpoint temperature. In the outgasing and operation phases, the temperature is controlled by a PI process. When increasing the temperature in the startup phase, one has to specify by how many degrees [°C] the heating should heat up in a certain interval [h]; e.g. an increase of 1° C in 12 h. An increase of more than 2–3°C / 24h is not recommended, as the biology has to get used to the rising temperatures. An error is output if the deviation of the temperature from the setpoint temperature is undercut or exceeded and thus the heating activity ("activity alarm") is exceeded. One can thus monitor whether the heater works.

*Remarks on the heating: The integrated heating band can heat up to a maximum of 1°C/h. The closer the setpoint temperature is to the end temperature, the lower the maximum temperature increase. The heating power also depends on the external conditions.*

**NOTE:** A maximum heating rate of 2°C/24h is advisable for microbiological experiments.

Under "Duration" [h/m/s], the time of how long the phase is in operation is specified, and in the operating phase, how long this phase should last. The countdown [h/m/s] indicates how long the system is still in the currently active phase. Under "Analyze gas", it is possible to select whether the produced gas in the fermenter should be measured in the individual phases.

**NOTE:** The gas storage bag is emptied when changing phases and at the termination of the entire experiment, so there is no mixing of different gases from different experiments/phases.

### 3.1.2.2 Stirrer

Stirrer settings can be made in this tab. The fields highlighted in green are currently activated.

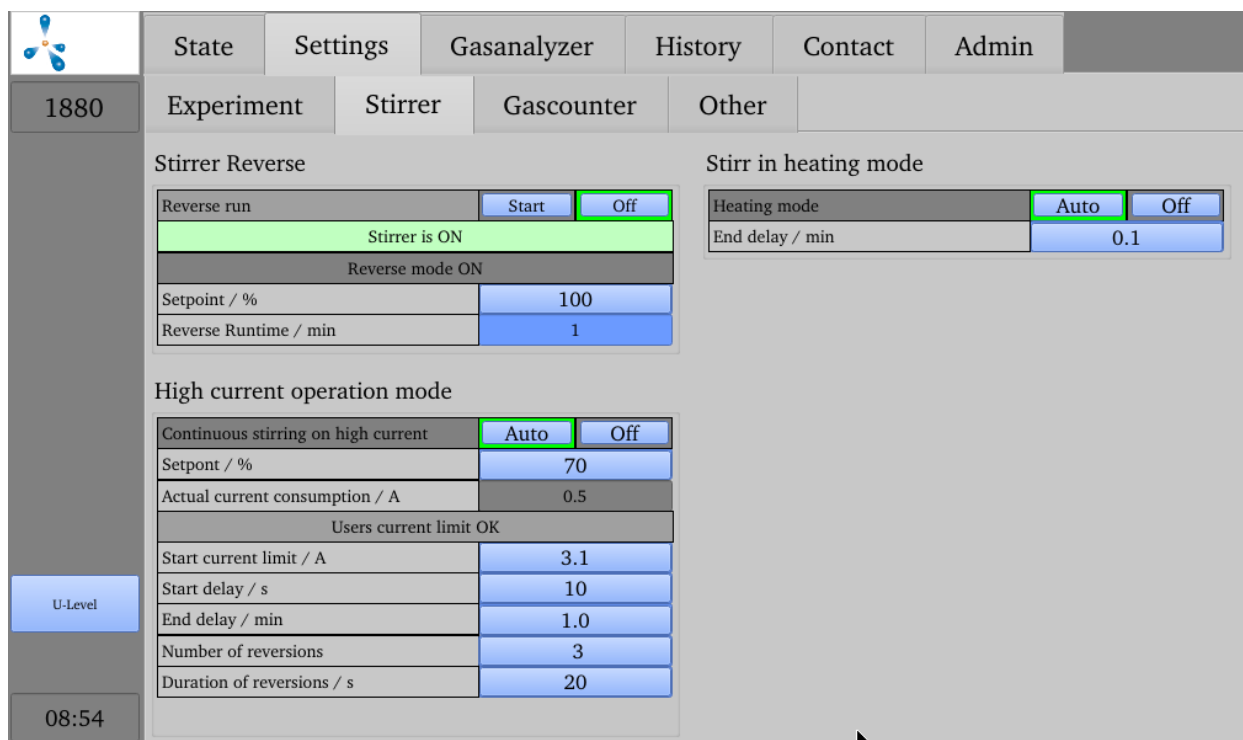


Illustration 4: "Settings" Tab, sub-menu "Stirrer"

#### Stirrer Reverse Mode

In normal operation, the stirrer operates clockwise. If the stirrer is operating, the button "Stirrer operating" is highlighted in green. The "Reverse mode active" button can be used to switch the counterclockwise rotation on ("START" of "Reverse mode" highlighted green) or off ("OFF" highlighted in green), for example in order to dissolve floating layers. The setpoint of the stirrer [%] can be set, the duration via "Reverse mode time".

#### Operating Mode with High Current Consumption

If this mode is set to "Auto" and the limits are reached, the interval stirring is deactivated. The stirrer stirs continuously, taking into account the start delay [s], with the defined setpoint [%] and, if defined, this mode starts with the number of set reversals (left-hand rotation) and time [s] of the individual reversals.

Continuous stirring ends after the set "switch-off delay" [min].

The mode is activated by entering an individual current limit ("current limit start").

When entering the individual current limit and reaching it, the substrate can be homogenized by a higher rotational speed again. It should be noted that the current consumption of the stirrer depends on the rotational speed. The current limit must therefore be set at a certain rotational speed and adjusted when changing.

If an alarm is given due to an exceeding of the warning limits, "User current limit reached" is displayed. If there are no alarms, these values are ok.

### Stirring during Heating

Set the switch-off delay, i.e. how long the stirrer should run after the end of heating. It is advisable to keep the stirrer running during the heating phase, so that the heat can be better transferred inwards and the biology at the edge of the fermenter is not affected/damaged by overheating.

#### 3.1.2.3 Gas Meter

Values and settings for the gas meter can be made under this tab.

The screenshot shows the software interface for the AwiLAB Digester. The top navigation bar includes tabs for State, Settings, Gasanalyzer, History, Contact, and Admin. The 'Settings' tab is active, and the 'Gascounter' sub-tab is selected. The main content area displays the 'Gascounter Digester' settings table, with the 'Gas Meter' sub-menu highlighted in green.

Settings	
Milligas Counter	Gas Meter
Start measuring	Start
Actual gas bag volume / l	0.5
Reset gas bag volume	Reset
Factor / l/impulse	0.00250376
Reset all counters	Reset
Empty all gas bags	Empty
Set value gas bag volume / l	4.2

Additional interface elements visible include a sidebar with '1880', 'U-Level', and '08:55'.

Illustration 5: Tab "Settings", sub-menu "Gas Meter"

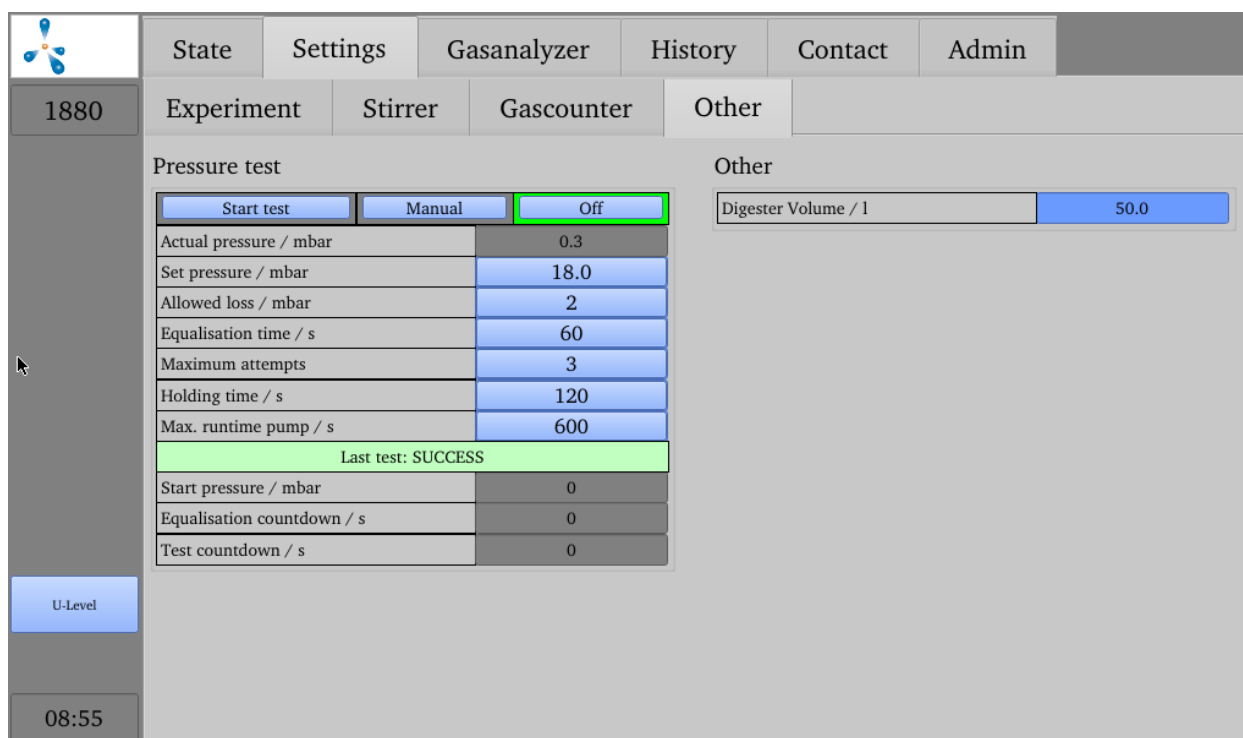
## Operation of the AwiLAB Digester

Using the button "Milligascounter" or "Drum gas meter", one can select with which type of gas meter the gas quantity produced is recorded. This is important for the stored factor [l/pulse]. This factor specifies how much gas is counted per pulse. This can be calculated from the calibration certificate or can be read off the milligascounter.

Using the button "Start measurement", a manual measurement of the analysis gas can be triggered when the minimum volume is reached. The current gas volume [l] of the gas storage bag is indicated. The value can be reset to "zero" via "Reset gas bag volume". When using several gas meters and gas storage bags, all counters ("reset all counters") can optionally be set to "zero" or all bags emptied ("empty all gas bags"). **Resetting the counter does not involve emptying the corresponding gas bag!** When replacing the gas storage bag, the gas quantity must be reset so that the gas quantity count corresponds to the volume in the gas bag.

### 3.1.2.4 Miscellaneous

In this view, the leak tightness of the fermenter can be tested by means of a pressure test.



The screenshot shows the software interface for the AwiLAB Digester. The top navigation bar includes tabs for State, Settings, Gasanalyzer, History, Contact, and Admin. The 'Settings' tab is selected, and the sub-menu 'Miscellaneous' is active. The 'Pressure test' section is visible, containing a table of parameters and their values. The 'Start test' button is highlighted in blue, and the 'Manual' button is highlighted in green. The 'Off' button is highlighted in red. The 'Other' section shows 'Digester Volume / 1' set to 50.0.

Start test	Manual	Off
Actual pressure / mbar		0.3
Set pressure / mbar		18.0
Allowed loss / mbar		2
Equalisation time / s		60
Maximum attempts		3
Holding time / s		120
Max. runtime pump / s		600
Last test: SUCCESS		
Start pressure / mbar		0
Equalisation countdown / s		0
Test countdown / s		0

Other

Digester Volume / 1: 50.0

Illustration 6: "Settings" Tab, sub-menu "Miscellaneous"

In order to check the leak tightness after filling the fermenter, a pressure test can be carried out by the system. For this, set the setpoint pressure [mbar] and the max. allowed pressure drop [mbar] over a certain holding time [s]. **The setpoint pressure must never be higher than the counter-pressure set by means of overpressure protection!** The allowable pressure drop should not be set too low, since the line lengths and temperature fluctuations may lead to a pressure drop which is not caused by a leak. The maximum operating time of the pump is the time in which an attempt is made to reach the set target pressure value. The current pressure is also displayed.

If one sets a number greater than 1 under "maximum number of attempts", one can then search for the leak during the leak test, which may be repeated several times, without having to restart each time.

The result (successful, failed, unknown) of the last pressure test is displayed.

The information under "Start pressure", "Countdown slowdown" and "Countdown test" changes continuously during the leak test. Thus, it can be determined how stable the pressure in the system is.

If the leak test is carried out manually, all settings are ignored and the pump operates only according to the set "Maximum operating time pump". Thus, a leak detection is possible and the pressure that may have gotten too high is released via the overpressure protection.

The pressure test can be done either with air or by connecting a gas to the gas analysis system (e.g., nitrogen). The connection port and maximum pressure of the gas can be found on the gas flow diagram.

### 3.1.3 Gas Analysis Tab

The gas analysis system is available in the version AwiFLEX. Depending on their version, AwiFLEX analysis systems can take on all the functions listed in the Instruction Manual and can even later be expanded to include further functions.

#### Measurement Process

The gas analysis systems actively sucks in biogas from the extraction point. The sensors are flushed with fresh air between the measuring intervals which prolongs the life of the sensors considerably. Prior to every measurement, the analysis gas is sucked in via a bypass line and the line is filled with fresh measuring gas. The time for the sucking in of the analysis gas in the bypass is preset.

## Operation of the AwiLAB Digester

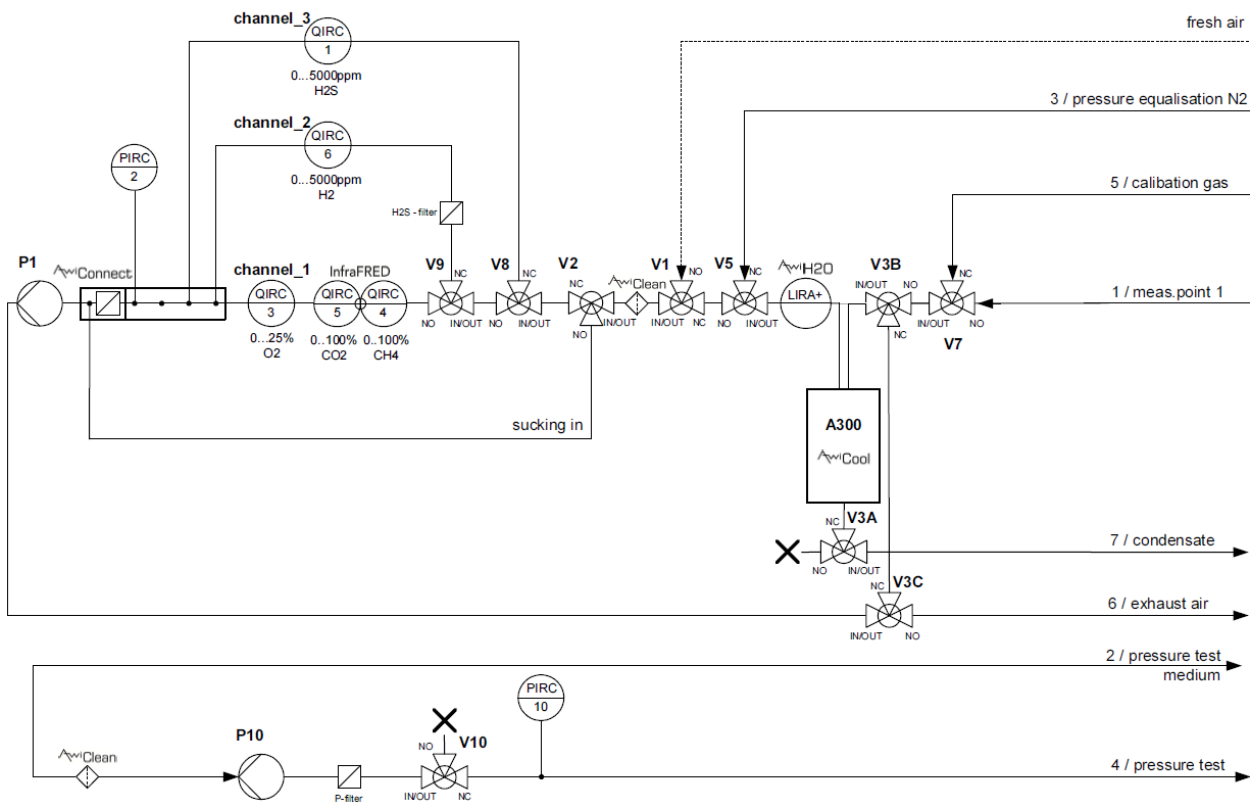


Illustration 7. Gas flow plan of a laboratory gas analysis system with methane, carbon dioxide, hydrogen, and hydrogen sulphide sensors

### Interval Measurement (discontinuous)

A **measuring cycle** consists of the following steps, which are repeated at each measuring point:

1. **Sucking in** of the sample, bypassing the sensors.
2. **Measurement**: Sample gas is led via the sensors of the first measuring channel.
3. **Flushing**: Cooler is flushed with air in order to remove any condensate. Air is led over the measuring channel in order to flush the sensors.
4. The next measuring channel is selected and the process continues with step 2 – if there is no further channel, then step 5 is continued with.
5. The next measuring point is selected and the process continues with step 1. If there are no more measuring points (the last measuring point is air) the process continues with step 6.
6. **Pause**: Device pauses.



You can change the intervals for the suction process yourself via the touch panel. Depending on the configuration of the gas analysis system, different intermediate steps are also possible (e.g. removal of condensate, measurement of pressure etc.). For gas analysis systems with gas accumulating bag, the bag will be emptied before step 5. (Please refer to separate instructions manual for lab devices for this.)

Measurement according to measuring interval takes place in gas analysis systems with a gas collection bag only after reaching the minimum fill level of the gas collection bag.

### 3.1.3.1 Status Tab – Gas Analysis

The current operation status with the following additional information is displayed:

**Pause:** The screen displays the time until the next scheduled measurement.

**Suction:** Analysis gas is sucked in via the bypass (e.g. from the fermenter). The display shows the remaining time of suction. The number of the measuring point where measurement is currently taking place is displayed as well. The measuring gas is not yet channeled over the sensors in the course of this process, but past them through the bypass. By tapping on ">>" the display of the status message is maximized to fill the whole width of the screen.

**Measurement:** After the analysis gas has been sucked in long enough in the bypass (variable setting) the measurement can take place. Now the measuring gas is channelled over the sensors. If the gas analysis system has different measuring channels, there is an intermediate flushing with air prior to the switch-over. The remaining time for the measurement of the current channel is displayed. The number of the measuring point as well as the number of the measured channel is shown.

**Flushing:** The remaining time during which the current channel will be flushed with air is indicated. The number of the measuring point as well as the number of the channel being flushed are shown.

**Stop:** The gas analysis system is at Stop, the pump is switched off. If a serious error occurs, the gas analysis system will be automatically stopped. You can find more information on the errors in the error list (Table 1).

### 3.1.3.2 Settings Tab – Gas Analysis

In this view, a measurement can be triggered manually or a calibration of the sensors can be performed.

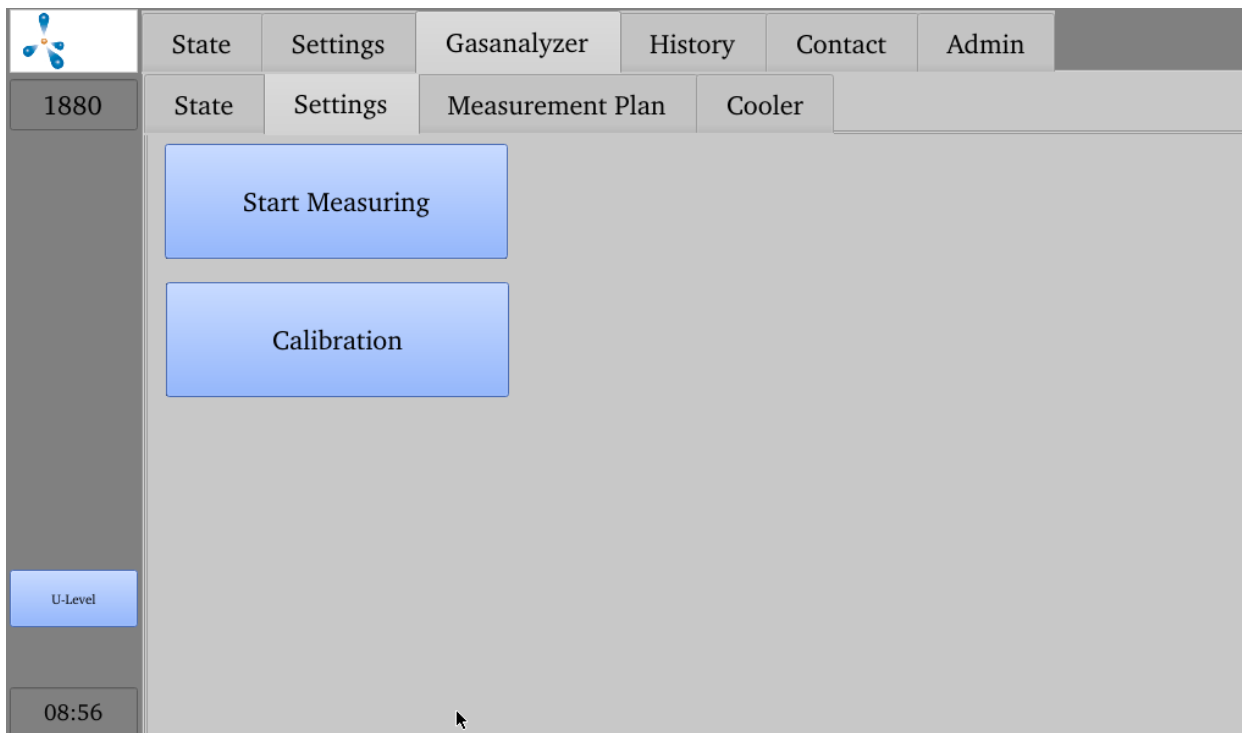


Illustration 8: “Settings” Tab under “Gas analysis”

#### 3.1.3.2.1. Start Measuring

The “**Start Measuring**” sub-menu allows you to manually trigger an immediate measurement in addition to the chosen measuring interval. Pop-up menus list the measuring points to be measured, which can be confirmed by choosing “Yes” or “No”.

Measurement according to measuring interval takes place in gas analysis systems with a gas collection bag only after reaching the minimum fill level of the gas collection bag.

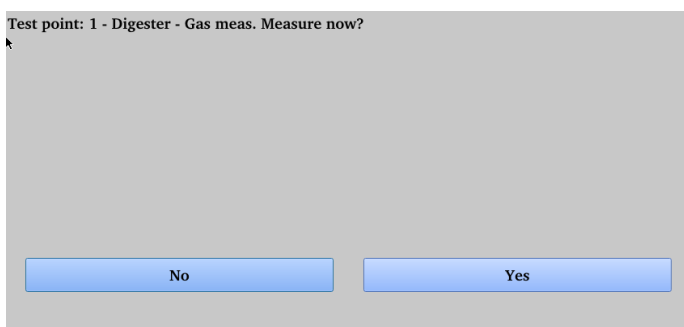


Illustration 9: Query as to which measuring point should be analyzed during a manually triggered measurement

### 3.1.3.2.2. Calibration

In this view, information on the calibration media used can be entered, and the status of the calibration process can be read off.

The screenshot shows the MEAS software interface. The main menu includes State, Settings, Gasanalyzer, History, Contact, and Admin. The 'Settings' sub-menu is open, showing State, Settings, Measurement Plan, and Cooler. The 'Calibration' sub-menu is selected, displaying a table of calibration media and their actual values.

Media	Actual values
Calibration gas air	
Methane	0
Carbon dioxide	0
Hydrogen	0
Hydrogen sulphide	0
Oxygen	20.95

Illustration 10: Gas analysis Tab, sub-menu Settings → Calibration

### 3.1.3.2.3. a) Media

Under the Media tab (Illustration 10 Fehler! Verweisquelle konnte nicht gefunden werden.) all test gas mixtures required for the calibration are displayed. When new calibration gases are used (please confirm composition in consultation with Awite), the exact concentrations of the components have to be entered into the gas analysis system by clicking on the blue fields. Please note the actual values stated on the analysis certificate on the neck of the corresponding gas cylinder (not the ones on the labels on the cylinders). Use only test gases with certificates. Please ensure to order new calibration gases well in advance, as the production of individual mixtures takes several weeks.

3.1.3.2.4. b) Status

Under the Status tab (Illustration 11), the individual sensors as well as the gases used for calibration are listed.

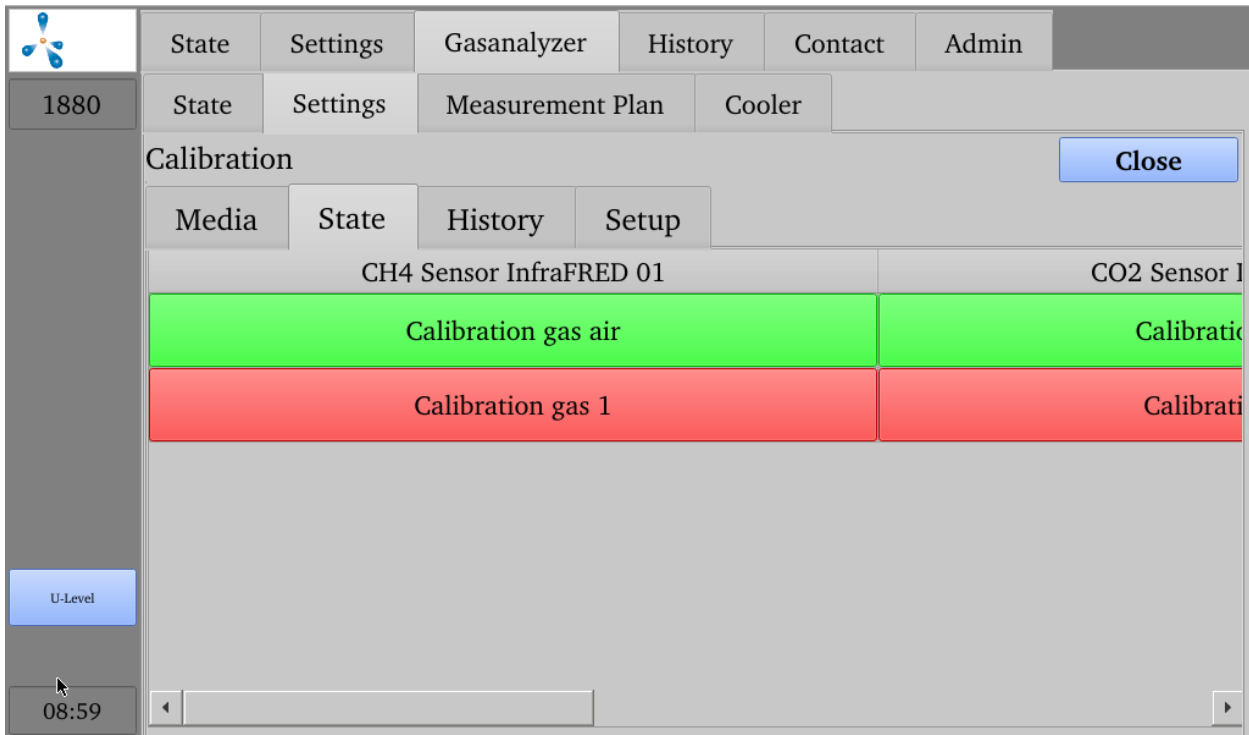


Illustration 11: Gas analysis Tab, sub-menu Settings → Calibration → Status

The colouring of the fields means:

- Green: Calibration carried out successfully
- Blue: Calibration underway
- Red: Calibration failed
- Yellow: Calibration cancelled

By clicking on the fields, the window “Expanded Calibration Status” opens up (Illustration 12). This window shows the setpoints and actual values of the measuring gas and the sensor for the sensor/medium constellations as well as the status of the calibration.

The following messages are possible for the status of the calibration:

If the **calibration has not been completed yet**, the following messages might be displayed in the status display (Illustration 12):

- "No calibration started yet"
- "Calibration running"
- "Calibration cancelled" (highlighted in yellow)

If the **calibration was completed successfully**, the following messages are possible:

- "Calibration: no changes necessary": It was not necessary to adapt the calibration curve as the deviation from the setpoint value was too small
- "Calib: Measurement successfully completed." The calibration curve has been adjusted.

In the case of a **failed calibration**, the following messages are displayed (for troubleshooting see chapter 3.2):

- "**Calibration failed: sensor drift too high**": The actual signal during calibration is outside the valid min./max. signal of the sensor. When clicking the error button the message "Calibration partly failed" is displayed.
- "**Calibration – need another run**": The calibration is running, but the constancy of the measured values is not yet achieved. Another calibration cycle is necessary.
- "**Calibration failed**": This message is displayed when two or more calibration cycles are allowed, but no constancy of the measured value has been achieved yet on reaching the allowable maximum of cycles. Still, the signal may well be within the acceptable limits.

## Operation of the AwiLAB Digester

The screenshot shows a web interface for the AwiLAB Digester. The top navigation bar includes 'State', 'Settings', 'Gasanalyzer', 'History', 'Contact', and 'Admin'. Below this, a sub-menu is open with 'State', 'Settings', 'Measurement Plan', and 'Cooler'. The 'Settings' sub-menu is further expanded to show 'Calibration', 'Media', 'State', 'History', and 'Setup'. The 'Calibration' sub-menu is selected, showing 'Extended Calibration State' with a 'Close' button. The main content area displays the following information:

Sensor: **CH4 Sensor InfraFRED 01** - Medium: **Calibration gas air** - Calibration: **K01**  
**(CH4,CO2,O2) 3-point**  
SETPOINT concentration: **0.00 % Vol.** (no adjustment at: +/- 0.10 % Vol.)  
SETPOINT signal: **6402** (+/- 250) at 958.5 mbar

During calibration:  
07 May 15:46:  
ACTUAL VALUE: **-0.09 % Vol.** (average is used, NUMBER of values: 4)  
ACTUAL VALUE signal: **6382** at 958.5 mbar

On the left sidebar, there is a 'U-Level' button and a clock showing '09:05'.

Illustration 12: Gas analysis Tab, sub-menu Settings → Calibration → Status → Extended Calibration State

### 3.1.3.2.5. c) History

Under the History tab (Illustration 13), the calibration cycles are documented.

The screenshot shows the same web interface as Illustration 12, but with the 'History' sub-menu selected under 'Calibration'. The 'nextno data' text is visible in the main content area. The left sidebar shows the 'U-Level' button and a clock showing '09:03'.

Illustration 13: Gas analysis Tab, sub-menu Settings → Calibration → History

### 3.1.3.2.6. d) Settings

Under the Settings tab (Illustration 14), the measuring channels that are available in the device are displayed. Each measuring channel is calibrated separately. The display indicates which sensors in the corresponding measuring channel are connected in series: e.g. channel 01 (CH<sub>4</sub>, CO<sub>2</sub>, O<sub>2</sub>).

If the **calibration is successful**, no more messages are displayed. The sensors are adjusted within the tolerance limits. The calibration process takes approx. 10 minutes, depending on the sensor and channel features.

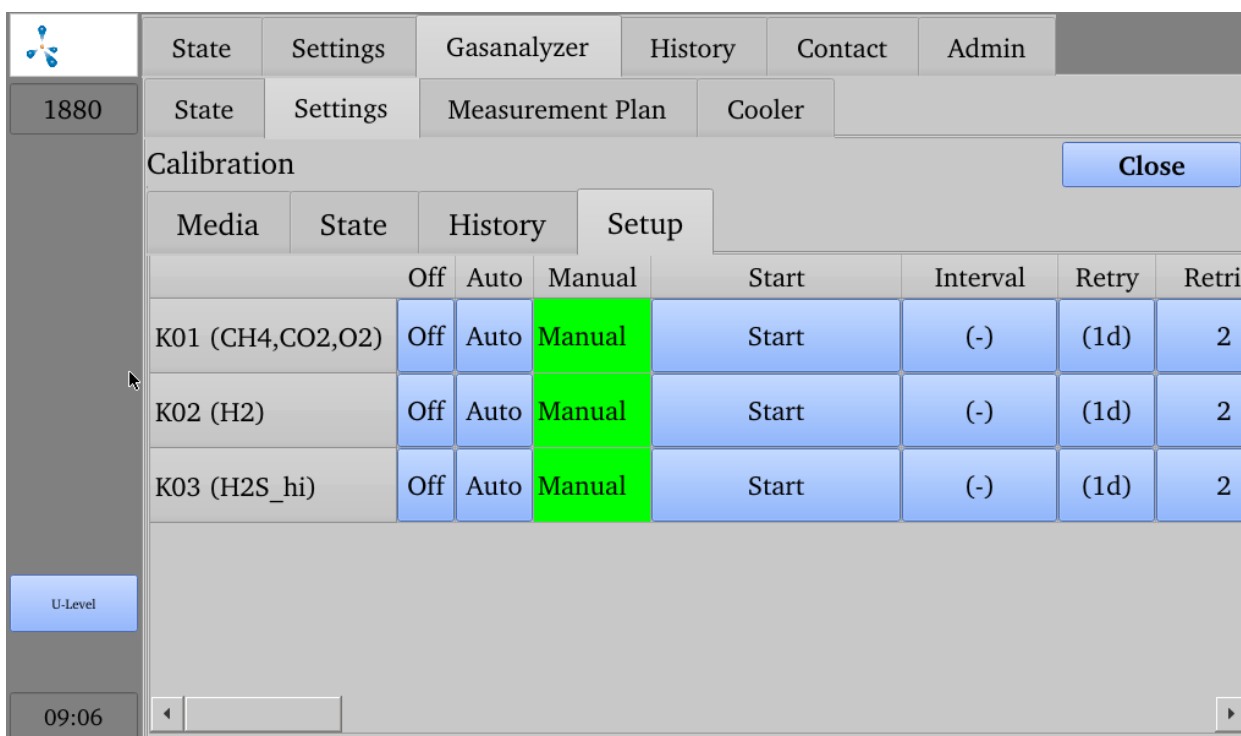


Illustration 14: Gas analysis Tab, sub-menu Settings → Calibration → Settings

The following settings are possible from user level 1000 onwards (enter 1000 under Admin > User level).

**Off:** Deactivates the calibration for the respective measuring channel.

**Auto:** The calibration is started automatically depending on the set interval. It has to be ensured that the calibration gas is connected.

**Manually:** The calibration is started manually using the "Start" button. Menu items that are not relevant for the manual calibration are displayed in rounded brackets, e.g. Interval -> (3d).

## Operation of the AwiLAB Digester

<b>Start:</b>	Starts a manual calibration. The "Start" button is only available if the calibration is set to manual. After clicking "Start", the pop-up window "Start Calibration now? Yes/No" will appear. After confirming and air calibration, there will be a double request to connect the calibration measuring point with the calibration gas. Confirm both messages with <b>Yes</b> .
<b>Interval:</b>	Time interval for the automatic calibration.
<b>Again:</b>	The repeat interval for the automatic calibration if the calibration fails.
<b>Repetition:</b>	The number of retries if the calibration fails. When this number is reached, no more repeats are carried out until the next interval.
<b>Last:</b>	Display of the last calibration with corresponding date and status.
<b>Next:</b>	Date display for the next automatic calibration.
<b>Start Takeover:</b>	The point within a calibration cycle from which on the values will be used.
<b>Runs:</b>	Number of runs within one calibration.
<b>+ Sensors:</b>	Display of the active sensors. By clicking, sensors can temporarily be removed for the next calibration. These sensors will not be calibrated then.
<b>– Sensors:</b>	Display of the sensors removed temporarily. By clicking on them, the temporarily removed sensors can be activated again.

### 3.1.3.3 Measurement Plan Tab - Gas Analysis

In this view, one can set the measuring intervals of the respective measuring points



# Operation of the AwiLAB Digester

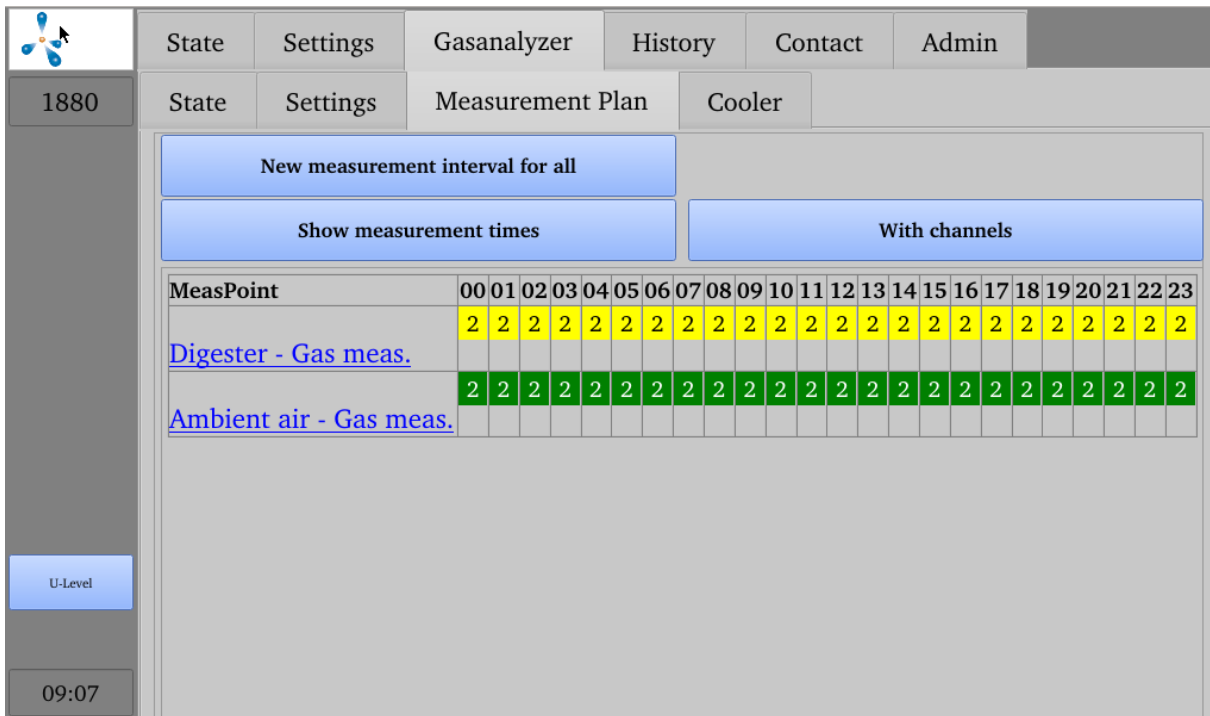


Illustration 15: "Gas Analysis" Tab, sub-menu "Measurement Plan"

In the measurement plan one can set how many measurements should be performed in which time window per measuring point. A "1" at any time means that one measurement is taken every hour. To make a change, click on the name of the measuring point. You can display the measurement schedule under "Show measuring times".

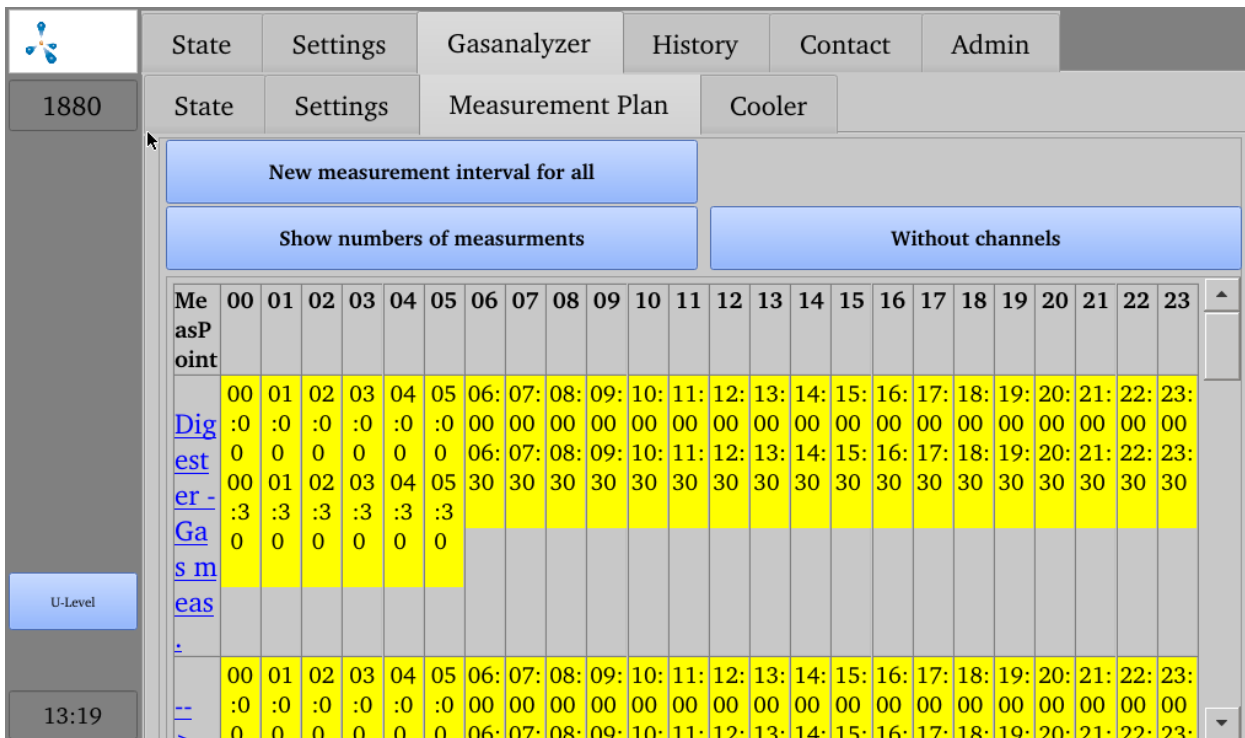


Illustration 16: Measuring times of the individual measuring points

## Operation of the AwiLAB Digester

By clicking on "New Measuring Interval for all", the desired measuring interval (in minutes) can be entered into the pop-up menu. If a value is specified for the measuring interval that is above or below the allowed values, the entered value for the minimum or maximum allowed value is overwritten automatically.

The screenshot shows a pop-up menu with a grey header containing the text "Please enter new measurement interval (Minutes)." Below the header is a grey bar with the number "30" on the right side. The main area of the menu contains a grid of blue buttons. The first row has buttons for "7", "8", "9", and "C". The second row has buttons for "4", "5", "6", and "+/-". The third row has buttons for "1", "2", "3", and "OK". The fourth row has buttons for "0", a blank space, ".", and "cancel".

Illustration 17: Entering new measuring interval in minutes

The measuring interval can be extended to the different channels and is to be specified separately for each channel. Click on "with channels". This button provides a switch-over option for the display of the measuring points with or without the associated channels in the measurement plan table. Click on the name of the channel and make the desired setting.

## Operation of the AwiLAB Digester

The screenshot shows the 'Measurement Plan' sub-menu. It features a grid with columns for hours 00 to 23 and rows for different measurement points and channels. The 'Digester - Gas meas.' row and its sub-channels (CH4, CO2, O2, H2, H2S\_hi) are marked with yellow '2's, indicating a measurement interval of 2 hours. The 'Ambient air - Gas meas.' row is marked with green '2's, indicating a measurement interval of 2 hours. Buttons for 'New measurement interval for all', 'Show measurement times', and 'Without channels' are visible at the top.

MeasPoint	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Digester - Gas meas.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
> Channel CH4,CO2,O2																								
--> Channel H2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
--> Channel H2S_hi	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ambient air - Gas meas.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Illustration 18: Measurement plan per measuring point and channel

### 3.1.3.4 Cooler Tab – Gas Analysis

The “Cooler” sub-menu shows the temperature values and states of both the cooler and the casing.

The screenshot shows the 'Cooler' sub-menu. It displays temperature data for the cooler and housing, condensate levels, and controller status. The cooler setpoint is 3.0 °C and the actual value is 2.9 °C. The housing temperature is 32.4 °C. Condensate actual is 0.000 mL, with start request at 5.0 mL and critical at 9.5 mL. The last removal was 2326 seconds. The controller status shows ID 1, enabled, 1.0, Y 24.0, P 5.0, and I 2.0.

temperatures / °C	
setpoint	3.0
actual value	2.9
housing	32.4

condensate / mL			
actual	0.000	start request	5.0
		critical	9.5
		last removal / s	2326

controller status					
ID	1	enabled	1.0	Y	24.0
				P	5.0
				I	2.0

Illustration 19: Gas Analysis Tab, sub-menu Cooler

“Setpoint” is the setpoint value temperature of the cooler; “Current value” shows the current cooler temperature. The subsequent status bar shows the current state of the cooler and whether it lies in the allowed range (green bar), deviates from it (yellow bar) or strongly deviates from it (red bar). The system calculates this status from the temperature of both the cooler and the casing and the power consumption of the cooler. Additionally, the casing temperature is displayed, with this also being in the form of a bar that indicates whether the current value is within the permitted range.

### 3.1.4 History Tab

Under “History” you can choose between the **Graph**, **Table**, **Settings** and **Events** sub-menus.

#### 3.1.4.1 Graph

The “Graph” sub-menu can display the measured values of the individual sensors of each measuring point over a longer period of time (up to 9 days).

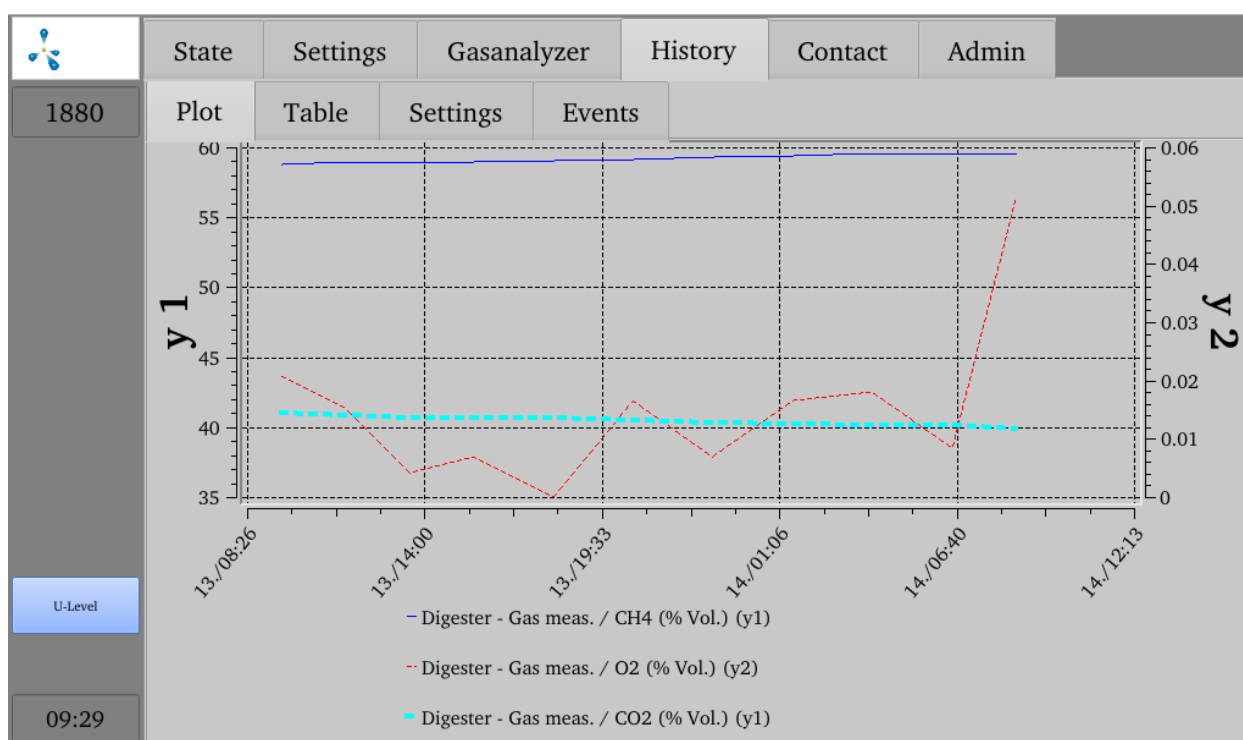


Illustration 20: “History” Tab, sub-menu “Graph” graphically displays the measuring value history

## Operation of the AwiLAB Digester

The left high-value axis (y1) is divided into percentages (for the display of the measured values of the methane, oxygen or carbon dioxide concentrations), the right high-value axis (y2) is scaled to ppm (parts per million<sup>1</sup>) for hydrogen sulphide or hydrogen. In case of a lower case "y" in the legend designation, the axis assignment was made automatically, with a capitalized "Y", the axis assignment was done manually. These settings are to be made under "History" → "Settings" → of the *respective tab* (cf. Illustration 21). If you select a point on the curve by tapping the screen with a finger or touch-screen pen, the corresponding date and time are displayed.

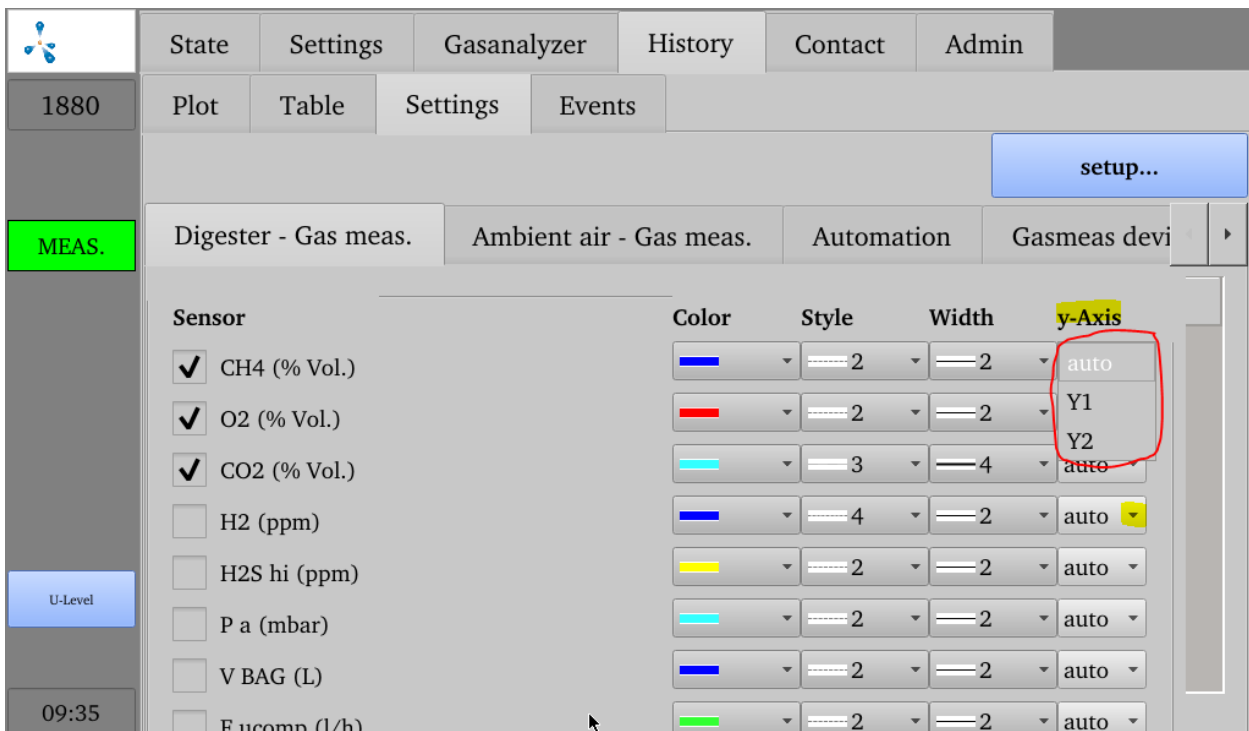


Illustration 21: Settings Axis Assignment

<sup>1</sup>The display 1 ppm stands for 1/10,000 percent by volume

3.1.4.2 Table

The "Table" sub-menu (Illustration 22) displays the measured values in table format.

		State	Settings	Gasanalyzer	History	Contact	Admin
1880		Plot	Table	Settings	Events		
		1		2		3	
MEAS.	14.05.2018	Digester - Gas meas. / CH4 (% Vol.)		Digester - Gas meas. / O2 (% Vol.)		Digester - Gas meas. (% Vol.)	
	08:31	59.6		0.05		39.9	
	06:31	59.6		0.01		40.1	
	04:01	59.5		0.02		40.2	
	01:31	59.4		0.02		40.3	
	13.05.2018	Digester - Gas meas. / CH4 (% Vol.)		Digester - Gas meas. / O2 (% Vol.)		Digester - Gas meas. (% Vol.)	

Illustration 22: Tab "History", sub-menu "Table" displays the measuring value history in the form of a table

In one column the histories of a measurement at a specific measuring point are displayed (for up to 9 days). You can scroll up and down in the table using the arrow keys. By clicking the single arrows < and >, you can jump up or down 3 rows. The double arrows << and >> move the display by 7 rows. The arrow >>| brings you back to the top of the table, i.e. the most recent measured values.

### 3.1.4.3 Settings

In the “Settings” sub-menu you can influence the display of the measuring values in the sub-menus “Graph” and “Table”.

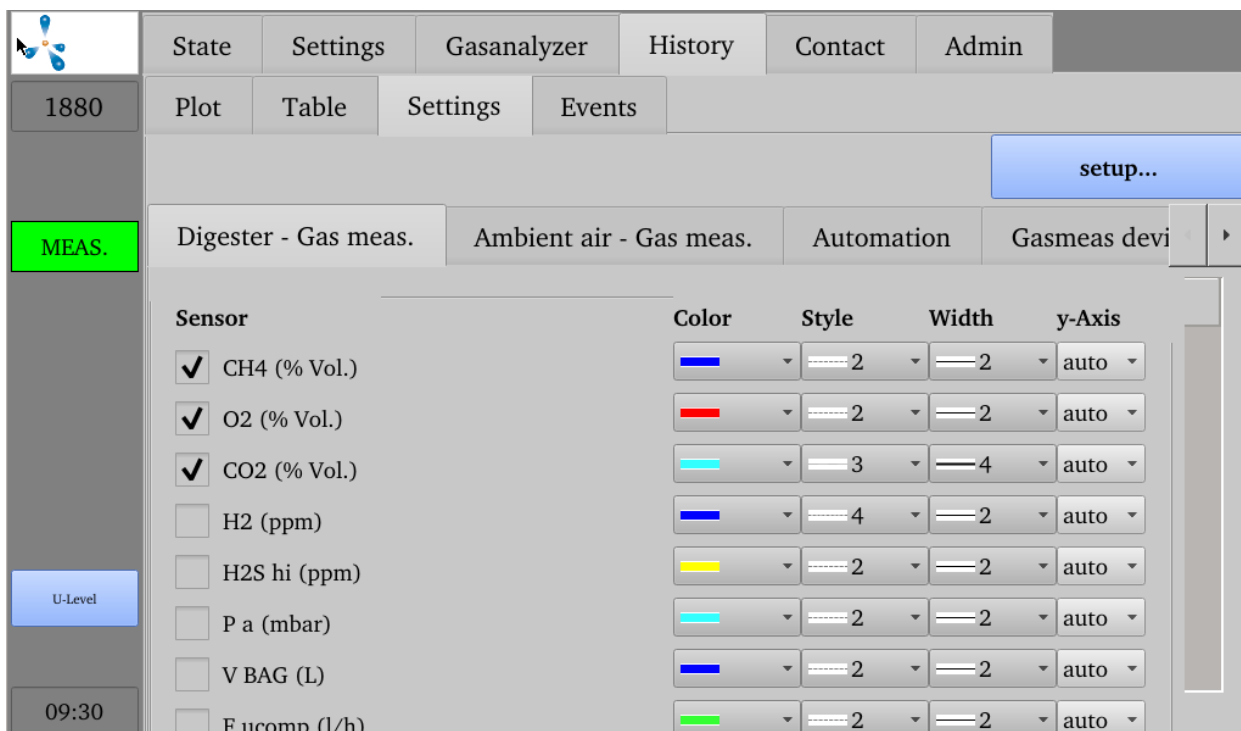


Illustration 23: Tab “History”, sub-menu “Settings” shows the configuration options for displaying the graphs or table

If you want only some of the sensors to be displayed, you can make your selections in the sub-menus for the individual measuring points through check marks. Here you can also change the colour (for the display in the table and the graph) as well as the line type and line width (display in the graph). The same settings are possible for the parameters under “Automation” and “Gas Analysis Device”.

Under **History > Settings > Settings**, the following settings can also be made. The date input in the top line (format: month/day/year) defines up to which date the measured values are to be displayed. The “time span” determines for how many days prior to the chosen date the values are to be shown (maximum of 9 days). Due to the large amount of data, the number of loaded table rows should be limited in the field “Max. Number of Rows”. This reduces the charging time even with very short measuring intervals.

### 3.1.4.4 Events

Depending on the configuration of the device and user level, the "Events" sub-menu displays different event archives (e.g. archive of error messages).

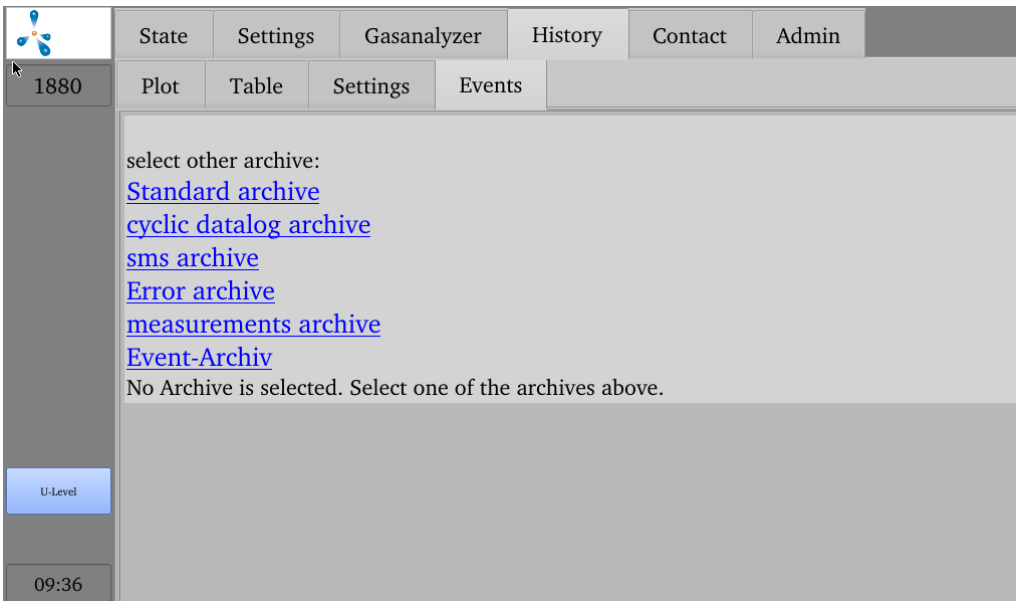


Illustration 24: Tab "History", sub-menu "Events" shows e.g. an archive of error messages

### 3.1.5 Tab "Contact"

Here you will find the contact details for our service as well as information about the installed firmware and the serial number of the analyzer.



Illustration 25: Tab "Contact" with Awite contact details



### 3.1.6 Tab "Admin"

Not all systems offer all sub-menus. Only fields highlighted in blue are active (Illustration 26). The currently set user level is displayed in the right field.

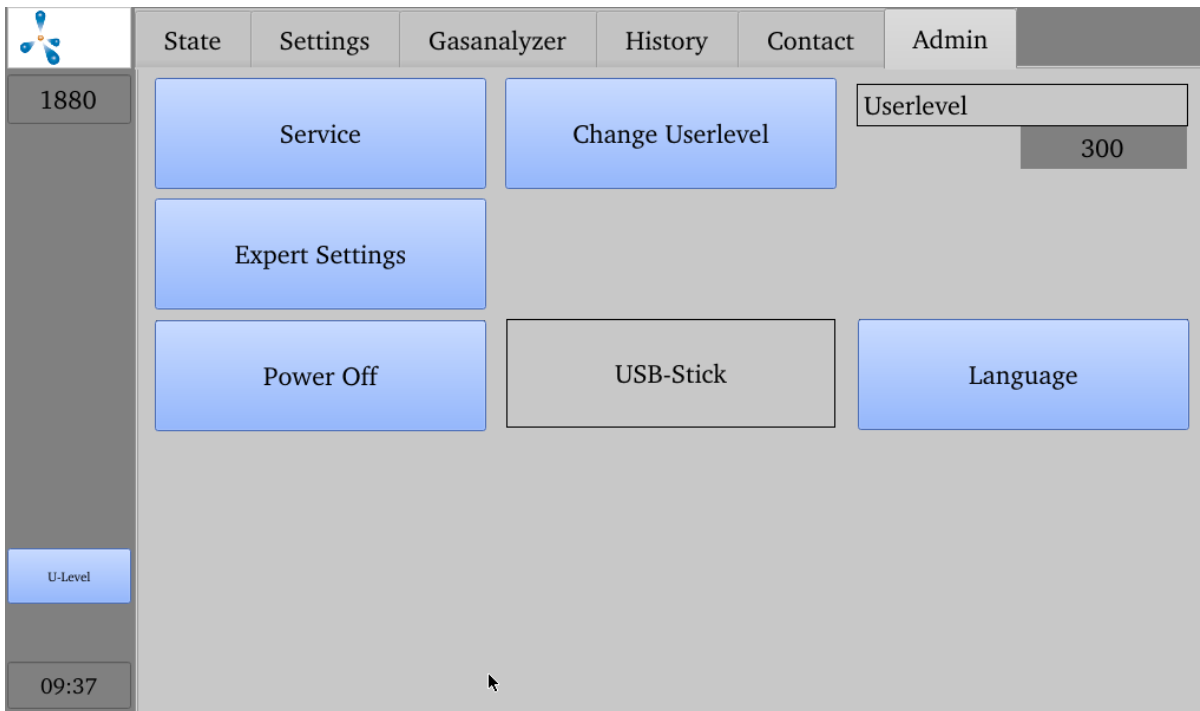


Illustration 26. Tab "Admin" with sub-menus

#### 3.1.6.1 Tab "Admin" – "Service"

Settings for service or maintenance can be made from the "Service" sub-menu.

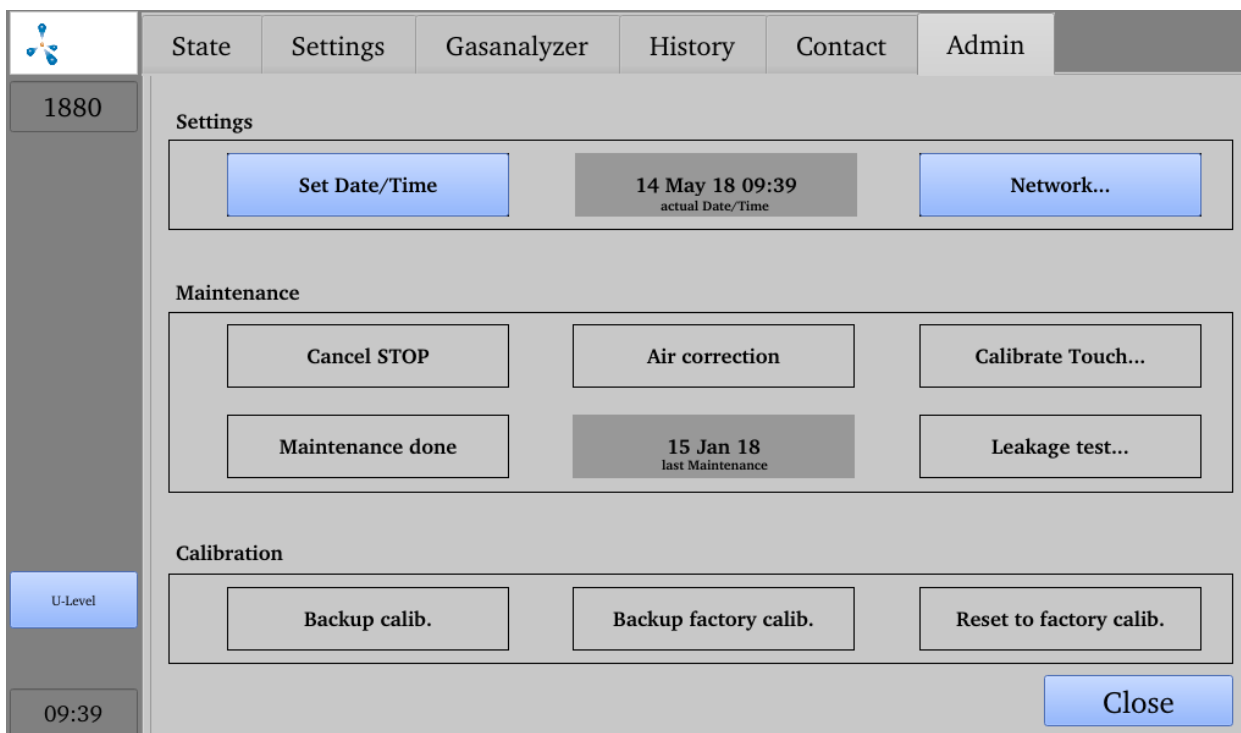


Illustration 27: Tab "Admin" – sub-menu "Service"

### Set Date / Time

Procedure:

1. Admin > enter user level "1000" (see chapter 3.1.6.2)
2. Admin > Service > Date/time...

After this, the device needs to be restarted using the "Power Off" option (chapter 3.1.6.4).

### IP address / Change Network Settings

Procedure:

1. Admin > enter user level "1000" (see chapter 3.1.6.2)
2. Admin > Service > Network...

The current network settings are displayed here. The settings can be changed by clicking on "Settings". In order to apply the changes to the system configuration, a restart of the gas analysis system is necessary. After closing the network menu, the user is asked if the restart should be done now or later.

### Cancel Stop



**CAUTION**

Errors can occur where the unit is set to STOP (dangerous atmosphere) for safety reasons. If the gas analysis system is stopped and the error still persists, the cause of error has to be eliminated and acknowledged before the gas analysis system is activated again. The stop state may only be released if the operator of the plant has verified that there is no more safety risk (gas leakage, explosive atmosphere).

Procedure:

1. Admin > Enter user level "1000" (see chapter 3.1.6.2)
2. Admin > Service > Cancel Stop...

### Performing Air Adjustment

By means of a so-called air adjustment or air correction (calibration with fresh air), the zero points of the sensors can be aligned. In this case, the oxygen sensor is adjusted to 21% in ambient air. The air adjustment should be carried out in the event of:

- a newly installed oxygen sensor
- if an older oxygen sensor shows less than 21% when measuring air

Before you can carry out the air adjustment, the gas analysis system must have been in operation for at least half a day.

Procedure:

1. Admin > Start Measurement

Under "Start measurement" initiate a measurement of all measuring points. Please wait until the measurement, including measurement of the air, is fully completed.

2. Admin > Enter user level "1000" (see chapter 3.1.6.2)
3. Admin > Service > Air adjustment...

Please confirm "Perform air adjustment?" with "Yes". Also confirm the following sub-points. After successful adjustment, a message is displayed indicating that all sensors have been set.

To check the air adjustment, please carry out step 1. After the measurement, the oxygen concentration at the air measuring point should be between 20.8% and 21.1%.

### Calibration Touch screen

Procedure:

#### **1. Admin > Service > Calibration Touch**

##### **3.1.6.2 Tab "Admin" – User Level**

In the **"User level"** sub-menu, the user level for the gas analysis system can be entered. This setting particularly concerns the service personnel. Click **Admin > User level** in order to enter the user level and the corresponding code in the pop-up window.

##### **3.1.6.3 Tab "Admin" – Expert Settings**

This setting particularly concerns the service personnel. In normal operating mode, accessing the expert settings is not necessary.

##### **3.1.6.4 Tab "Admin" – Power Off**

By clicking **Admin > "Power Off"**, the gas analysis system can be stopped or switched off. Confirm both the **"Do you really want to cancel?"** and the **"Do you also want to switch off the device?"** pop-up menus with **"Yes"**. After a few seconds, several rows containing white letters are displayed. Now the main switch can be set to **"off"**. If the main switch is left as is, the gas analysis system will re-start by itself immediately after the shutdown is complete.

##### **3.1.6.5 Tab "Admin" – USB stick**

See chapter 3.3.1

##### **3.1.6.6 Tab "Admin" – Language**

Clicking **Admin > "Language"** opens a window which contains the available visualization languages. After choosing the desired language, confirm your entry with **"Yes"** to restart the visualization server.

## 3.2 Error Messages

The following chapter is designed to help you find the cause for occurring errors and to provide you with the information required to solve these problems.

### 3.2.1 Errors for Touch Panel or during Transmission of Measured Values

If the touch panel and/or the transmission of measured values to external devices are faulty, use the following checklist to start your troubleshooting:

Error appearance	Troubleshooting
No display on the touch panel and no transmission of measured values to external gas analysis systems	<ol style="list-style-type: none"> <li>1. Check power supply of the gas analysis system</li> <li>2. Check fuses</li> <li>3. Check the LEDs on the AwiProtect module (Illustration 28), mounted in the upper left in the gas analysis device: There are 3 LEDs in the component. The colour may indicate the reason for the fault. <ul style="list-style-type: none"> <li>- Green: Normal operation</li> <li>- Yellow: Overvoltage (triggered if the voltage at the power-supply unit is &gt;27.5V, reason: overvoltage has damaged power-supply unit, counter measure: contact Awite)</li> <li>- Red: Overcurrent (triggered when current is &gt;5/10A, reason: faulty components in the device have caused a short circuit, counter measure: contact Awite)</li> </ul> </li> </ol>
No display on the touch panel, but output signals exist	<ol style="list-style-type: none"> <li>1. Check whether the data cable and the power supply for the touch panel are properly connected</li> <li>2. Display module faulty</li> </ol>
Despite display of measured values on the gas analysis system, no signal output	Check connectors and cable connection to external devices

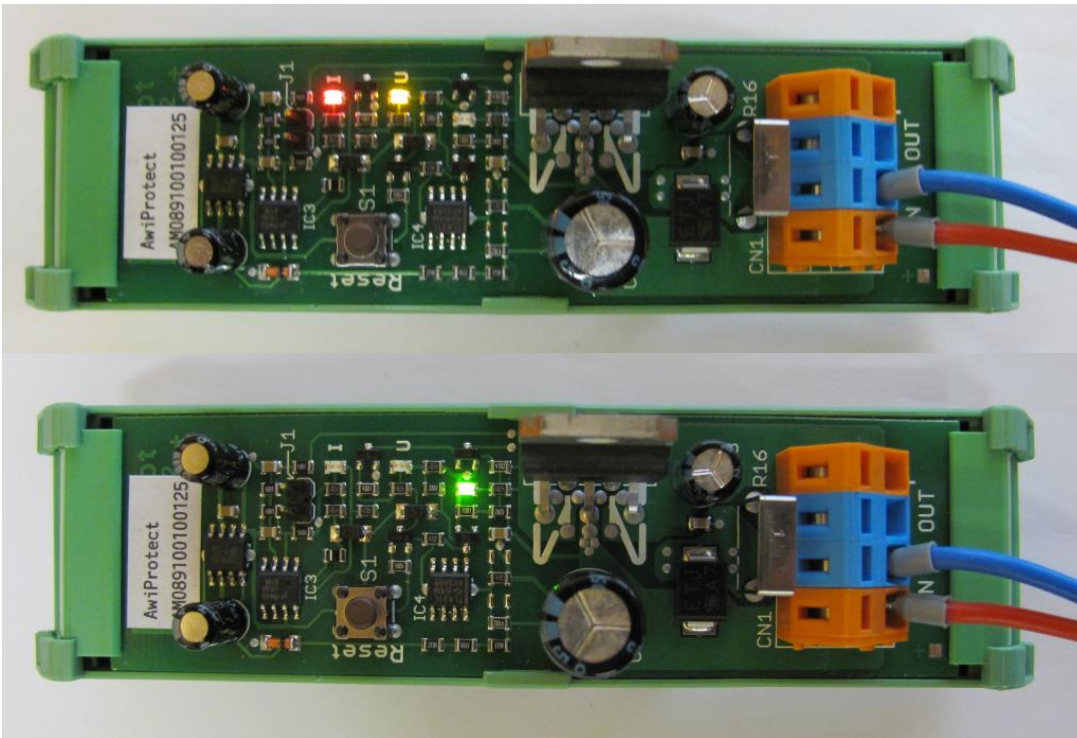


Illustration 28: AwiProtect module with LEDs showing the current operational status (green: normal operation; yellow: overvoltage error; red: overcurrent error). The module is built into the upper left in the gas analysis device (see also art A of the Instruction Manual).

### 3.2.2 System Error Messages

In the event of system errors, these are displayed via error messages.

There are three types of errors, which are displayed by a button on the left hand side of the screen.

- Current and not acknowledged errors (red button)
- Current and acknowledged errors (orange button)
- Non-current and not acknowledged errors (yellow button)

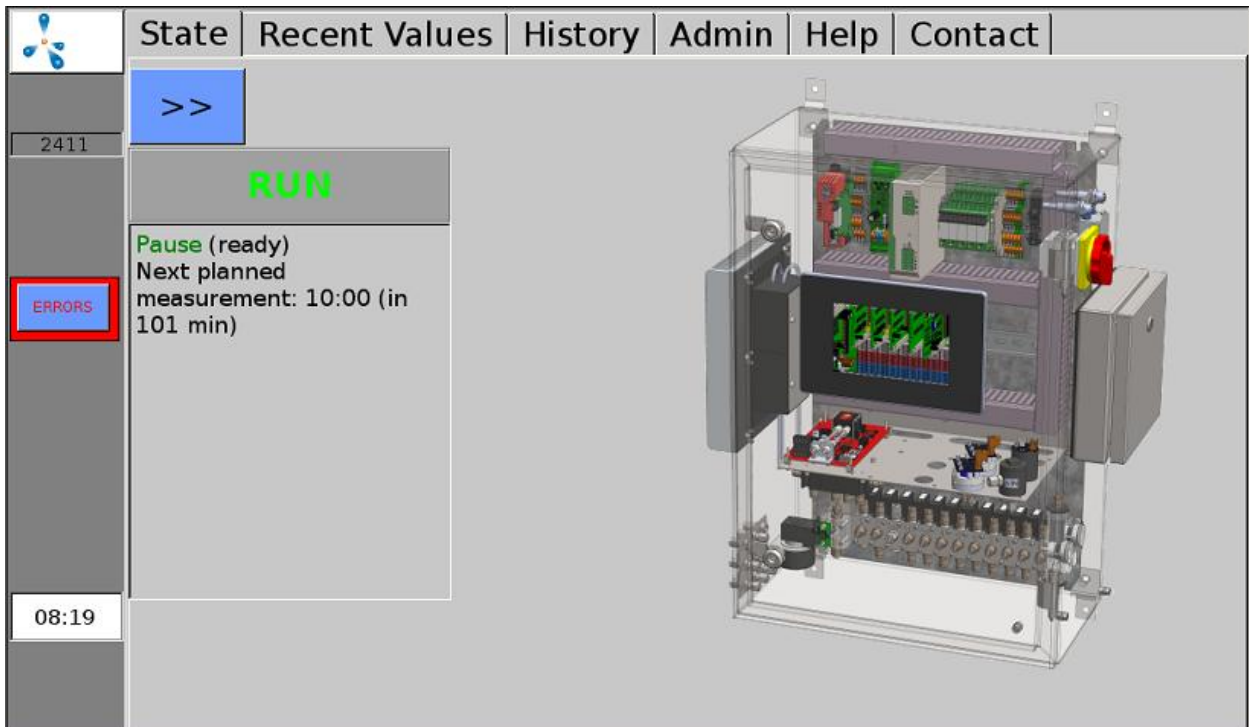


Illustration 29: A current and not acknowledged error (red button) is displayed on the left edge of the screen

When you click the button, the error window is displayed. You can call up detailed errors by clicking the underlined name. By clicking on the word "Confirm", individual errors can be confirmed, with "All confirm" all errors can be confirmed. Click "Close" to close the error window.

If the system fails to recognize the successful outcome of the troubleshooting process, it is additionally necessary to "delete" the error after acknowledging it.

If errors don't get acknowledged for a longer period of time, a prompt to do so will be shown repeatedly on the display. Some errors are still displayed after they are acknowledged if they are still unresolved.

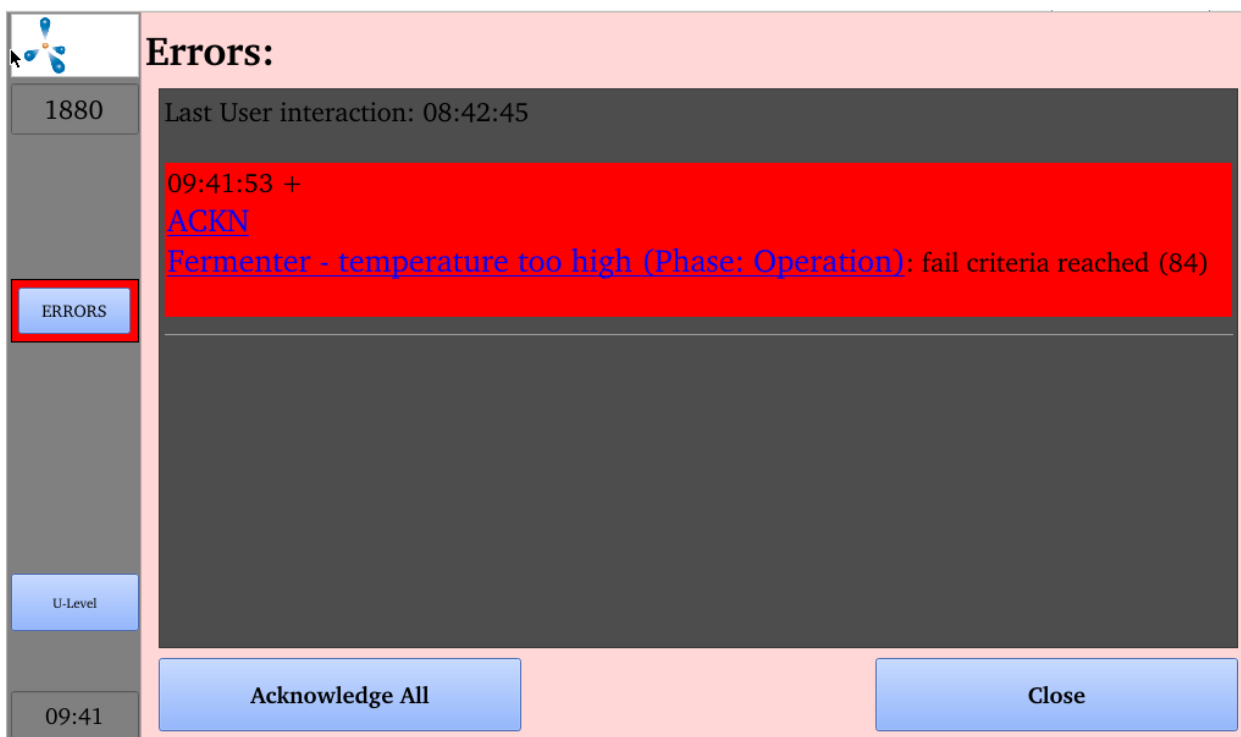


Illustration 30: Error window displays a list of the errors that occurred

Table 1. List of the possible system error messages with a short description of the error, possible causes and notes for determining or resolving the error

Error no.	Error no.	Error Text	Short description of the error	Possible causes	Troubleshooting or Handling of the Error
Gas Analysis System	Bus connection	German			
1	9999	Signal too high	Sensor has reached maximum signal	Sensor provides signal that is too high or indicates an error	Measured value is higher than measuring range of the sensor
7	-9995	General error (7)	General error	Corresponding object does not function properly or indicates an error	Please contact service
13	-9989	Timeout: Emptying took too long (13)	Timeout: Emptying takes too long	Pump faulty or leakage in the system	Check pump for proper functioning and system for leakage
14	-9988	Timeout: Filling took too long (14)	Timeout: Filling takes too long	Request for connecting something was not followed	Repeat procedure
17	-9985	Switched off due to overload of another sensor (17)		One of the sensors connected in series (most of the time channel 1: CH <sub>4</sub> , CO <sub>2</sub> , O <sub>2</sub> ) has an overload detection. Therefore the other sensors were switched off.	Switch gas analysis off and on or contact service
18	-9984	Not measured because of filter test failure (18)	Measurement deactivated to protect the sensors	Internal or external filter is used up	Exchange filter
19	-9983	No measurement values yet (19)	No measurement has taken place yet	1. No measuring interval set 2. Validity expired	Check when measurement is planned for, set measuring interval



## Operation of the AwiLAB Digester

Error no. Gas Analysis System	Error no. Bus connection	Error Text German	Short description of the error	Possible causes	Troubleshooting or Handling of the Error
20	-9982	Sensor gives no signal! (20)	No measurement signal	1. Sensor faulty 2. Cable faulty 3. No connection to internal PLC (LEDs don't flash on I/O module)	To 1. and 2.: Check contacts (loose pin contact, corrosion ...) To 3.: LEDs on I/O module don't flash > Please contact service
32	-9970	Serial interface: Error during opening (32)	Serial interface could not be opened	Communication with internal or external bus component failed	Most of the time hardware problem, therefore check cable connections of the respective components
33	-9969	Serial interface: Communication error (33)	Serial interface: Communication error	Communication with internal or external bus component failed	Most of the time hardware problem, therefore check cable connections of the respective components
35	-9967	No feedback from peripherals (35)	No feedback from the peripherals	Object <ul style="list-style-type: none"> <li>• not in operation</li> <li>• not available</li> <li>• Assembly faulty</li> </ul>	Please contact service
36	-9966	State is not safe: stopped (36)	State is not safe, gas analysis system was stopped	1. Faulty hardware 2. Critical error	Please contact service
38	-9964	Reading logfile failed (38)	Error when reading log file	Problems with memory card	Please contact service
39	-9963	Writing log file failed (39)	Error when writing to log file	Memory card full	Please contact service
41	-9961	Filter test failed (41)	Filter test failed	Internal or external filter is used up	Exchange filter
42	-9960	Calibration file not found (42)	Calibration file not found	Damaged calibration file	Please contact service
43	-9959	Too few calibration points defined (43)	Too few calibration points defined	Configuration error	Please contact service
46	-9956	No flow (46)	No flow could be detected at the respective measuring point	1. Measuring pipe clogged 2. Extraction point dirty 3. Manual valve at the extraction point is closed	Check measuring pipe from extraction point to gas analysis system for any blockage
47	-9955	Bus: Timeout (47)	Communication error bus	Communication with internal or external bus component failed	Please contact service
48	-9954	Bus: Set Comm. (48)	Communication error bus	Communication with internal or external bus component failed	Please contact service
49	-9953	Bus: CRC Error (49)	Communication error bus	Communication with internal or external bus component failed	Please contact service
50	-9952	Bus: opening failed (50)	Communication error bus	Communication with internal or external bus component failed	Please contact service
51	-9951	Bus: Connecting failed (51)	Communication error bus	Communication with internal or external bus component failed	Please contact service
52	-9950	Bus: Socket failure (52)	Communication error bus	Communication with internal or external bus component failed	Please contact service

## Operation of the AwiLAB Digester

Error no. Gas Analysis System	Error no. Bus connection	Error Text German	Short description of the error	Possible causes	Troubleshooting or Handling of the Error
53	-9949	Calibration failed (53)	Calibration failed	Problems with optional automatic calibration (See chapter Fehler! <b>Verweisquelle konnte nicht gefunden werden.</b> )	Please contact service
54	-9948	Calibration partly failed (54)	Calibration partly failed	Problems with optional automatic calibration (See chapter Fehler! <b>Verweisquelle konnte nicht gefunden werden.</b> )	Please contact service
55	-9947	Calibration: Calibration: deviation too high – Sensor defective? (55)	Calibration: Deviation too high	Problems with optional automatic calibration (See chapter Fehler! <b>Verweisquelle konnte nicht gefunden werden.</b> )	Please contact service
56	-9946	Sensor defective or dangerous atmosphere! (56)	One or more sensors faulty. A hazardous atmosphere is unlikely, but cannot be completely ruled out.	-explosive atmosphere at installation location or in the interior of the device -pumps faulty -exhaust air line blocked -sensor faulty	Explosive atmosphere detected: <ul style="list-style-type: none"> <li>• avoid sparks</li> <li>• no switching operations</li> <li>• ventilation</li> <li>• eliminate leakage</li> </ul> Check pump (trigger measurement > pump must start up)  Check exhaust line for any blockage Check sensor values
57	-9945	Caution! Possibly Explosive Atmosphere! (57)	Explosion Hazard! - One or more sensors have detected a hazardous atmosphere. It is likely that there is an explosive atmosphere inside the device.	See error 56	See error 56
58	-9944	Sensor defective (58)	Sensor faulty	Measured value could not be accepted in the scheduled time Sensor reacts too slowly	Sensor used up > replace sensor
60	-9942	Timeout: No measurement values yet (60)	Timeout: Time span since last measurement is too long	Error only with analogue outlet, measured value too old and therefore no longer valid	Please contact service
62	-9940	not released (62)	Not released	Controller or process not released	Check motor protection switch desulphurization
63	-9939	stopped (63)	Stopped	Gas analysis system was stopped due to error message	See chapter Fehler! <b>Verweisquelle konnte nicht gefunden werden.</b>
64	-9938	switched off (64)	Switched off	Control is switched off	Activate the controller.
65	-9937	stopped, switched off or not released (65)	Not released, stopped, not active or not switched on	Motor protection switch desulphurization	Check desulphurization

## Operation of the AwiLAB Digester

Error no. Gas Analysis System	Error no. Bus connection	Error Text German	Short description of the error	Possible causes	Troubleshooting or Handling of the Error
66	-9936	Gas analysis system was stopped due to failure of a component (66)	Only used with special devices.	e.g. water sensor responded	Please contact service
68	-9934	no data file (68)	Data file not found		Please contact service
70	-9932	Bus: Writing failed (70)	Communication error bus	Communication with internal or external bus component failed	Please contact service
71	-9931	Bus: Reading failed (71)	Communication error bus	Communication with internal or external bus component failed	Please contact service
72	-9930	Out of memory (72)	Out of memory	Memory full	Restart the gas analysis system
75	-9927	not ready (75)	Not all prerequisites are met yet	Gas analysis system cannot run yet as certain prerequisites are not met: <ul style="list-style-type: none"> <li>• Other gas analysis system not switched on</li> <li>• tank empty</li> <li>• switch incorrectly set</li> </ul>	See causes
84	-9918	Error criterion reached (84)	End criterion with error when reaching: Error as reached Object cooler: The temperature of the cooler is too high or too low in relation to the ambient temperature Object casing temperature: Temperature of the casing too high or too low	Above or below threshold value Object cooler: 1. Device was switched off 2. Problems with the cooler (not able to reach setpoint temperature any more) Object casing temperature: 1. Installation location too hot or too cold 2. Device has not been running for long	Object cooler: 1. Wait until the temperature has been adjusted (1 hour) 2. Service required Object casing temperature: 1. Check installation location 2. Wait
85	-9917	OK criterion not reached (85)	End criterion with error on failure to reach: Error, as not reached	Above or below threshold value	
90	-9912	Pressure too high (90)	Pressure too high	Input pressure too high	Check input pressure
91	-9911	Pressure too low (91)	Pressure too low	Input pressure too low	Clean measuring pipe or exchange filter
92	-9910	Pressure problem (92)	Pressure problem		Please contact service
93	-9909	used up (93)	used up (e.g. filter)	Filter used up	Exchange filter
98	-9904	Write error (98)	File could not be written	1. microSD full 2. Data corruption on microSD	Please contact service
99	-9903	Watchdog write error (99)	Communication error with counterpart	1. Faulty component 2. Communication with counterpart failed	Please contact service

## Operation of the AwiLAB Digester

Error no. Gas Analysis System	Error no. Bus connection	Error Text German	Short description of the error	Possible causes	Troubleshooting or Handling of the Error
100	-9902	could not be opened (100)	File could not be opened	1. microSD full 2. Data corruption on microSD	Please contact service
101	-9901	write error with secondary file (101)	A secondary file (e.g. backup copy) of the archive could not be created. Saving of data might have been aborted.	1. microSD full 2. Data corruption on microSD	1. a) Restart the device (during restart some files are deleted) b) Delete log files (Service personnel) 2. Please contact service
103	-9899	Range exceeded (103)	Measuring ranges have been exceeded	Set alarm thresholds were exceeded or sensor gives a signal that is too high or too low	Please contact service
104	-9898	Pump is defective or outlet is blocked (104)	Pump faulty or outlet blocked	1. Pump faulty 2. Exhaust line blocked 3. Exhaust line frozen up	Check exhaust line for any blockage and exchange pump if necessary
105	-9897	Drift is too high (105)	Sensor drift is too high	The sensor in question is possibly depleted. This error occurs during calibration.	Please contact the service.

### 3.2.3 Error multi-gas sensor InfraFRED

The multi-gas sensor InfraFRED has LEDs (Illustration 31) that show the current status (Table 2) of the sensor. Errors can be transmitted as well here.



Illustration 31: Status LED Multi-Gas Sensor InfraFRED

Table 2: List Status Conditions Multi-Gas Sensor InfraFRED

State	LED blue	LED orange	LED green
normal operation, warm-up phase not yet completed	flashes alternately with orange LED (5 Hz)	flashes alternately with blue LED (5 Hz)	off
normal operation, warm-up phase completed (approx. 15 min after switching on)	flashes alternately with orange LED (5 Hz)	flashes alternately with blue LED (5 Hz)	on
Error thermostatisation measuring cell (= sensor at STOP)	on	off	off
Error IR emitter (= sensor at STOP)	off	on	on
Other errors	on	on	off

### 3.2.4 Error Failed Calibration

If problems occur during the calibration, three different error messages may be displayed. These errors cannot be deleted. They will be reset automatically after a successful calibration.

#### Calibration partly failed, channel ...:

During calibration of multiple sensors at the same time, the calibration failed for some (not all) of the sensors.

#### Calibration failed:

In the case of a calibration with multiple calibration cycles, the measured values were within the acceptable limits for at least one sensor, but within one calibration cycle (repetitions) the dispersion of the measured values was higher than allowed.

#### Calibration: Deviation too high – sensor faulty:

During a calibration all sensors were outside the acceptable limits.

#### A calibration may fail due to one of the following reasons:

- No calibration gas connected
- Wrong calibration gas connected
- No gas flow (e.g. due to closed-off pressure reducer or blockage)
- Sensor depleted
- Sensor faulty

## 3.3 Options

Please find a description of additionally available options below.

- Download / Update via USB stick
- Remote access AwiRemote
- Fast access to parameters that require frequent changes
- Automatic calibration

### 3.3.1 Download / Update via USB stick

Procedure:

- 1. Admin > Settings > USB Stick**
- 2.** Insert the USB stick into the appropriate slot on the right hand side of the device

**“Download”** button: Thus, the recorded data of the gas analysis can be transferred onto the stick. The copying process is started by clicking the “Download” button and is shown by the left-facing arrow (for copying direction) turning green and an animation. Please wait until the process is completed before you remove the USB stick. The copied data on the USB stick can be opened and evaluated with the program “AwiView2”. Please find more information on the AwiView 2.0 programme online at [www.awite.de](http://www.awite.de).

**“Update”** button: Thus, a software update can be transferred to the gas analysis using a prepared USB stick. The copying process is started by clicking the “Update” button and is shown by the left-facing arrow (for copying direction) turning green, and an animation. Please wait until the process is completed before you remove the USB stick. After this, the device needs to be restarted using the **“Power Off”** option (3.1.6.4).

### 3.3.2 AwiRemote

By means of the AwiRemote option, the gas analysis system automatically establishes a secure connection to the Awite remote maintenance server for purposes of remote maintenance and remote control as soon as there is a functioning Internet access. The gas analysis system must be connected via Ethernet to the customer's Internet router for this. Both the functionality of the Internet access as well as incurred costs for Internet services and data transfer are within the responsibility of the customer. Awite assumes no liability nor any costs for this.

Minimum speed for internet access:

- PV browser: 56 kBit/s (ISDN)
- VNC viewer: 256 kBit/s

#### 3.3.2.1 Remote access via PV browser

The software for remote access via PVB can be downloaded and installed from the following website: <http://pvbrowser.de/pvbrowser/index.php>.

1. After starting the PV browser, the following address is entered into the address bar: **awiremote.com:port number**. The port number after ":" is made up of **40000 + serial number**. The serial number can be found on the display or on the label on the right external side of the device. For this, you add 40000 plus the serial number..  
Example: Serial number **1910** > Port number = **41910**
2. The "Name" field is left blank in the display window. Only the password has to be entered: The password is provided by the project manager / service technician or in case of loss under [info@awite.de](mailto:info@awite.de).
3. Press LOGIN

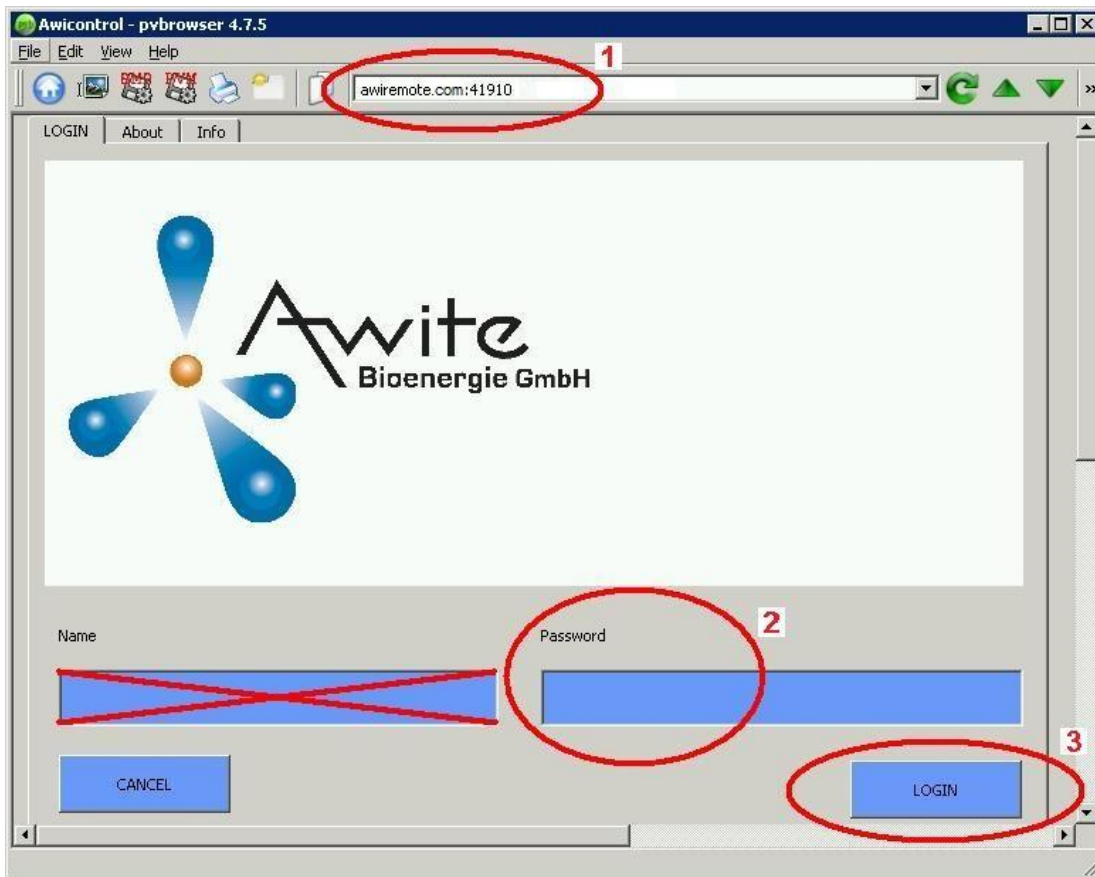


Illustration 32. Input window PV-Browser

Under Windows, please run the PV browser with the option "run as administrator". If no connection is possible, please check or follow these points:

- Is the gas analysis system connected to a working Internet connection?
- Does the PC have a working Internet connection?
- Are all entries correct and complete?
- The PC as well as the gas analysis system should be restarted if necessary!

### 3.3.2.2 Remote access via smartphone or tablet

As a software for remote access via smartphone or tablet, Awite recommends the VNC viewer for Android and Apple iOS operating systems, and the TinyVNC viewer for Windows. These applications can be downloaded from Google Play Store, from the Apple App Store, or from Windows Marketplace, respectively.



#### 3.3.2.2.1. Procedure with the VNC Viewer (Google and Apple):

1. After starting VNC Viewer, the following address is entered into the address bar:  
**awiremote.com:port number**. The port number after ":" is made up of **30000 + serial number**. The serial number can be found on the display or on the label on the right external side of the device. For this, you add 30000 plus the serial number.  
Example: Serial number **1910** > Port number = **31910**
2. Enter Name: The name may be freely chosen. **Example:** Gas analysis
3. Initiate the connection with Connect
4. Enter password: The password is provided by the project manager / service technician or in case of loss under [info@awite.de](mailto:info@awite.de). If the "Save Password" option is checked, the password required later only needs to be entered once.

#### 3.3.2.2.2. Procedure with TinyVNC (Windows):

1. After starting TinyVNC, enter a name: The name may be freely chosen. Example: Gas analysis
2. Now enter the address **awiremote.com**
3. The next step is to enter the port: The port number is made up of **30000 + serial number**. The serial number can be found on the display (see chapter3) or on the label on the right external side of the device.
4. For this, you add 30000 plus the serial number.
5. Example: Serial number **1910** => Port number = **31910**
6. Enter password: The password is provided by the project manager / service technician or in case of loss under [info@awite.de](mailto:info@awite.de).
7. Save with "Save" When "Save password" is set to "On", the password remains saved and does not have to be re-entered later.

If no connection is possible, please check or follow these points:

- Is the gas analysis system connected to a working Internet connection?
- Does the smartphone/tablet have a working Internet connection?
- Has the right application been installed?
- Are all entries correct and complete?
- The smartphone/tablet as well as the gas analysis system should be restarted if necessary!

**Note:** Only one user may dial in. If there is already a connection to a further user, no further connection can be established. One can dial in only after that connection was terminated.

### 3.3.3 Fast Access to Parameters that Require Frequent Changes

Settings that need to be changed frequently – e.g. alarm limits, reset gas counter, etc. – can be moved to the **Admin > Expert Settings** window for faster access. For more information on this, please contact the Awite team.

### 3.3.4 Automatic Calibration

For automatic calibration, the gas analysis system is firmly connected to the calibration gases using its own calibration gas connectors, or the calibration gases are only connected to the gas analysis system during the calibration process. At user level 300 (enter "300" under Admin → User level) you can specify basic settings. From user level 1000 (enter "1000" under User level) on, you can specify expanded settings.

### 3.3.5 Fixed Calibration Gas Connection

The gas analysis system is equipped with separate measuring points for the calibration gases. It is recommended to use this option, if calibration is to take place frequently.

#### 3.3.5.1 Display of Measured Values during Calibration

The measured values of the calibration can be viewed like all other measured values in the "History" or "Current Values" tabs. To do this, the calibration measuring point must be selected in the respective "Settings" sub-menu. This option is only possible for an automatic calibration with firmly connected calibration gas.

### 3.3.6 Test Measurement with Calibration Gas

The calibration gas measuring points can be measured for test purposes without adjusting the sensors. In order to do this, the user level has to be changed to User Level 300 (Admin > enter User level "300"). Then click on **Admin > Start Measurement**. All measuring points (including the test gases) are queried. For "normal" measuring points (e.g. fermenter/CHP...) answer "No" when asked "Start Measuring now". Click "Yes" to confirm the desired calibration measuring point. Depending on the customer's needs, any combination of test gases and measuring channels can be configured for this manual measurement.

### 3.3.7 Without Fixed Calibration Gas Connection

In the case of gas analysis systems without a fixed calibration gas connection, the calibration gas has to be connected to a “normal” measuring point for the duration of the calibration. After the calibration, the calibration gas cylinder is disconnected from the gas analysis system. The calibration is carried out analogously to chapter 3.1.3.2.2.

## 4 Document and Change History

Date	Change	New Dates and Versions	Editor
2018-05-18	Initial document created	00-00	Breier
2019-01-07	Update of references	00-01	Breier

## 5 Appendix

Documentation on „AwiCharts“. Is attached in the separate attachment.