Bieler+Lang

Biogas 08
Basissystem

Version 4

SETTING UP AND USER'S MANUAL

Gasanalyzer and Warning System

Table of contents

Important note

This setting up and users's manual is conceived for the standard version of the GMC 08 Biogas08-Analyzer.
For options cases, please check the specific manuals of these options.

Application

A continuous surveillance of the produced biogas is necessary to efficiently control the production process of a biogas plant.
Using a Bieler + Lang biogas analysis equipment the contents of methane, carbon dioxide, residual oxygen and hydrogen sulphide are measured in individually determined measuring cycles.
Thanks to its simple and compact conception, this equipment can be kmodified and widened in its functions with reduced cost in a very quickly.

Products description

- Analysis of a gas produced from methanisation
- Conceived for a regular and continuous analysis directly on the biogas plant
- Analysed component: CH_4, H_2S, CO_2, O_2
- Technics of measurements: NDIR infrared sensor double beams for the CH_4 and the CO2, electrochemical sensor for the H_2S und O_2
- Pressure and temperature compensation of the infrared sensor
- Flame arrester security following the current standard EN 12874
- Ventilation integrated in the analyzer's case
- Clear and easy to use
- Data storage for measured values
- Relay of the programmation of the process
- Output of the results of each component in signal 4-20mA
- Option: 2 gas detector for the machinery room's supervision
- Option: preparation and cooling of the biogas to be analysed at 5°C to dry it
- Option: Up to 4 possible measurement points

Unity of measures

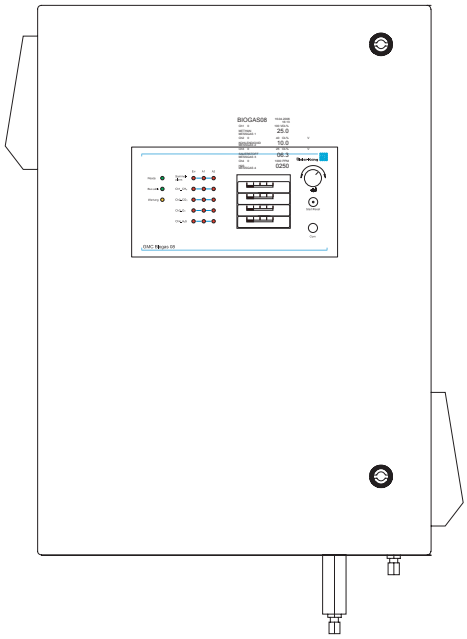
Gas	Unity of measures
CH_4	0 – 100 vol%
H_2S	0 – 5.000 ppm
O_2	0 – 25 vol%
CO_2	0 – 40 vol%

Assembling

The Analyzer GMC08 exists in 2 versions:

- with drying by cooling the sampling biogas
- without drying the sampled gas

All the components are integrated in a closed and pre-cabled case.
All the gas' connection necessary for the sampling are situated at the bottom on the right of the housing. The electric connection are also placed under the case. The visualisation screen und the control unit are integrated on the side of the locker's door. The analyzer owns a integrated and automatic ventilation for security reasons. The internal's components are separated in 2 zones. On the right are fixed the pneumatic component with gas sensors/captors. On the left are placed the electronical components and the different relay of commands.



Functioning

The Analyzer GMC08 owns 2 functioning modes.
In the automatic mode, the analysis are made by regular and programmed intervals. Moreover the system can make separate and other intervals analysis.
In this mode, an analysis requested by manually operated control.

At each new sample, the "zero points" of the differents captors and sensors can be adjusted thanks to surrounding filtered air.
This air is filtred thanks to particles filtres and coal filter, cleaned and sent back by solenoid valves to the different sensors.
After the successful adjustment of the "zero point", the pump withdraws the biogas to be analysed and conveys it through a flamm arrester to the explosion protection until the gas' cooler.
The sampling gas is cooled down to a temperature of 5°C.
The produced condensate is then pumped and evacuated through the output conceived for this effect (supple pipe to link at the output and evacuation of the condensate to outside). The sensor H2S is protected by an automatic dilution of the sampled gas. The biogas is then injected in the different captors to be analysed.
At the end of the measures, the network of the Analyzer's sampled gas is cleaned by an automatic injection of air.

The measured values can be read during the development of the analysis on the display unit. After the measurement, the system compares the results with the alarm thresholds indices of each component recorded in the program.
These thresholds obtain in addition to the alarms attribut for the overtaking of the low and for the higher indices.

Functionning

Thanks to this programmation, the gas' concentration to be analysed can vary. The system releases the alarm relay at each overtaking of these threshold. The analyzer emits for each component a visual alarm by a signal 4-20mA. The program records 1.440 analysis in its system. The results recorded are readable thanks to an interface RS232. The 13 last analysis' results are readable on the analyzer control screen.
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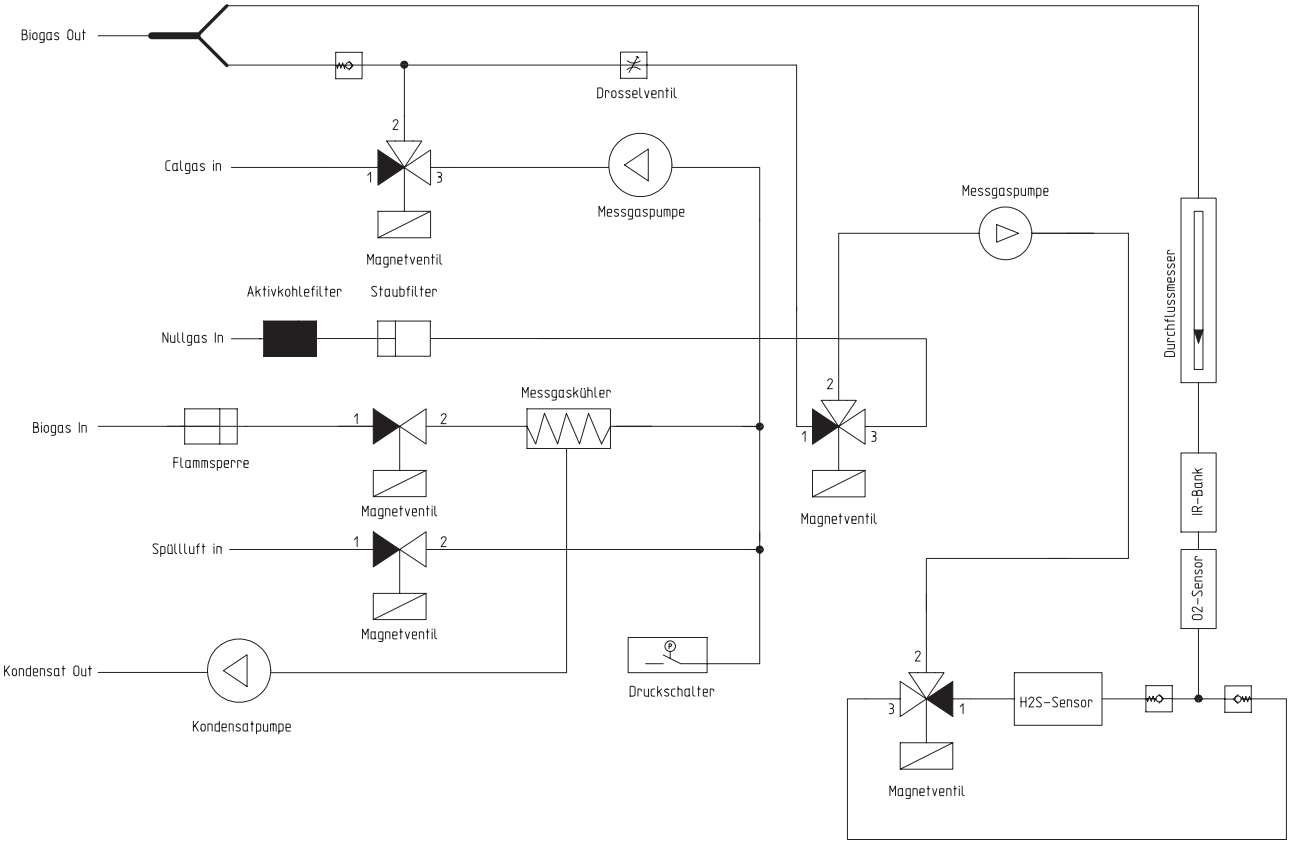
In option, it is possible to plug in the analyzer 2 gas detectors for the machinery room. These detector's alarms are linked to the equipment's collective alarm's message. This evaluation of the threshold is realised permanently.

The analyzer is easy to maintain and doesn't require a big maintenance. All the sensors are easily accessible. For the review and adjustment of the gas sensors is an additional connection available in the system



Technical datas

Unity of measures

Gas	Unities	Resolution	Technics
CH_4	0 – 100 vol%	0,1 vol%	NDIR infrared double beam
H_2S	0 – 5.000 ppm	1 ppm	elektrochemical Gas sensor
O_2	0 – 25 vol%	0,1 vol%	elektrochemical Gas sensor
CO_2	0 – 40 vol%	0,1 vol%	NDIR infrared double beam

Interfaces

Display / Measurements	160x160 Pixelilluminated graphic screen Status of each component
Relay output	2 alarm thresholds for each component 2 alarm thresholds for the collective alarm Maintenance Breakingdowns, errors
Digital output	RS232, transfert and digital edition of the analysis
Similar output	output signal 4-20mA for each component
Similar input	2x 4-20 mA for the gas detectors in the machinery room

Electricity supply

Electricity supply	230 VAC, 50 Hz (85 - 264 VAC / 47 – 63 Hz)
Consumption	Standby: 0,2 A ON: 0,7 A
Commutation Relay's outputs	250 VAC, 2 A

Environment

Air temperature	+10°C – +40°C
Storage temperature	-10°C - +50°C
Humidity rate	< 80% rel. F.
Air pressure	850 – 1100 hPa

Biogas input

Gas connection	Sample gas, condensate: Id/Ad = 4/6 mm Output diam. int/diam.ext = 9/12 mm
Safety Device	Explosion protection with flame arrester Ex IIG IIB3 PTB 04 ATEX 4003X
Sample gas Input	Biogas08 without cooler: max 5 ℃ Biogas08 with cooler: max 40 ℃
Biogas' temperature	max 40 ℃
Input's pressure	-50 … +10 hPa
Output's pressure	the sampled biogas is to be re-thrown back outside without pressure

Technical datas

Case/Dimension

Case	Painted metallic case
Dimension (WxHxD)	ca. 580 x 780 x 230
Weight	ca. 30 kg
Protection Factor	IP20

CONNECTIONS

NOTE

Please imperatively respect the following instructions:

- manipulate the analyzer with caution during the transport and handling
- Works including: setting-up, putting into service, maintenance and mending must be made by qualified employees
- Read the notice before setting-upand putting into service, respect without restriction the security instruction which are described

Assembling

- Protect the analyzer from dust, water, oil, dirt or anything that could damage it
- Setting up is allowed only outside ATEX zones
- Set-up in a dry place, with stable temperature and no vibrations
- Forsee enough space to access and do the system's maintenance

Important remarks

This user's and setting-up manual describes the caracterisitics and the use of the Biogas GMC08 analyzer in its standard version. For options, please refer to the specific manual attached for these options.
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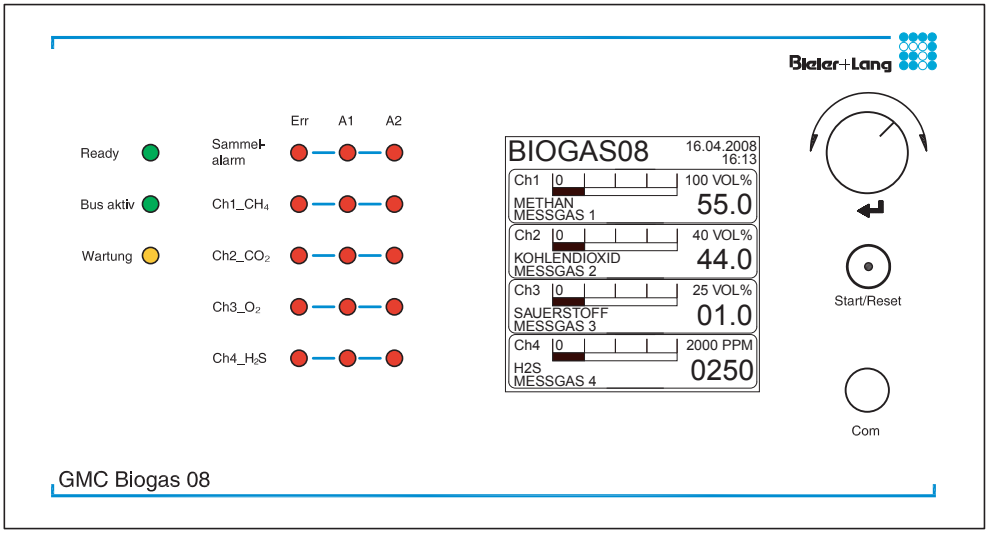
Electric connection

See the plan "electric connection" attached.

GAS connection

- Biogas input
  Connection for the biogas' injection to analyse
- OUTPUT Biogas 1 / OUTPUT Biogas 2
  Outputs towards the outside of the biogas', after analysis. The disposal towards the outside must be made without pressure (as short as possible)
- INPUT for calibration gas
  Connection for the grading gas' injection during the trail period
- OUTPUT condensate
  Outputs towards the outside for the condensates' rejection.

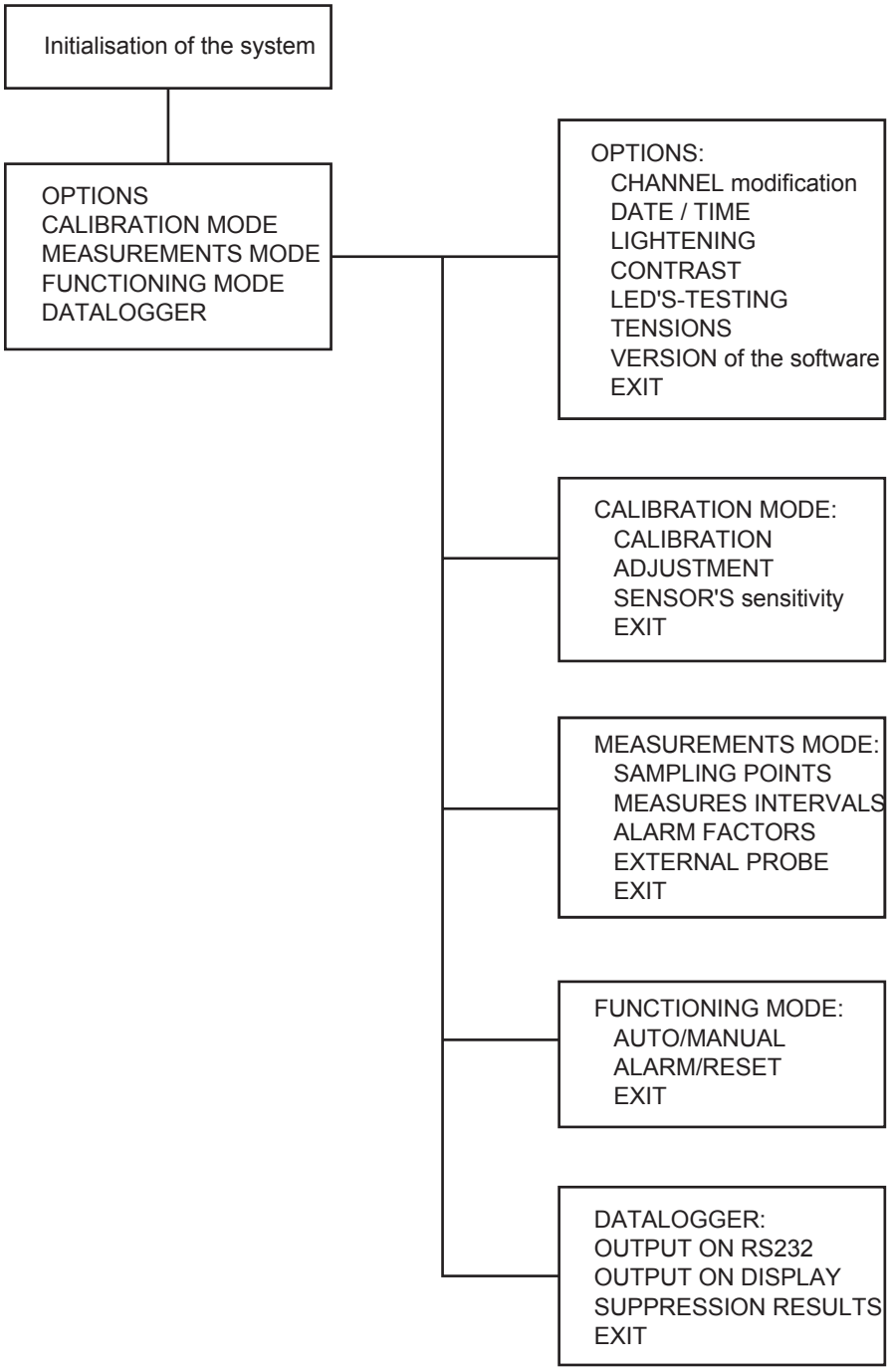
DISPLAY and COMMAND



Ready	Switched on	Equipment
Bus actif	flashing	Communication established with the system
Pause/Wartung	switched on	The analyzer is on pause (stand-by)
Err	switched on	Component's channel on, declares : - computer problem - electrical problem - pneumatic problem - Parameter of the measures outside tolerances - Failure of the sensor's adjustmen
A1	switched on	Channel of the switched on component: Alarm threshold 1 activated
A2	switched on	Channel of the switched on component: Alarm threshold 2 activated
Collective alarm	LED Err, A1 oder A2 switched on	- One of the channel has activated the alarm - Gas detector (option) has acitvated the alarm
Ch1 CH_4	LED Err, A1 oder A2 switched on	Methane measures: failing / mistake or threshold with overtaken alarms
Ch2 CO_2	LED Err, A1 oder A2 switched on	Carbon dioxyde measures: failing / mistake or threshold with overtaken alarms
Ch3 O_2	LED Err, A1 oder A2 switched on	Oxygen measures: failing / mistake or threshold withe overtaken alarms
Ch4 H_2S	LED Err, A1 oder A2 switched on	Hydrogen sulfide measures: failing / mistake or threshold with overtaken alarms

Button	Turn	- Navigate and change point in the menu - modify the parameter of the datas
	Press	Record the executed modifications
Com		Interface in serie

Presentation- of the program



INITIALISATION of the system

The system initializes itself automatically as soon as its starts. The following functions are made one after another

.Hinweis: Abhängig von den eingestellten Parametern, kann dieser Vorgang bis zu sieben Minuten dauern.

- STARTING THE COMMAND'S PLATES
  - Initialization and control of the command's plates
- STARTING THE MEASUREMENTS SYSTEM
  - Adjustement of the different sensors and parameters
- TEST TO CONTROL THE SYSTEM OF ANALYSIS
  - Control of the sensor's sensitivity and data's measures
- TEST TO CONTROL THE GAS COOLER
  - turn the gas cooler on (if chosen option) and wait until the temperature allready recorded is reached.
- ADJUSTMENT (prepared in the factory)
  - -Aspiration of the calibration gas
  - -Starting up the calibration at the "zero point"
  - -Calibration in due course
  - -Test to control the calibration
  - - Adjustment of the "zero points" of each component
  - - Adjustement and reinforcement of the O2 sensor (Display 20,9 vol%)

After a successful initialization, the system puts itself on "stand-by" mode.

STAND-BY Mode

The analyzer procedes to automatic or manual measures. During the pause between the analysis, the display on the screen is the following:

```
BIOGAS08          16.04.2008
                  16:13

  STAND-BY
  ANALYSIS MODE: AUTO

  IN 0005 MINUTES
  MEASURES GAS POINT 01
```

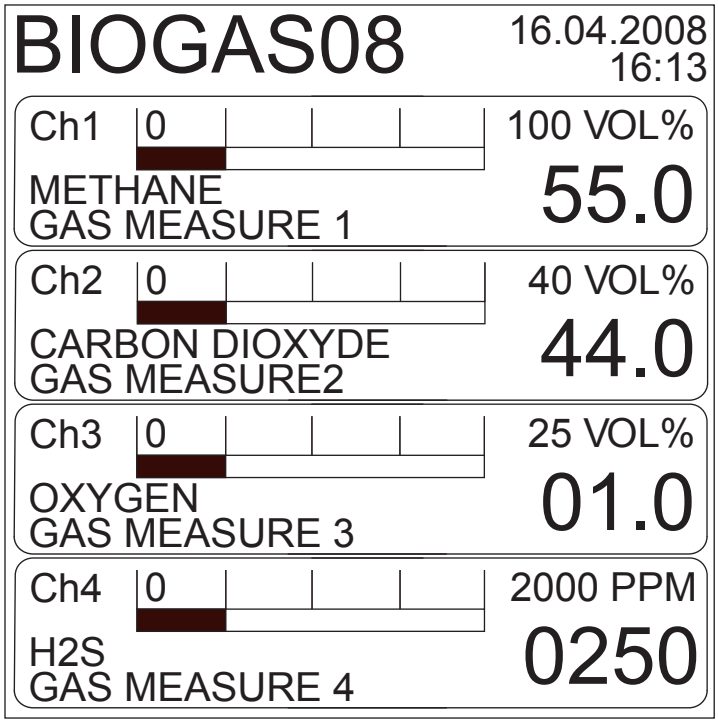
or

```
BIOGAS08          16.04.2008
                  16:13

  STAND-BY
  ANALYSIS MODE: MANUAL

  Measures with pressure
  -- START/RESET --
```

- AUTOMATIC MODE
  The analysis are made automatically in defined intervals. The remaining time until the next measure is displayed in minutes on the screen.
- MANUAL MODE
  Press the button START/RESET to launch a sampling

ANALYSIS

The analyzer GMC08 makes biogas samples following the programmed cycles (Mode AUTO) or manually. Before each analysis, the grading "zero point" and reinforcement of the signal of the oxygen's sensor are adjusted.
During the analysis, the datas are visible on the equipment's display. Then the results are compared to the programmed threshold's alarms
The signals in 4-20mA show the state of each component until the next analysis (Err, A1, A2 or nothing if ok).
After the alarm's reports, the GMC08 puts itself in "stand-by" mode.
The measurementsare visible later on the equipment's display via the DATALOGGER or the interface RS232.



System parameters

During the stand-by mode, all the parameters of the GMC08 Analyzer can be modified. The main menu activates itself by pressing the big button on the front of the case.

MAIN MENU

```
--> OPTIONS
    CALIBRATION MODE
    MEASUREMENTS MODE
    FUNCTIONING
    DATALOGGER
    EXIT
```

- OPTIONS
  - General characterisitics of the system
- CALIBRATION MODE
  - Implementation of the calibration with a testing gas
- MEASUREMENTS MODE
  - Recording of the datas for the gas' analysis
- FUNCTIONING
  - Choose the automatic or a manual mode
  - Alarmreset / Cancellation
- DATALOGGER
  - Visualisation and transfer of the results of the analysis
- EXIT
  - back to stand-by mode

OPTIONS

```
OPTIONS:
--> Channel modification
    DATE / TIME
    LIGHTENING
    CONTRAST
    LED'S-TESTING
    TENSIONS
    VERSION of the software
    EXIT
```

CHANNEL MODIFICATION

```
CHANNEL modification:
--> Ch1.CH4:     --> ON
    Ch2.CO2:         ON
    Ch3.O2:          ON
    Ch4.H2S:         AFF
    EXIT
```

The analyzer GMC08 can analyse until 4 components. Choose the desired components and modify the status of every on ON or OFF.

DATE / TIME

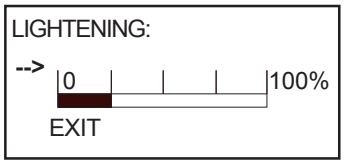
```
DATE / TIME:
--> DAY:      --> Monday
    DATE:         16
    MONTH:        04
    YEAR:         2008
    HOUR:         16
    MINUTES:      43
    EXIT
```

Modify the current date and time.

System parameters

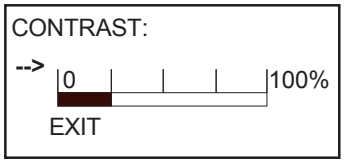
OPTIONS

LIGHTENING



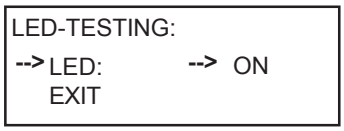
Adjust the screen's luminosity.

CONTRAST



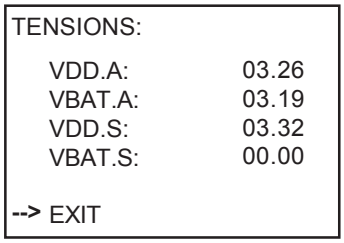
Adjust the screen's contrast.

LED-TESTING



To test the LED'S good working order.

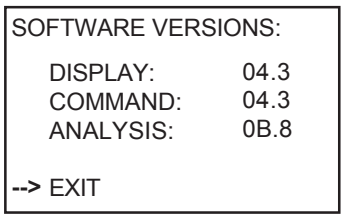
TENSIONS



Display of the internal tension to control.

Hinweis: Zur Pufferung der integrierten Echtzeituhr gegen Stromausfall ist eine Batterie eingebaut. Die aktuelle Spannung wird durch den Wert VBAT.A dargestellt. VBAT.A muss größer 02.50 sein. Die erwartete Lebensdauer beträgt 36 Monate.

SOFTWARE VERSIONS



Display the versions of the set-up programs.

System parameters

CALIBRATION MODE

```
CALIBRATION MODE:
--> CALIBRATION
    ADJUSTMENT
    SENSOR'S-SENSITIVITY
    EXIT
```

Regularly, a control of the sensitivity and of the good working order of the different components'sensors, must be made. It is realised by injection a grading gas:

- CALIBRATION
  Comparaison of the results of a known testing gas
- ADJUSTMENT
  Comparaison of the precision of the sensors with a concentration of a known testing gas.
- SENSOR'S SENSITIVITY
  Display of the sensitivity / precision of the different sensors.

CALIBRATION

```
CALIBRATION START:
--> START
    EXIT
```

Procedure:
1) Connect the grading gas to the input "CALGAS" made for this purpose
2) Star the calibration
3) Automatic "back to zero"
4) During the display "Calgas aufgeben" and the measured datas, adjust the calibration gas output at 60l./h.
5) After a successful procedure, automatic return to the main menu.

ADJUSTMENT

```
ADJUSTMENT:
--> TYPE OF GAS
    CONCENTRATION
    START
    EXIT
```

- TYPE OF GAS:
  Record the component of the used calibration gas
- CONCENTRATION:
  Record the concentration of each component
- START:
  Start the adjustment

ADJUSTMENT (TYPE OF GAS)

```
TYPE OF GAS:
--> Ch1.CH4:    -->  YES
    Ch2.CO2:         YES
    Ch3.O2:          NO
    Ch4.H2S:         YES
    EXIT
```

Define the type of gas (here Biogas) and its different components to be analysed. For a gas like the biogas , give a channel for each component and record it in mode YES.
NOTE: Ch3.O2 should be set to (NO), because before each measurement, an automatic adjustment takes place.

System parameters

CALIBRATION MODE

ADJUSTMENT (CONCENTRATION)

```
CONCENTRATION GAS:
--> Ch1.CH4:    60.00 VOL%
    Ch2.CO2:    40.00 VOL%
    Ch3.O2:
    Ch4.H2S:    0300  PPM
    EXIT
```

Record the concentration of the grading gas.

ADJUSTMENT (START)

```
ADJUSTMENT START:
--> START
    EXIT
```

Procedure:
1) Connect the biogas to be analysed to the input made for this purpose on the right under the case
2) Start the adjustment
3) Automatic "back to zero" before each adjustment
4) During the display "calgas aufgeben", adjust the gas debit to 60l./h
5) After a successful adjustment, automatic return to the main menu.

System parameters

MEASUREMENT MODE

```
ANALYSIS MODE:
--> SAMPLING POINTS
    INTERVALS
    ALARMS THRESHOLDS
    EXT. PROBE
    EXIT
```

SAMPLING POINTS

```
EXT. SAMPLING POINTS:
--> Sampling point: 01
    EXIT
```

It is possibility to connect until 4 different sampling points on the GMC08 Analyzer. Record here the number of sampling point.
.

MEASURING INTERVALS

```
MEASURING INTERVALS:
--> CURRENT:       30 MIN
    HOUR OF REF: 12:00h
    DIVIDER H2S :  01
    Aspirat. Length1: 10 SEC
    Aspirat. Length2:
    Aspirat. Length3:
    Aspirat. Length4:
    EXIT
```

- CURRENT:
  Define here the wished intervals between the sampling
- HOUR OF REFERENCE:
  The interval starts again each day at the define hour. Like that the intervals between the analysis always stays synchronized even if there is a power cut.
- DIVIDER H2S:
  The sensor H2S is subject to wear. To extend its life span, there is a possibility to reduce the number of analysis of this sensor:
  Teiler 1: Analysis at each sampling as recorded in "current".
  Teiler 2: Anaylisis of the H2S every 2 samples (here for example every 60 minutes)
- ASPIRATION LENGTH
  The required length for a secured transfer of the biogas from the sampling point to the analyzer.

ALARM FACTORS

```
ALARM FACTORS:
--> Ch1.CH4:   < 40.00 VOL%   Alarm threshold 1
    Ch1.CH4:   > 80.00 VOL%   Alarm threshold 2
    Ch2.CO2:   < 20.00 VOL%   Alarm threshold 1
    Ch2.CO2:   > 40.00 VOL%   Alarm threshold 2
    Ch3.O2:    < 02.00 VOL%   Alarm threshold 1
    Ch3.O2:    > 05.00 VOL%   Alarm threshold 2
    Ch4.H2S:   > 0500  PPM    Alarm threshold 1
    Ch4.H2S:   > 0700  PPM    Alarm threshold 2
    EXIT
```

Record for each component and channel the alarm factor:

- Symbol <
  Alarm if overtaking of the minimum threshold recorded
- Symbol >
  Alarm if overtaking of the maximum threshold recorded

System parameters

Measurements Mode

EXTERNAL PROBE

```
EXT. PROBE:
--> ext. PROBE 1
    ext. PROBE 2
    EXIT
```

```
PROBE 1 (2)
--> CURRENT:    -->  ON
    UNITY:           %UEG
    MAX.:            0100
    ALARM 1:         0020
    ALARM 2:         0040
    EXIT
```

Possibility to connect, in option, 2 gas detectors in the machinery room:
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- CURRENT
  ON/OFF of the dectectors
- UNITY OF MEASURES
  Unity: %UEG, PPM, VOL%
- MAXIMAL RATE
  Display at 20mA external probe signal
- ALARM 1 / ALARM 2
  Release of the alarm in case the threshold is overtaken.
  These alarms are recorded in output by a collective alarm.

System parameters

FUNCTIONING

```
BETRIEBSMODUS:
- ->  AUTO/MANUAL
      ALARM/RESET
      EXIT
```

AUTO / MANUAL

```
AUTO/MANUAL:
--> CURRENT:   -->  AUTO
    EXIT
```

Choose the desired functioning mode: automatic analysis (AUTO) or occasionnal analysis (MANUAL).

ALARM / RESET

```
ALARM/RESET:
--> YES
    EXIT
```

Cancellation of the alarms with "YES".

System parameters

DATALOGGER

```
DATALOGGER:
-->OUTPUT RS232
   OUTPUT ON SCREEN
   SUPPRESSION RESULTS
   EXIT
```

The 1.440 last analysis are recorded in the datalogger (memory) of the equipment (30 days if the interval of sampling every 30 minutes)

OUTPUT LCD

```
DATALOGGER:
--> 16.04.2008   17:00 o'clock
    16.04.2008   17:30 o'clock
    16.04.2008   18:00 o'clock
    EXIT
```

```
DATALOGGER:
    16.04.2008  17:00
    Ch1.CH4:    40.00 VOL%
    Ch2.CO2:    20.00 VOL%
    Ch3.O2:     00200 VOL%
    Ch4.H2S:    0500  PPM
--> EXIT
```

The last 15 measurements can look on the equipment's display.

SUPPRESSION

```
SUPPRESSION:
--> Yes
    EXIT
```

Suppress with "Yes" every result recorded in the GMC08's memory.

OUTPUT RS232

```
OUTPUT RS232:
--> START
    EXIT
```

The recorded measurements can be read by the RS232's interface, choose the parameters 8N1 under 9600 Baud.

Connect your computer with the USB wire (option) to the analyzer. During the first data transfer, the system will ask for the installation of the programm (included in the Analyzer's programm).

Start a Terminalemulator (z. B. PuTTY).

NOTE: *PuTTY ist a free Terminalemulator*

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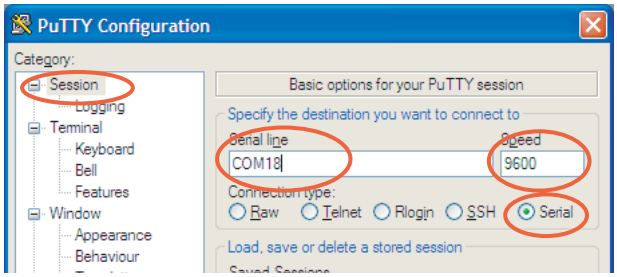
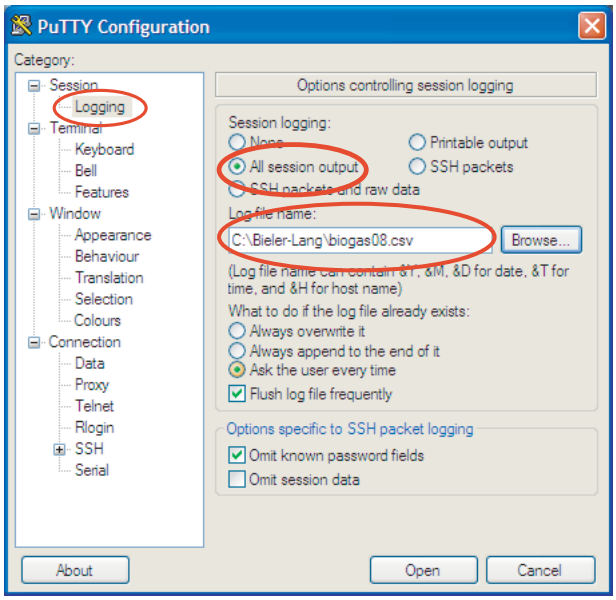


In the connection choice, choose the option "SERIAL". In "Speed", choose 9600 Baud for the speed of data transfer and in "serial line", the number of the serial interface.

System parameters

DATALOGGER

Output RS232



Select a destination for the results' downloading.
Hinweis: Verwenden Sie „.csv“ als Dateiendung.

Start the terminal with "Open".

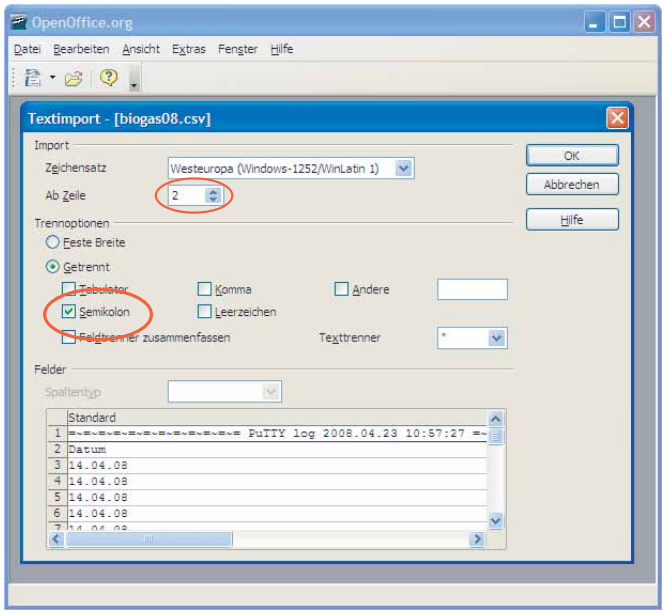
```
OUTPUT RS232:
--> START
    EXIT
```

Start the downloading of the analysis by pressing on "START".
In the computer's window, you can follow the progress of the transfer. After the downloading close the program and the "terminulator".

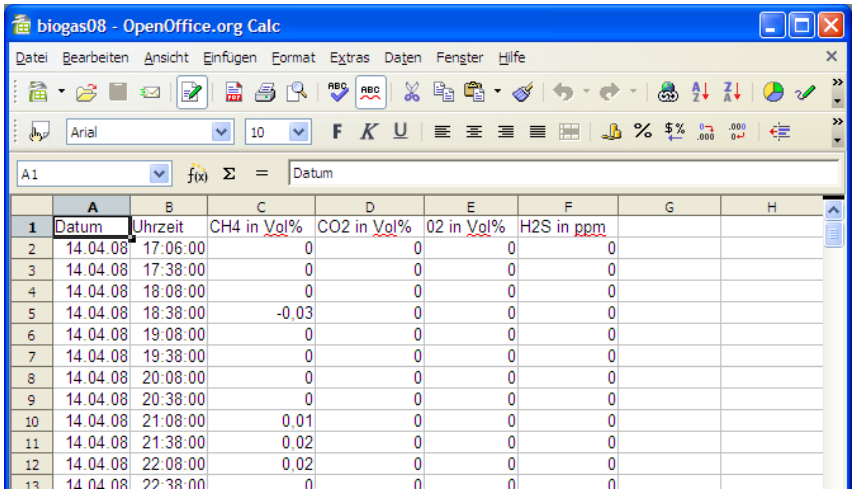
Data processing

The downloaded results can be read and worked on by all programms, like for example in a pivot table.
To do so, open your file withe the desired programm.

FIf the file doesn't appear as a choice, choose the type of file (*.*)



Choose "semikolon" for the separation option on the "text import".



	A	B	C	D	E	F	G	H
1	Datum	Uhrzeit	CH4 in Vol%	CO2 in Vol%	02 in Vol%	H2S in ppm		
2	14.04.08	17:06:00	0	0	0	0		
3	14.04.08	17:38:00	0	0	0	0		
4	14.04.08	18:08:00	0	0	0	0		
5	14.04.08	18:38:00	-0,03	0	0	0		
6	14.04.08	19:08:00	0	0	0	0		
7	14.04.08	19:38:00	0	0	0	0		
8	14.04.08	20:08:00	0	0	0	0		
9	14.04.08	20:38:00	0	0	0	0		
10	14.04.08	21:08:00	0,01	0	0	0		
11	14.04.08	21:38:00	0,02	0	0	0		
12	14.04.08	22:08:00	0,02	0	0	0		
13	14.04.08	22:38:00	0	0	0	0		

Certificate of explosion protection with flame arrester
Detonationsicherung

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

EG-Baumusterprüfbescheinigung

(1)

(2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**

(3) EG-Baumusterprüfbescheinigungsnummer

PTB 04 ATEX 4003 X

(4) Schutzsystem: Detonationssicherung Typ 1002-0008 bzw. 1002-0009

(5) Hersteller: Firma Flammer GmbH

(6) Anschrift: Steuppergstr.49, D-74389 Cleebronn

(7) Die Bauart dieses Schutzsystems sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Physikalisch-Technische Bundesanstalt bescheinigt als benannte Stelle Nr. 0102 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.

Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht PTB Ex 04-43143 festgelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 12874 "Flammendurchschlagsicherungen"

(10) Falls das Zeichen "X" hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Schutzsystems in der Anlage zu dieser Bescheinigung hingewiesen.

(11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Bau des festgelegten Schutzsystems gemäß Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Schutzsystems.

(12) Die Kennzeichnung des Schutzsystems muß die folgenden Angaben enthalten:

II G IIA

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Dr. H. Förster
Regierungsdirektor

Braunschweig, 2004-03-15

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Accessories

Calibration gas
- USB-cable to transfer and reading of the datalogger
- Gas detector Type Exdetector HC100
- Gas detector Type Exdetector HC200
- Gas detector Type Gasmonitor HC150

Guarantee

Bieler + Lang GmbH
Gasmess- und Warnsysteme

Représentant en France:
Biomégan Energies SAS, Les Graves, 46140 CAILLAC

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Internet www.bieler-lang.de

Technischer Stand: 08/2009
Technische Änderungen vorbehalten!