Gas Quality Measuring Device EMC 500 / 500-L

OPERATING INSTRUCTIONS

Serving the Gas Industry Worldwide

STATUS FEBRUAR 2008

RMG by Honeywell

Note:

Unfortunately, paperwork does not automatically update itself but technical developments are constantly being made. Therefore, we reserve the right to change the descriptions and statements contained in our operating instructions without prior notice. However, you can conveniently download the most recent version of this manual (and those of other devices) from our website **www.rmg.com**.

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Introduction

In addition to the **superior calorific value**, the EMC 500 / 500-L measuring device **continuously** determines the **inferior calorific value**, **Wobbe index** and **standard density** of fuel gases.

The Wobbe index is a measured quantity for monitoring and controlling the heat output of gas burners and is defined as follows:

$$W = \frac{H}{\sqrt{rd}} \qquad rd = \frac{\rho_n}{\rho_{n,air}}$$

Where:

W	is the Wobbe index (W_i, W_s)
H	is the calorific value (H_i, H_s)
rd	is the relative density
ρ_n	is the standard density of the measuring gas
$\rho_{n,air}$	is the standard density of the air

The heat output of a gas burner can be maintained at a constant level if the gas supply is controlled in such a way that the Wobbe index remains constant.

The inferior and superior calorific values and the standard density are thermic characteristics which are used for monitoring the composition and energy content of fuel gases.

The EMC 500 measuring device is suitable for custody transfer flow measurements of the superior calorific value, the standard density and the CO_2 content of natural gases and their mixtures.
The version EMC 500-L is also suitable for natural gases which have been conditioned with up to 20% of air. This version may be used for custody transfer flow measurements of the superior calorific value and the CO_2 content. After a special test the standard density may be used for the calculation of the compressibility.

In contrast to conventional methods, the EMC 500 / 500-L measuring device determines the measured values without burning the measuring gas. Combustion-free measurement has significant advantages, such as:

- Low maintenance requirements ➪ no cleaning of the burner
  ➪ no maintenance of the air supply system
- No air for combustion has to be supplied, and therefore, the ambient air has no effect on the measured value.
- No undesired heat is produced at the place of installation.

The EMC 500 / 500-L detects changes in measured values within a very short time. So also automatic recalibration is terminated within a few minutes.
Moreover, the min./max. limits of the measured values and the temperature of the sensor are monitored.

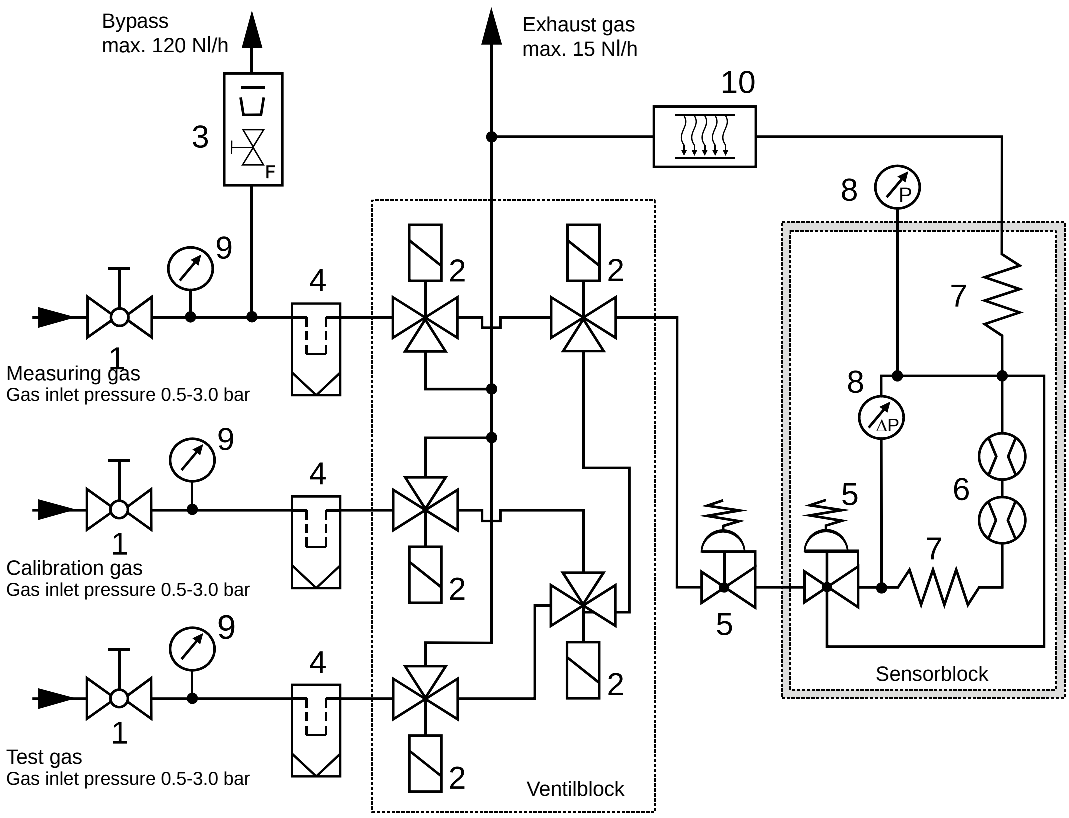
Operating principle

At the heart of the EMC 500 measuring device lie two thermal sensors depending on the type of gas used which are used to measure the heat capacity and thermal conductivity of the gas. Since these two quantities represent over a wide range a function of the superior calorific value, it is possible to calculate the superior and inferior calorific values from these measured values.

Furthermore, the pressure drop is measured by means of a flow resistor. Due to the fact that the pressure drop at a constant gas temperature is a function of the gas density, it can be used to determine the standard density of the gas. The Wobbe index is then calculated from the superior calorific value and the standard density.

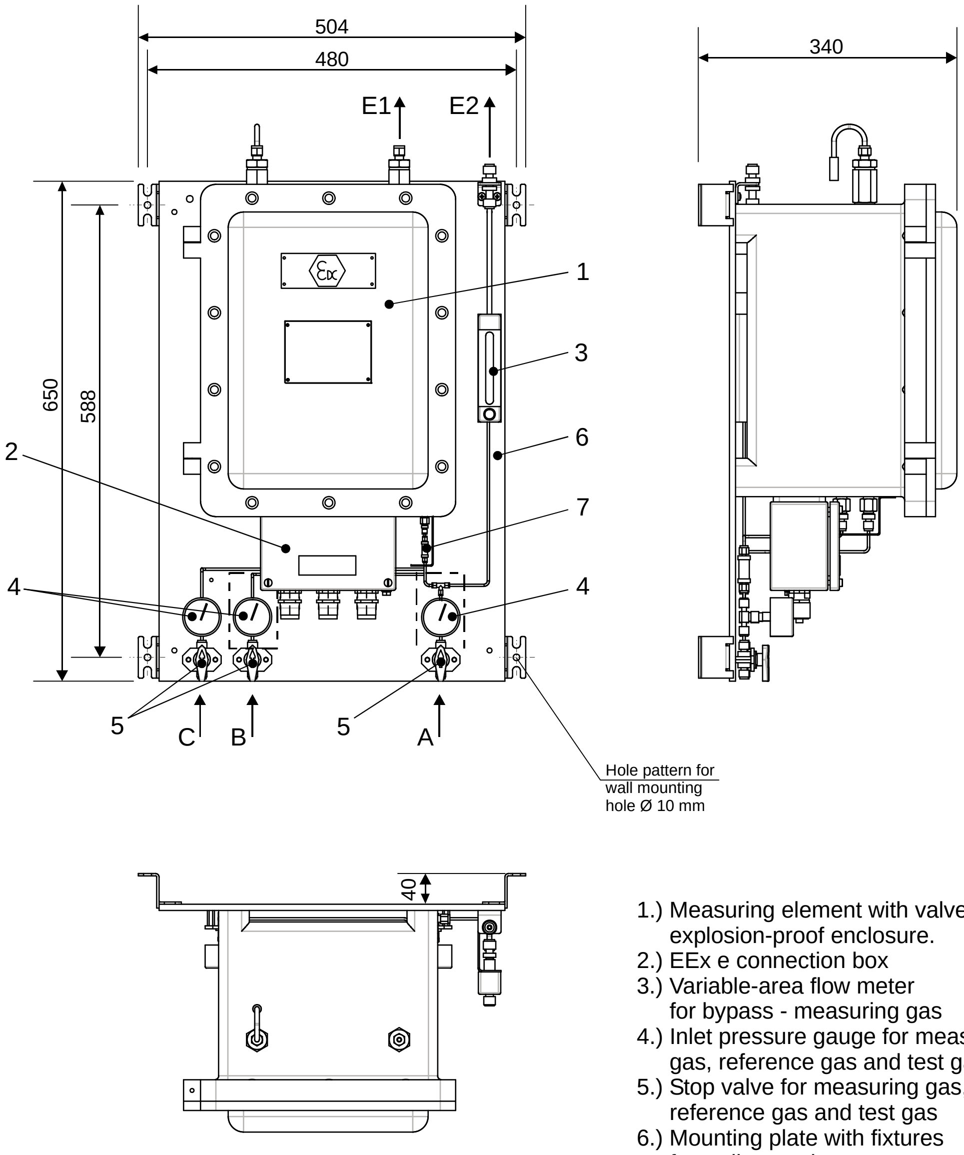
With a infrared sensor the CO_2 content is measured which is needed, besides superior calorific value and standard density, to calculate the compressibility according to GERG 88-S.

Block diagram



1. Stop valve
2. Solenoid valve
   (block and bleed configuration)
3. Flow meter with control valve
4. Filter
5. Pressure regulator
6. Sensors
7. Flow resistor
8. Pressure transmitter
9. Pressure gauge
10. CO_2 sensor

Construction of the explosion-protected (Ex) design



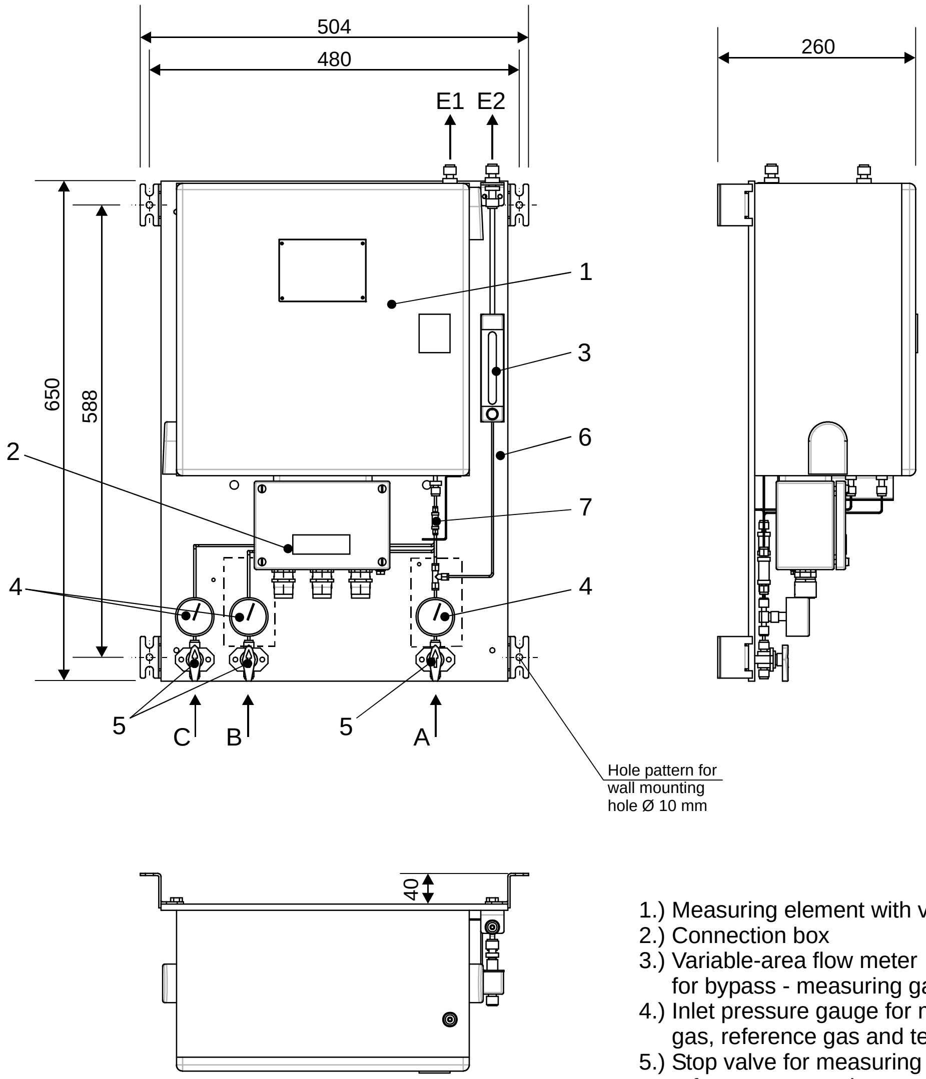
1.) Measuring element with valve control - explosion-proof enclosure.
2.) EEx e connection box
3.) Variable-area flow meter for bypass - measuring gas
4.) Inlet pressure gauge for measuring gas, reference gas and test gas
5.) Stop valve for measuring gas, reference gas and test gas
6.) Mounting plate with fixtures for wall mounting
7.) Inlet filter

Connections:

A: Measuring gas inlet
B: Calibration gas inlet
C: Test gas inlet
} Inlet pressure 0.5 to 3.0 bar; 1/8" pipe connection with Swagelok joint

E1, E2: Outlet pipes with 6 mm pipe connections with Swagelok joints

Construction of the not explosion-protected (Non Ex) design



1.) Measuring element with valve control
2.) Connection box
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4.) Inlet pressure gauge for measuring
gas, reference gas and test gas
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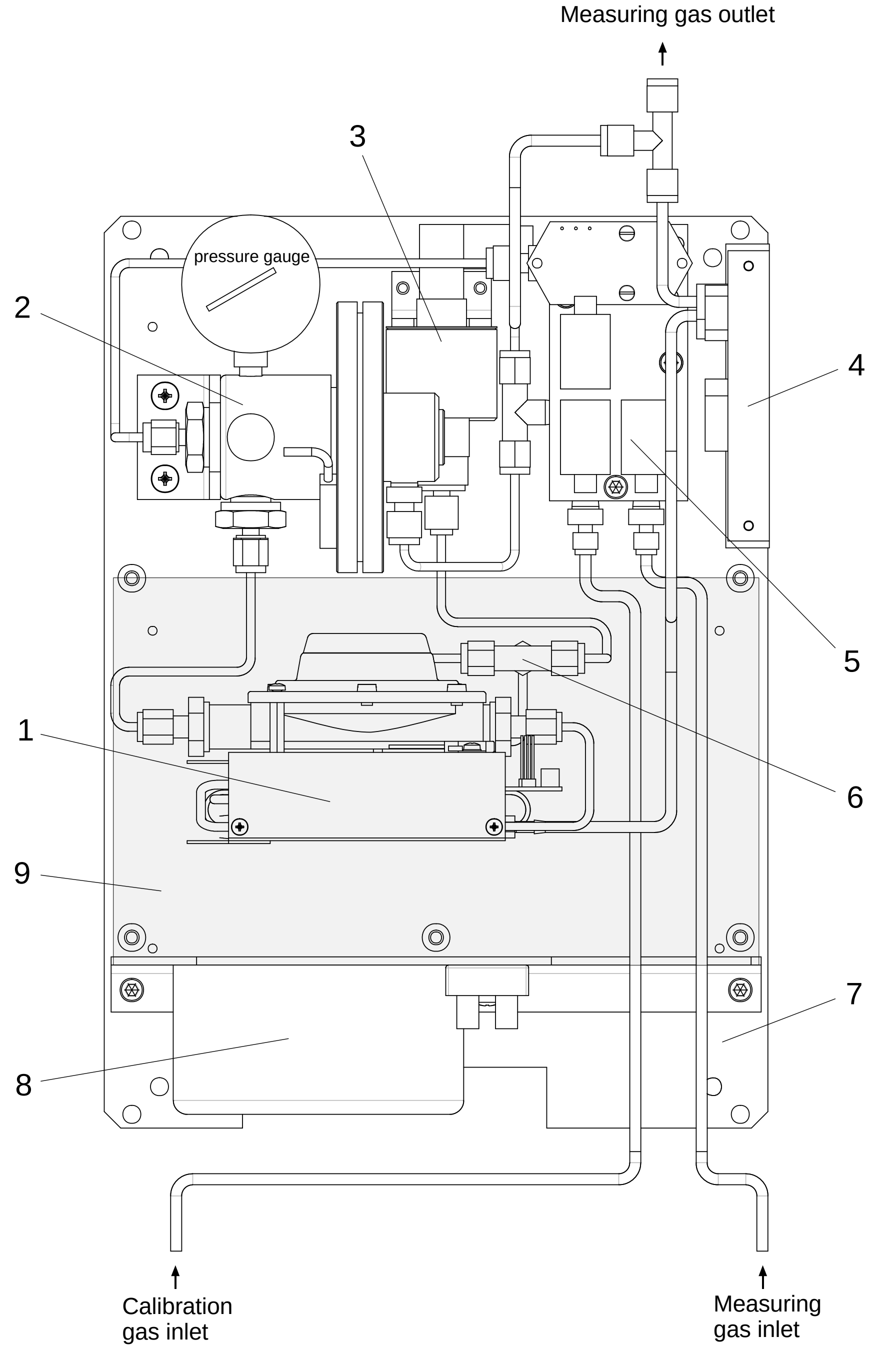
1/8" pipe connection with Swagelok joint

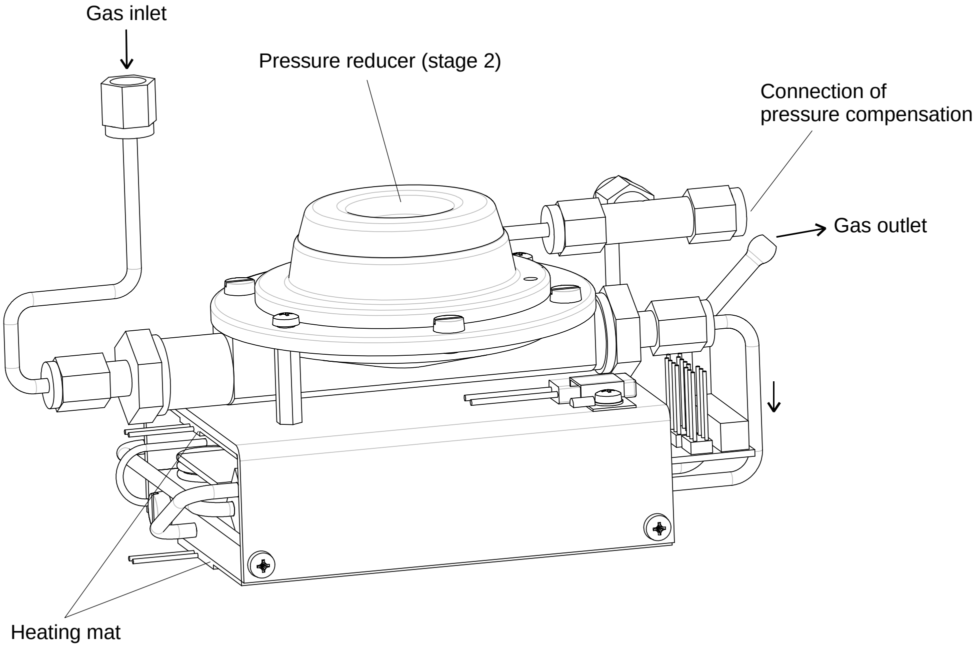
E1, E2: Outlet pipes with 6 mm pipe connections
with Swagelok joints

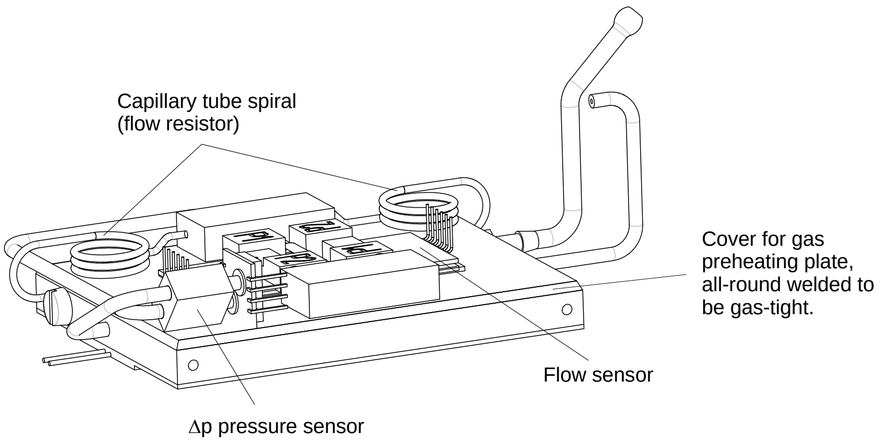
Measuring and electronic unit

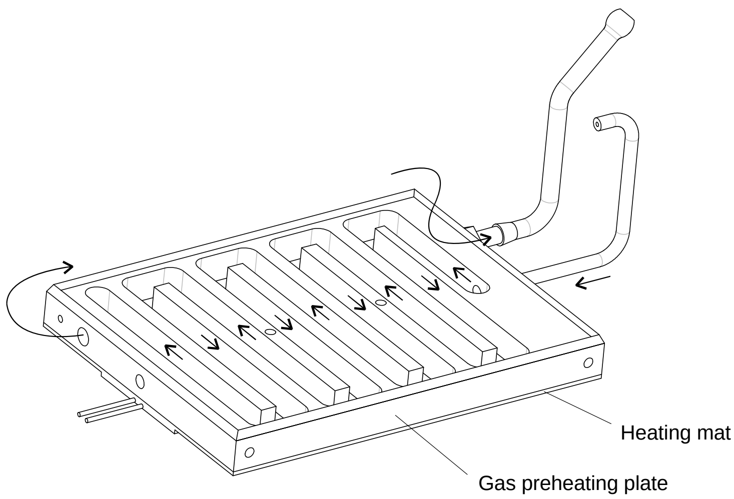


1. Sensor, heated and insulated
2. Pressure reducer (stage 1)
3. Pressure transducer
4. Infrared sensor (CO_2)
5. Solenoid valve block
   with 3/2-way solenoid valve
6. Line filter type SS-2F-2
7. Mounting plate
8. Power supply unit
   (only active in 230 V version)
9. Electronic board

Sensor block





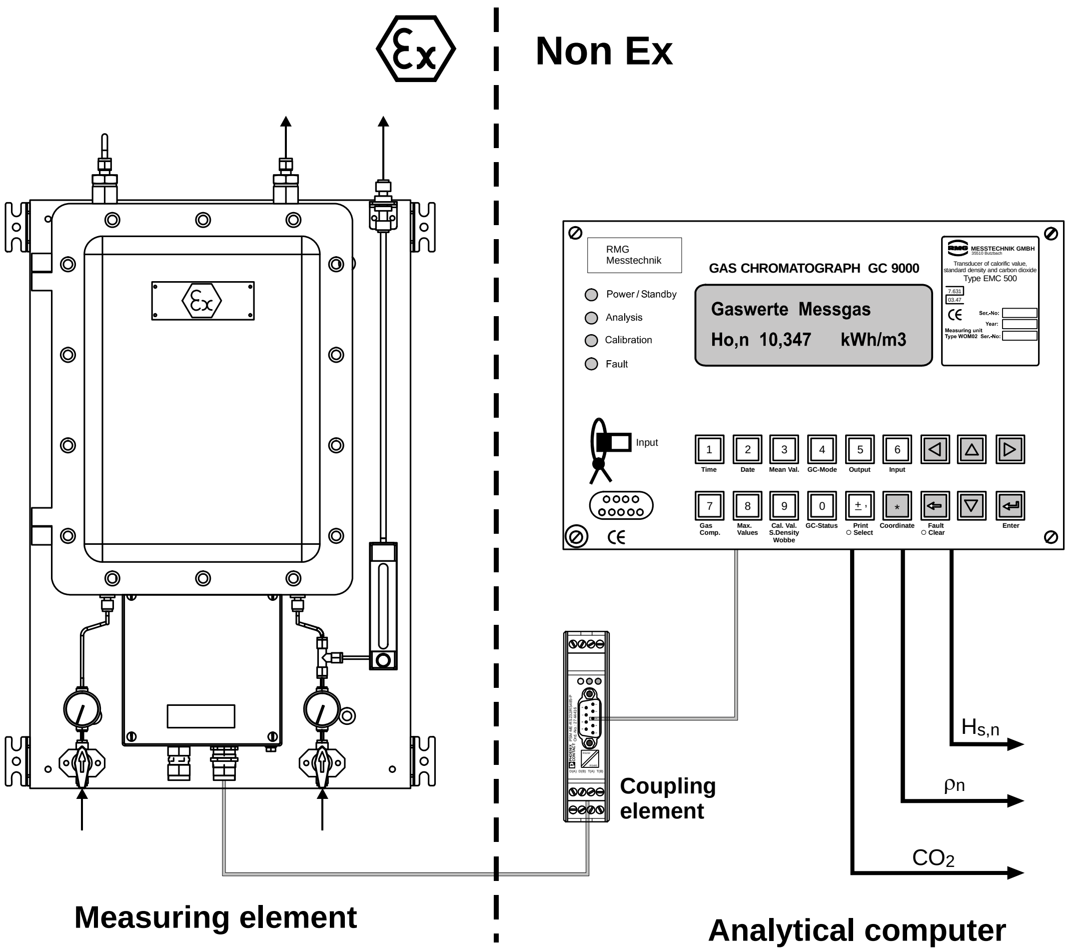


Complete configuration

The complete system consists of the measuring element and the analytical computer GC 9000 (for control and evaluation of the analysis). The analytical computer includes the following functions:

- Measurement of superior calorific value, standard density and CO_2 content for custody transfer applications.
- Determination of Wobbe index, inferior calorific value and relative density as well as monitoring of the nitrogen content.
- Bus interface (DSfG or Modbus ASCII)
- Operation as with the process gas chromatograph.

Configuration with analytical computer GC 9000



Operating Instructions for the Explosion-Protected Design

General Instructions

The explosion-protected design of the EMC 500 superior salorific value, standard density and Wobbe index measuring device is an explosion-protected electrical apparatus of the “explosion-proof encapsulation” type of protection with a terminal compartment of the “increased-safety” type of protection.

Code: II 2G EEx de IIB T4

The device complies with the provisions of Guideline 94/9/EG (ATEX 100a).
It can be installed in areas subject to explosion hazards in zone 1 which are endangered by gases and vapours classified under danger class IIB and temperature class T4.
For installation and operation, the appropriate ordinances and regulations must always be observed.
With regard to explosion protection, the device has been approved for an ambient temperature range of -20 to +60°C. For custody transfer measuring purposes, however, the ambient temperature must be between -20 to +50°C!
The device has to be protected against the weather.

Explosion-proof enclosure

The explosion-proof enclosure has no interlocking switch.
Before you open the enclosure, make sure that the voltage is switched off and then wait for one minute.
(See information on the data plate.)

Increased-safety terminal compartment

For the electrical connection of the device, make sure that the correct voltage is supplied (see information on the data plate).
The cable diameters of the supply lines must be within the clamping range of the cable feed-through.
Unused openings of wire feed-throughs must be plugged by impact-resistant stoppers which cannot become loose and are secured against distortion.
When these openings are closed, make sure that the seals remain effective in order to guarantee that the degree of protection IP 54 is maintained.

Maintenance

Explosion-protected electrical control systems must be subjected to maintenance at regular intervals.
These intervals depend on the operating and environmental conditions. We recommend that you check the system at least once a year (possibly in conjunction with the annual official verification of the EMC 500).

Safety Measures

In areas subject to explosion hazards, work is generally prohibited on voltage-carrying electrical apparatus (except for intrinsically safe circuits).
In special cases, it is possible to carry out work if it is guaranteed that there is no explosive atmosphere.
This can only be done if there are explosion-protected and approved measuring instruments involved.

Maintenance Work

Since explosion-proof enclosures are protected against water only to a limited extent due to the flameproof joint (IP 54), you must check for water collecting inside the enclosure.
Rusted joints must not be cleaned using abrasives or wire brushes, but should only be cleaned chemically, for example with reducing oils.
Then joints must be protected thoroughly with acid-free anticorrosive agents, e. g. ESSO RUST BAN 397, Mobil Oil Tecrex 39 or equivalent agents.
The seal of the intrinsically safe (Ex-e) enclosure must be checked for damage and replaced, if necessary.
Check cable glands and stoppers for tight fit.

Damage to the enclosures can terminate the explosion protection!

Repairs

If repairs are done to components of the device which are essential for explosion protection, such components must first be checked by an acknowledged expert before you can put them into service again.
If repairs are done by the manufacturer, they need not be approved by an expert.

Start-Up

Location of the EMC 500

Do not install the not explosion-protected (Non Ex) design of the EMC 500 measuring device in areas subject to explosion hazards!

Since the EMC 500 is fitted with a heating element for the measuring sensor, the room temperature must not drop below -20°C and must not rise to more than +55°C.

Mechanical connection

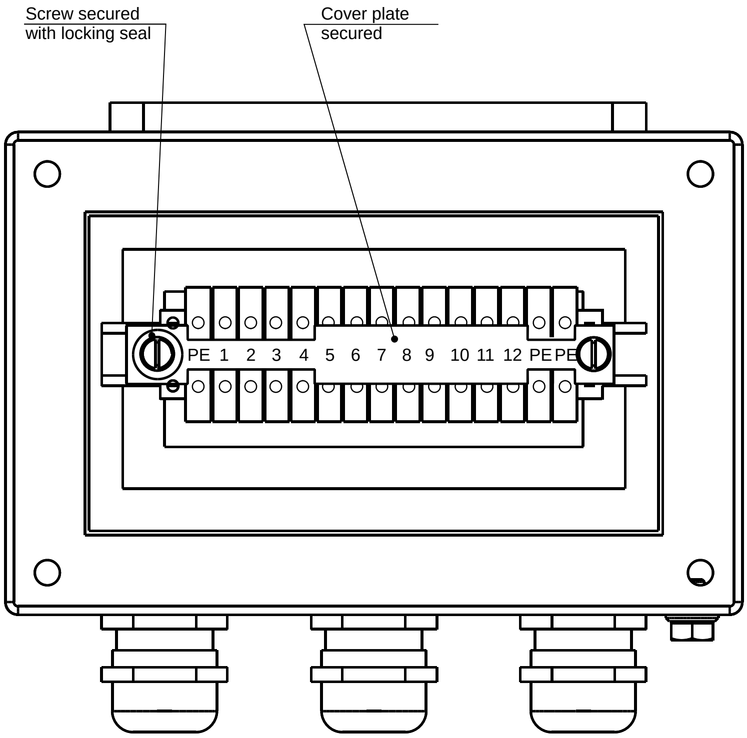
The EMC 500 has two gas inlets (one for the measuring gas and the other for the calibration gas) and one gas outlet.
In addition, a bypass is installed which can be connected in the event of long supply lines and high pressures in order to reduce reaction time. The flow through the bypass can be adjusted by means of the control valve (3).

- Both inlets are designed for 1/8" Swagelok couplings and can be used for pressures of a minimum of 500 mbar and a maximum of 3.0 bar.
- The gas outlets are designed for 6 mm Swagelok couplings.
  The blow-off pipe must be directly connected to the atmosphere or a gathering system. Make sure that there is no back pressure coming from a gathering pipe.
  Enlarge the outlet of the EMC 500 to 12 mm if blow-off pipes of a greater length are used.
  In the event of small pipe diameters, the bypass blow-off pipe may not be discharged together with the exhaust gas pipe, since high flow in the bypass pipe may produce a back pressure in the exhaust gas pipe.

Please follow the assembly instructions for Swagelok connections in the annex. You must bear in mind in particular, that you should never retighten these connections, otherwise they become leaky.

Electrical connections

Connection box of the measuring element



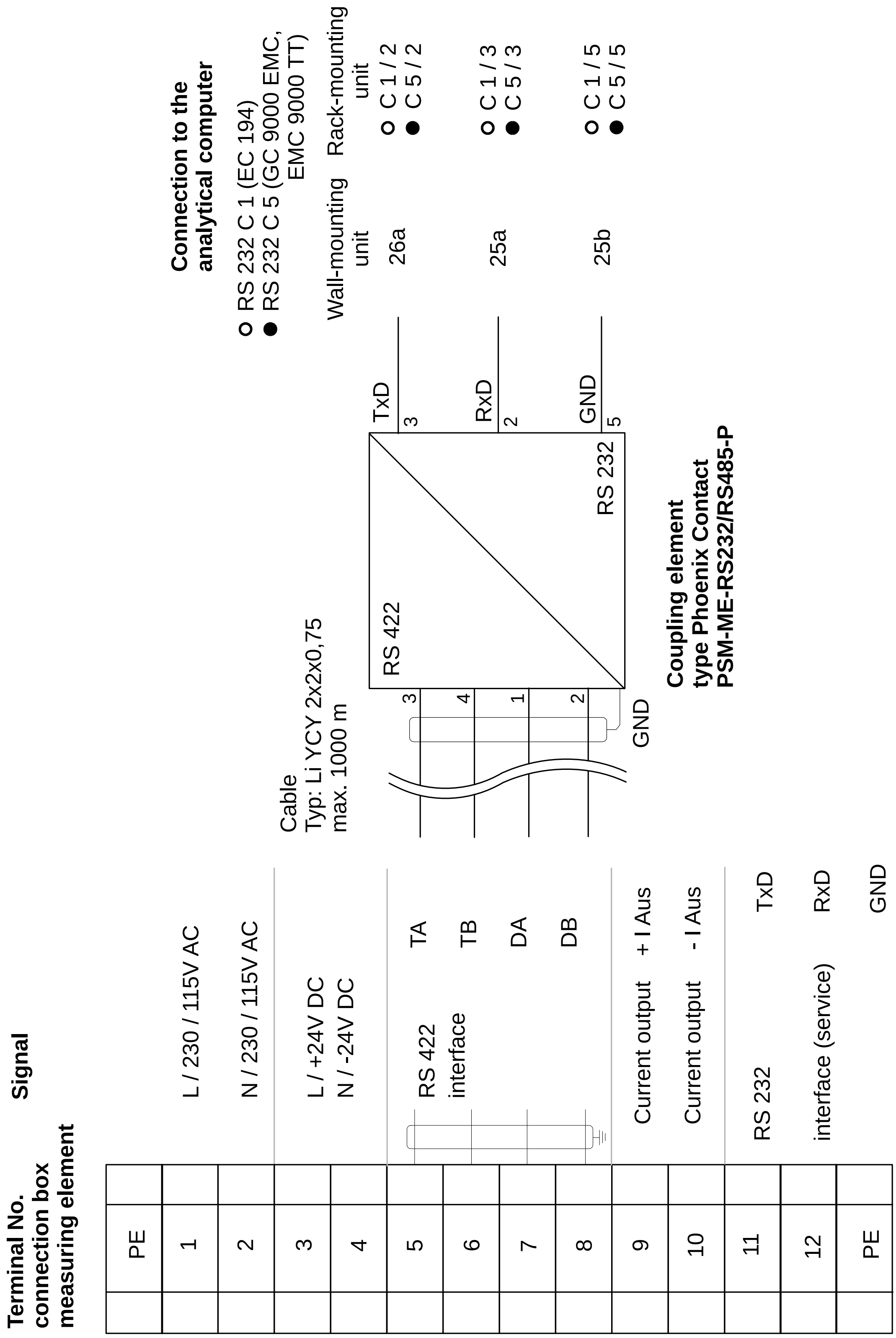
Terminal assignments for the EMC 500 design with analog transmission

Measuring element terminal	Analytical computer connector / terminal	Signal
1	L	230 / 115 V AC
2	N	230 / 115 V AC
3	L	+24 V DC
4	N	-24 V DC
5	RS 422 interface	TA
6		TB
7		DA
8		DB
9		+ I out (option)
10		- I out (option)
11	RS 232 interface	TxD
12		RxD

☞ See whether the device needs a supply voltage of 230 V or 24 V!

☞ Use screened cables for the power supply!

Terminal diagram of the measuring element for digital transmission



Warming-up phase

In order to obtain reliable measured values, the EMC 500 must warm up like any other measuring instrument.
This is mainly due to the following reasons:

- The sensor block of the EMC 500, where the sensors and the pressure regulators are located, is heated at a constant temperature of approx. +65°C. The warming-up phase is necessary to heat up the interior.
- The pressure regulators and the pressure sensor need this time to stabilize.

A warming-up phase of approx. 30 minutes must be observed when starting up the EMC 500 for the first time or after separating it from the measuring gas or the voltage supply for a prolonged period of time.
During this warming-up phase, the measuring gas should be connected to the EMC 500, so that the pressure regulators and the pressure sensor can stabilize.

The warming-up phase is monitored by the device itself. During this time, the text “Starting operation” is displayed together with the specified temperature and the current sensor block temperature.
As soon as the specified temperature has been reached, the device starts, if specified in field D 2, to perform a calibration run automatically.
After the calibration run has been completed successfully, the measuring operation will start.

Initial calibration

First you must connect a calibration gas to the EMC 500. Then you must enter the specified values of the calibration gas (values for the superior and inferior calorific values, Wobbe index and standard density as listed in the certificate of the calibration gas) via the keyboard of the EMC 500.

As soon as the EMC 500 has reached its operating temperature after the warming-up phase and the pressure regulators and the pressure sensor have stabilized, a calibration run is performed automatically. Another calibration run will be performed after 3 hours.

Press the GC-Status key to select the appropriate column. Press the ↓ key to reach the fields into which you want to enter the specified values (A 13, A 16, A 19, A 22 and A 25). A more detailed description of this procedure is given in the chapter "Analytical Computer" of this manual.

After you have entered the specified values, you can start a calibration in field A 2 pressing the * key, while the slide switch is in its Input position.

Operation

Automatic recalibration

Using the automatic recalibration feature, you can calibrate the EMC 500 either by pressing the appropriate key or at selectable intervals via its internal clock.

For custody transfer applications the calibration interval may not exceed 4 weeks.

The following settings are relevant for automatic recalibration:

Column	Line(s)	
A	13, 16, 19, 22, 25	Specified values of the calibration gas
D	21	Setting to automatic calibration
D	22	Weekday of first calibration
D	23	Time of automatic calibration
D	24	Selection of calibration intervals (min / h / days / week)
D	25	Repetition rate for calibration intervals

Example:	D 22	→	Monday
	D 23	→	06:00:00
	D 24	→	day(s)
	D 25	→	10

In this case, automatic calibration is performed every 10 days at 6 a.m starting next Monday.

During automatic recalibration, the last values of superior calorific value, standard density, CO_2 content, Wobbe index, inferior calorific value and relative density, measured before starting calibration are maintained.

Manual calibration

The manual start of a calibration takes place in the following way:

1. Input code number for user access (see page 22).
2. Press key "0" (GC-Status)
3. Start calibration with key "*" (display text: "Start with key *")

Sequence of calibration

The sequence of automatic recalibration, whether activated by pressing the appropriate key or via the internal clock, is always the same and lasts approx. 8 minutes.

Start (clock or key)

⇩

Connecting the calibration gas

⇩

Purging the device (waiting time)

⇩

Taking measured values/
finding a mean value

⇩

Calculating the new parameters

⇩

Connecting the measuring gas

⇩

Purging the device (waiting time)

⇩

Accepting the current measured value

Test gas analysis

For the analysis of an external test gas connect the test gas cylinder to the gas inlet "C" (s. drawing). To start the test gas analysis select the mode "Man. Test Gas" in coordinate M 12 and set it back to "Test Gas OFF" for completion. In any case a test gas analysis can maximally last as long as specified in coordinate M 13 as time limit (in minutes). Afterwards the EMC 500 switches back to measuring gas analysis. The results of the test gas analysis are displayed in M 14 to M 24.

Maintenance

The EMC 500 is basically maintenance-free.
As in the case of every measuring instrument, you must make sure that it is supplied with clean and dry gas only.
Drying and filtration units are available as options.

Analytical Computer GC 9000

The operating concept:
The operating concept has been chosen in such a way that the operator can easily use the device without wasting too much time reading a manual.

The function keys:
The most important data for the operator can be directly selected via function keys. There are function keys for

Date
Mean values
Mode
Outputs
Inputs
Maximum values
Status
Superior Calorific Value, Standard Density, Wobbe Index

The system of coordinates:
A system of coordinates makes it easy for the operator to access all configuration data, measured values and operands by means of a table.
The system of coordinates is based on 21 columns and 52 lines. Columns are marked A to Y, while lines run from 1 to 52. The operator can reach every value in this system of coordinates via cursor keys (arrows).

The display field:
An alphanumeric 2-line display with 20 characters per line enables data and measured values to be indicated together with their short designations and units. The display field consists of a fluorescent display in blue and is easily readable even from a distance.

The system:
A complete Flow Computer System has been developed taking the size of a Eurocard as a basis and using the most advanced SMD technology with large-scale integrated components. A fully assembled printed circuit board incorporates all inputs required for a complex corrector.
The GC model incorporates a second CPU card to increase the computing power. This CPU mainly performs arithmetic operations and gives interface reports, whereas the standard CPU continues to carry out all measuring tasks.
An interface module has been plugged onto the back of this CPU in order to provide the device with another four data interfaces.

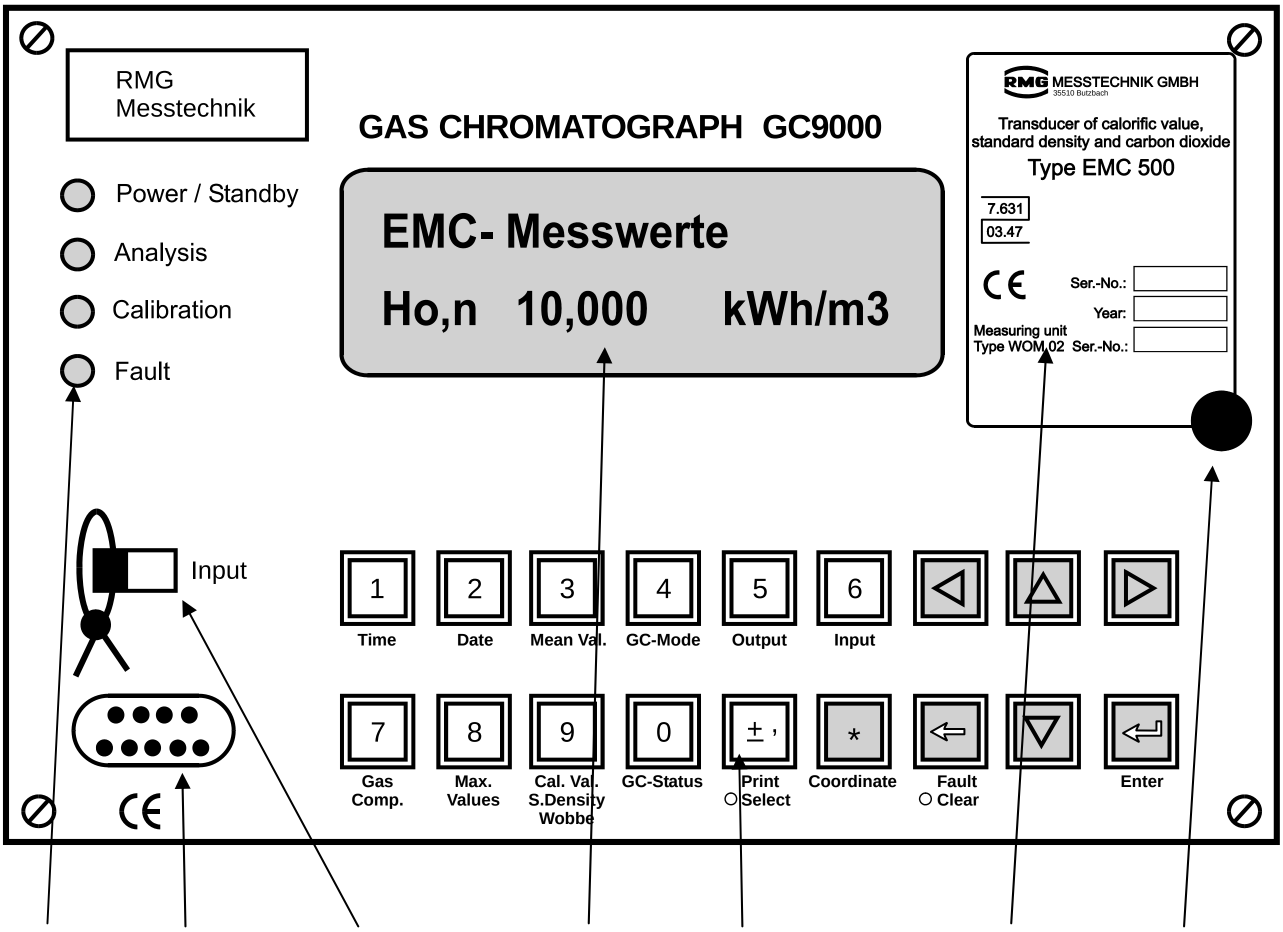
Measured data archive:

There are two different software versions available:

- The **data logger version** (without DSfG interface) has an archive for the measured values of superior calorific value, standard density and CO_2 content. 15 minute average values are generated, the memory depth is 18 months.
- With the **DSfG version** no storage of the measured values takes place. For storage of the measured values the data logger MRG 2203, approved for custody transfer application, is available. The software of this device is specifically adapted to the EMC 500.

The software version is to be read in Y 24.

GC 9000 Front panel



LED´s	RS 232 C port	Sealable slide switch	2-line display with 20charac-ters per line	Keypad for directly accessing the various device functions	ID plate with basic data; all other data can be accessed via the ID function key	Main stamp

On the ID plate you find, among other things the serial number of the measuring element. Since the operating parameters are adjusted to the measuring element and stored in the analytical, operation is only possible if the analytical computer is connected to the appropriate measuring element!

Operating the GC 9000

Description of the function keys

1	Indication of the TIME
2	Indication of the DATE
3	EMC archives
4	Indication of the calibration modes and when pressing the △▽ keys further values related to the calibration mode (except set values)
5	Indication of the current output No. 1 and when pressing the △▽ keys all values related to this current output. Press the ☐ key to switch over to current outputs 2, 3 and 4.
6	Indication of data for sensor 1 (measured value and parameters) Press the ☐ key to reach data for sensor 2, pressure and temperatur values.
7	Selection of calculated values (e.g. $H_{s,n}$, ρ_n, ...) and units
8	Version parameter and test values (to check the calculations)
9	Indication of superior calorific value, Wobbe index, standard density, relative density, inferior calorific value and CO_2 content incl. appropriate default values
0	Indication calibration status and when pressing the △▽ keys all values related to the calibration status incl. start and results
± ,	Calibration report, data report, revision report

Special Function keys

△▽ ▷ ◁ **Clear, Enter, Select**

Arrow up / down

To scroll up or down by lines within a column or in selection mode between operating modes.

Arrow right / left

To scroll to the right or left by columns within a line. If you press the ◁ key, you can jump via the first column to the last column. If you press the ▷ key, you can jump via the last column to the first column.
These keys fulfill a special function in the mean-value column.

The following applies to cursor keys in general:
Unoccupied line fields within a column and unoccupied columns within a line are automatically skipped. If the column jumped to is occupied but the line field is empty, the line number is automatically increased until an occupied field is found. When you jump to the next column, the initial line number is selected again.

Clear / Fault

a) To indicate faults in the normal mode
b) Special function (clear fault)
c) To clear incorrect inputs in the programming mode.
The state prior to inputting the first digit is restored.

Enter

To initiate and complete a data input. All data inputted are accepted.

Select

To switch over from short designations to coordinates and vice versa.
Switching over is possible in almost all fields (also in the programming mode).
Release of special functions (according to instructions on the display)

Display fault / Clear Fault Function

Display fault

The occurrence of a fault is indicated by the **Fault** LED on the front panel of the device or by an isolated contact at the terminal block. The LED flashes if faults are pending. If faults are no longer pending, the LED turns to steady light.
To display fault texts, you must press the **CLEAR / FAULT** key. After you have pressed this key, the display field shows **error** and the bottom line shows the fault texts at 3-second intervals. All messages are consecutively shown in the display field. As long as the Fault LED flashes, there is still at least one fault pending. If the Fault LED shows steady light, all indicated fault messages are no longer valid and the device has returned to fault-free operation.

Clear fault

The time and date of the fault occurred are shown in the fields R3 and R4. If there is more than one fault pending, the time and date of the first fault occurred are shown.

Operating Examples

Displaying measured values, constants and modes

Press key **9** (Cal. Val.)

EMC Measured values
*Hs 10.123 kWh/m3

Press ▽

EMC Measured values
*rho,n 0.6478 kg/m3

Press ▽

EMC Measured values
Ws 13.254 kWh/m3

Press ◁

EMC Select calculation
EMC-rn ON

Press ▽

EMC Select calculation
EMC-d ON

Enabling programming

a) Code number to enable user access

Press key **8** (Max. Values) und one time ▽

```
        EMC - 9000
Code          * * * * * * * *
```

Press the **Enter** key

```
        EMC - 9000
Code          ? ? ? ? ? ? ? ?
```

The digits inputted remain invisible. Each digit is marked with an asterisk. All eight digits have to be inputted.

Input the appropriate digits

```
        EMC - 9000
Code          * * * * ? ? ? ?
```

Press the **Enter** key to complete the data input

```
        EMC - 9000
Code  * * * * * * * *
```

(for correct code number)

If the code number is correct, the POWER / STANDBY LED on the front panel starts to flash at one-second intervals and the bottom line of the display turns bright. If the code number is not correct, the display changes back to the input mode and keeps dark.

```
        EMC - 9000
Code   ? ? ? ? ? ? ? ?
```

(for incorrect code number)

Repeat the operation using the correct code number!

The computer enables you to access user data. To change data, you must select the desired coordinate on the bottom line of the display and press the **ENTER** key. The brightness of the bottom line is reduced to indicate that access to the coordinate field is enabled.
If you want to lock the computer again after having completed your programming, press the **CLEAR / FAULT** key twice quickly. If you forget to do so, the computer itself disables access after approx. 30 minutes. It is possible to change the code number if the sealable slide switch is in its "Input" position.

b) Sealed switch for the Office of Weights and Measures

When the switch is operated, the POWER / STANDBY LED starts to flash at one-second intervals and access to the memories (incl. code number) is enabled. To change data, you must select the desired coordinate on the bottom line of the display and press the **ENTER** key. The brightness of the bottom line is reduced to indicate that access to the coordinate field is enabled.

Programming a new constant

You want to change the default value for the CO_2 content.

Press **9** key (Cal. Val.)

EMC Parameters
Hs 10,123 kWh/m3

Press △ two times

EMC Parameters
CO2-def 1,000 Mol%

Set the switch to "Input" (in this case also the code number is sufficient)

Press the **Enter** key

The bottom line of the display turns darker and the POWER / STANDBY LED flashes at one-second intervals to indicate the programming mode.

Press the "**1**" key

EMC Parameters
CO2-def 1 Mol%

Press the "**±,**" "**1**" "**5**" and "0" keys consecutively

EMC Parameters
CO2-def 1,150 Mol%

Press the **Enter** key

EMC Parameters
CO2-def 1,150 Mol%

The display turns bright

Lock the data inputted by means of the "Input" **switch.**

Programming is completed!

General information about inputting new values:

If a value is locked with the code number (user data), you must first input the correct code number into the field Y5 in the **MODE** function. You can input values either in the short designation or coordinate display mode. Switching over is possible at any time by pressing the **Select** key.

For values in exponential representation the "E" is entered by pressing the ± key. For this purpose it is necessary that a comma has been entered before. So for example the input of 3E-5 is not possible but it must be entered 3.0E-5.

Programming a new mode

You want to change the calibration mode from "OFF" to "Calibrate".

Press the **4** key (GC Mode)

```
EMC-Mode
CalStart      Calibrate
```

Press ▽

```
EMC-Mode
CalOper       OFF
```

Set the **switch** to "Input"
The POWER / STANDBY LED flashes at one-second intervals to indicate the programming mode, and after you have pressed the **ENTER** key, the bottom line of the display turns darker.

Press ▽ two times

```
EMC-Mode
CalOper       Calibrate
```

Press the **Enter** key and lock the input by means of the "input" **switch.**

Programming current outputs

You can select the desired values in the columns F to I via the **5** (Output) function key and the cursor keys. First specify the mode in field 10, then select the measured value to be outputted in field 7 and finally program the limits in the fields 4 and 5. The constant calibration current is set in field 6.

Example: You want to output the Wobbe index to current output 1 as current from 4 to 20 mA.

1. Press the **5** (Output) key.
2. Press △. (The actual mode will be displayed).
3. Press the **Enter** key.
4. Select the mode "4-20mA" in the filed F10 with the △ and ▽ keys.
5. Press the **Enter** key.
6. Press △ three times.
7. Select "Wobbeindex" in field F7 with the △ and ▽ keys.
8. Press the **Enter** key.

Now the limits for the Wobbe index at 4 and 20 mA remain to be inputted.

Coordinate system GC 9000

Survey over the matrix

Column	A	B	C	D	E
Heading	**EMC Calibration**	-	**EMC Constants**	**EMC Mode**	**variable**
Contents	• Calibration results (lines 2-9) • Set and actual values of the calibrations (lines 13-30)	This column contains calculated values which are not displayed	Constants which are needed for the calculation of calorific value and standard density etc. (lines 2-63)	• Selection of the calibration modes (lines 2-25) • Calibration status (lines 26-36)	EMC archives with 15 minute mean values and actual values (lines 2-69)
Page	27	-	28	29	30

Column	F - I	J	K	M
Heading	**Current output 1 - 4**	**variable**	**Select calculation**	**Measured values**
Contents	Programming of the current outputs 1-4 (lines 2-10) and contact outputs (lines 11-14)	Parameters and modes of the serial interfaces e.g. for RMG bus (lines 2-66)	• Selection of the quantities which are to be calculated from the sensor values (lines 2-24) • Results of the last valid measurement (lines 26-31)	• Actual results of measurement of the values selected in column K (lines 2-11) • Alarm limits and default values (lines 27-78)
Page	31 - 34	35	36	37

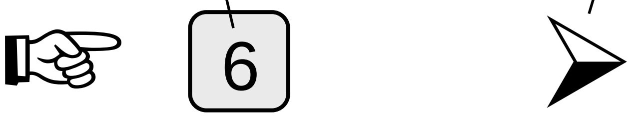
Column	O	P	Q	R	T - U
Heading	**Printer control**	**Date**	**Time**	**Fault**	**EMC Sensor 1 - 2**
Contents	Starting manual printouts and programming automatical printouts (lines 2-13)	Display and setting of the date (lines 2-3)	Display and setting of the time (lines 2-6)	Display and clearing of fault messages (lines 2-6, 41-46)	Measured values and parameters of the thermal sensors 1 and 2 (lines 2-37)
Page	39	40	40	41	42 - 43

Column	V	W	X	Y
Heading	**EMC Pressure**	**EMC Case temperature**	**EMC Block temperature**	**Version Parameters**
Contents	Measured values and parameters of the pressure sensor and the CO_2 measurement (lines 2-40)	Measured values and parameters of the case temperature sensor (lines 2-37)	Measured values and parameters of the measuring unit temperature sensor (lines 2-37)	• General device parameters, e.g.: • code number (line 5), • test values for check of the calculations (lines 10-16, 43), • status of the interfaces (lines 31-42)
Page	44	45	46	47

Description of the matrix structure

Function key on the GC 9000

Sequence of key operations to reach the desired column



indirect | Input | and one time | right

Designation of the column A...Y. The 1st line always contains a heading

		Column U	Description of coordinates	Unit	Comment(s)
1	D	S2-EMC	Heading EMC sensor 2		
2	D	S2	EMC sensor 2	mV	
3	D	S2-in	Input value from EMC sensor 2	mV	1)
4	D	S2-Oc	Actual offset sensor 2	mV	
6	**S**	**S2min**	**Lower alarm limit EMC sensor 2**	**mV**	
7	**S**	**S2max**	**Upper alarm limit EMC sensor 2**	**mV**	
14	S	S2-af	Averaging factor EMC sensor 2		

Short description of the coordinate

Unit of the value displayed or programmed

Abbreviation of the coordinate (Display of the GC 9000)

Data protection level:
D = Display value
C = Data which the user can modify using a code number
S = Data which can be modified via

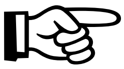
Explanatory notes on the coordinate

Designation of the line in a column. The headline is not displayed in coordinate representation.

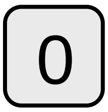
Bold text shows important fields!

Description of Individual Columns

EMC Calibration



direct

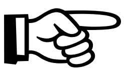
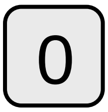
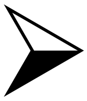


GC-Status

		Column A	Description of coordinates	Unit	Comment(s)
1	**D**	**STATUS**	**Heading EMC calibration**		
2	**D**	**PurgT-1**	**Display of the current calibration run in seconds**	**s**	**1)**
3	D	HsCal	Calibration value EMC superior calorific value	s. K/21	
4	D	WsCal	Calibration value EMC Wobbe index	s. K/22	
5	D	rnCal	Calibration value EMC standard density	kg/m3	
6	D	dCal	Calibration value EMC relative density		
8	D	HiCal	Calibration value EMC inferior calorific value	s. K/23	
9	D	CO2Cal	Measured carbon dioxide content at calibration time	s. K/24	
13	**S**	**HsSpec**	**Specified calibration value for superior calorific value**	**s. K/21**	
14	D	HsLast	Actual calibration value for superior calorific value	s. K/21	
15	D	HsDiff	Specified/actual deviation for superior calorific value	%	
16	**S**	**WsSpec**	**Specified calibration value for Wobbe index**	**s. K/22**	
17	D	WsLast	Actual calibration value for Wobbe index	s. K/22	
18	D	WsDiff	Specified/actual deviation for Wobbe index	%	
19	**S**	**rnSpec**	**Specified calibration value for standard density**	**kg/m3**	
20	D	rnLast	Actual calibration value for standard density	kg/m3	
21	D	rnDiff	Specified/actual deviation for standard density	%	
22	**S**	**dSpec**	**Specified calibration value for relative density**		
23	D	dLast	Actual calibration value for relative density		
24	D	dDiff	Specified/actual deviation for relative density	%	
25	**S**	**HiSpec**	**Specified calibration value for inferior calorific value**	**s. K/23**	
26	D	HiLast	Actual calibration value for inferior calorific value	s. K/23	
27	D	HiDiff	Specified/actual deviation for inferior calorific value	%	
28	**S**	**CO2Spec**	**Specified calibration value for carbon dioxide content**	**%**	
29	D	CO2Last	Actual calibration value for carbon dioxide content	%	
30	D	CO2Diff	Specified/actual deviation for carbon dioxide content	%	
36	S	TB	Temperature at base conditions *0°C /15°C / 20°C / 25°C*		
37	S	TBHs	Temperature at base cond. sup. calorif. value *0°C /15°C / 20°C / 25°C*		

1) In this field a manual calibration can be started with the "*" key if the code number has been inputted before (see display text).

EMC Constants

indirect GC-Status and once right

		Column C	Description of coordinates	Unit	Comment(s)
1	D	CON_HS	Heading EMC constants		
2	S	Hs-C1	Parameter C1 EMC superior calorific value		1)
3	S	Hs-C2	Parameter C2 EMC superior calorific value		1)
4	S	Hs-C3	Parameter C3 EMC superior calorific value		1)
5	S	Hs-C4	Parameter C4 EMC superior calorific value		1)
6	S	Hs-C5	Parameter C5 EMC superior calorific value		1)
7	S	Hs-C6	Parameter C6 EMC superior calorific value		1)
8	S	Hs-C7	Parameter C7 EMC superior calorific value		1)
9	S	Hs-A0	Parameter A0 EMC superior calorific value		
10	S	Hs-A1	Parameter A1 EMC superior calorific value		
11	S	Hs-F0	Parameter F0 EMC superior calorific value		
12	S	Hs-Z0	Parameter Z0 EMC superior calorific value		
13	S	Ws-C1	Parameter C1 EMC Wobbe index		1)
…	S	…	…		1)
19	S	Ws-C7	Parameter C7 EMC Wobbe index		1)
20	S	Ws-A0	Parameter A0 EMC Wobbe index		
21	S	Ws-A1	Parameter A1 EMC Wobbe index		
22	S	Ws-F0	Parameter F0 EMC Wobbe index		
23	S	Ws-Z0	Parameter Z0 EMC Wobbe index		
24	S	rn-C1	Parameter C1 EMC standard density		1)
…	S	…	…		1)
30	S	rn-C7	Parameter C7 EMC standard density		1)
31	S	rn-A0	Parameter A0 EMC standard density		
32	S	rn-A1	Parameter A1 EMC standard density		
33	S	rn-F0	Parameter F0 EMC standard density		
34	S	rn-Z0	Parameter Z0 EMC standard density		
35	S	d-C1	Parameter C1 EMC relative density		1)
…	S	…	…		1)
41	S	d-C7	Parameter C7 EMC relative density		1)
42	S	d-A0	Parameter A0 EMC relative density		
43	S	d-A1	Parameter A1 EMC relative density		
44	S	d-F0	Parameter F0 EMC relative density		
45	S	d-Z0	Parameter Z0 EMC relative density		
46	S	Hi-C1	Parameter C1 EMC inferior calorific value		1)
…	S	…	…		1)
52	S	Hi-C7	Parameter C7 EMC inferior calorific value		1)
53	S	Hi-A0	Parameter A0 EMC inferior calorific value		
54	S	Hi-A1	Parameter A1 EMC inferior calorific value		
55	S	Hi-F0	Parameter F0 EMC inferior calorific value		
56	S	Hi-Z0	Parameter Z0 EMC inferior calorific value		
57	S	CH-C1	Parameter C1 EMC hydrocarbons		1)
…	S	…	…		1)
63	S	CH-C7	Parameter C7 EMC hydrocarbons		1)

1) Value in exponential notation

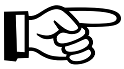
EMC Mode

direct GC-Mode

		Column D	Description of coordinates	Unit	Comment(s)
1	D	CalMod	Heading EMC calibration mode		
2	**S**	**CalStart**	**EMC calibration mode at the start** ***OFF / Offset / Calibrate / Offs+Calib***		
3	S	CalOper	EMC calibration mode during operation *OFF / Offset / Calibrate / Offs+Calib*		
5	S	DP-Cal	Calibration value EMC differential pressure		
6	S	p-Cal	EMC calibration pressure	mbar	
7	S	t-Cal	EMC calibration temperature	°C	
8	S	Cal-max	EMC maximum calibration deviation	%	
9	S	T-Purg1	Purging time 1 (calibration gas) EMC calibration Permissible values: ≥6 and ≤60000 seconds	s	1)
10	S	T-Meas	Duration of measurement EMC calibration Permissible values: ≥6 and ≤999 seconds	s	1)
11	S	T-Purg2	Purging time 2 (measuring gas) EMC calibration Permissible values: ≥6 and ≤60000 seconds	s	1)
12	S	T-Recov	Recovery time EMC calibration Permissible values: ≥6 and ≤999 seconds	s	1)
13	S	rn-Air	Standard density air		
14	S	EMC-MS	EMC master / slave function		
15	S	Hs-Off	Maximum offset superior calorific value by GC	s. K/21	
16	S	rn-Off	Maximum offset standard density by GC	kg/m3	
17	S	Ws-Off	Maximum offset Wobbe index by GC	s. K/22	
18	S	d-Off	Maximum offset relative density by GC		
19	S	Hi-Off	Maximum offset inferior calorific value by GC	s. K/23	
20	S	CO2-Off	Maximum offset carbon dioxide content by GC	s. K/24	
21	**S**	**CalMode**	**EMC general calibration operation** ***Manual / Automatic***		**2)**
22	**S**	**CalDay**	**Calibration start at selected weekday** ***Sunday / Monday / Tuesday / Wednesday / Thursday / Friday / Saturday***		**3)**
23	**S**	**T-CStart**	**EMC starting time for automatic calibrations**	**Uhr**	
24	**S**	**Cal-Auto**	**EMC interval basis for automatic calibration** ***Minute / Hour / Day / Week***		
25	S	T-Auto	EMC calibration interval (is multiplied with interval basis)	var	
26	D	L-M	Time of last manual EMC calibration		
27	D	No-MCal	Number of manual calibrations		
28	D	L-A	Time of last automatic EMC calibration		
32	D	No-ACal	Number of automatic calibrations		
33	D	Next-Cal	Time until next calibration	min	
34	D	AC-Flag	EMC status automatic calibration		
35	D	No-ICal	Number of failed calibrations		
36	D	CalFlag	EMC calibration status		

1) The changed setting is only accepted after a restart of the analytical computer.
2) The start of calibration is conditional on the start mode being terminated. After the automatic mode has been started, the synchronization routine will be restarted after the power-up sequence in the case of a power failure.
3) The calibration day determines the time of synchronization for automatic calibration. As soon as the calibration day and the set time have been reached, the calibration cycle begins for the automatic daily and weekly intervals (see field D-24). For hour- or minute-based intervals, the time of synchronization is the next change of hour or minute, independently of the weekday and the starting time. As soon as the time of synchronization has been reached, no calibration will be initiated.

EMC Archives

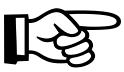


3

direct Mean Val.

		Column E	Description of coordinates	Unit	Comment(s)
1	D	ARCHIVE	Heading EMC archives		
2	D	H-Archiv	EMC archive of hourly mean values		
3	D	D-Archiv	EMC archive of daily mean values		
4	D	MO-Archiv	EMC archive of monthly mean values		
5	D	M-Archiv	EMC archive of minute-based mean values		
6	D	C-Archiv	EMC archive of current values		
7	S	T-AStart	EMC starting time/change of day for archives		
8	S	CurATime	Averaging time for actual, corrected values	s	
9	D	HsGC	Current GC-corrected superior calorific value	s. K/21	
10	D	HsEMC	Event-related EMC superior calorific value	s. K/21	
11	D	HsO-GC	Current superior calorific value, GC-offset	s. K/21	
12	D	Hs15	15 minute mean value, uncorrected superior calorific value	s. K/21	
13	D	Hs60	Hourly mean value, uncorrected superior calorific value	s. K/21	
14	D	HsGC60	Hourly mean value, GC-corrected superior calorific value	s. K/21	
16	D	rnGC	Current GC-corrected standard density	kg/m3	
17	D	rnEMC	Event-related EMC standard density	kg/m3	
18	D	rnO-GC	Current standard density, GC-offset	kg/m3	
19	D	rn15	15 minute mean value, uncorrected standard density	kg/m3	
20	D	rn60	Hourly mean value, uncorrected standard density	kg/m3	
21	D	rnGC60	Hourly mean value, GC-corrected standard density	kg/m3	
23	D	WsGC	Current GC-corrected Wobbe index	s. K/22	
24	D	WsEMC	Event-related EMC Wobbe index	s. K/22	
25	D	WsO-GC	Current Wobbe index, GC-offset	s. K/22	
26	D	Ws15	15 minute mean value, uncorrected Wobbe index	s. K/22	
27	D	Ws60	Hourly mean value, uncorrected Wobbe index	s. K/22	
28	D	WsGC60	Hourly mean value, GC-corrected Wobbe index	s. K/22	
31	D	dEMC	Event-related EMC relative density		
33	D	d15	15 minute mean value, uncorrected relative density		
34	D	d60	Hourly mean value, uncorrected relative density		
38	D	HiEMC	Event-related EMC inferior calorific value	s. K/23	
40	D	Hi15	15 minute mean value, uncorrected inferior calorific value	s. K/23	
41	D	Hi60	Hourly mean value, uncorrected inferior calorific value	s. K/23	
44	D	CO2GC	Current GC-corrected CO2 content	s. K/24	
45	D	CO2EMC	Event-related EMC CO2 content	s. K/24	
46	D	CO2O-GC	Current CO2 content, GC-offset	s. K/24	
47	D	CO215	15 minute mean value, uncorrected CO2 content	s. K/24	
48	D	CO260	Hourly mean value, uncorrected CO2 content	s. K/24	
49	D	CO2GC60	Hourly mean value, GC-corrected CO2 content	s. K/24	
51	D	MetGC	Methane number calculated on the basis of GC-corrected values		
52	D	MetEMC	Event-related EMC methane number		
53	D	Met15	15 minute mean value, uncorrected methane number		
54	D	Met60	Hourly mean value, uncorrected methane number		
57	D	Mo-idx	Index of monthly data archive		
59	D	D-idx	Index of daily data archive		
60	D	H-idx	Index of hourly data archive		
61	D	M-idx	Index of minutely data archive		
62	D	S-idx	Index of second-based data archive		
63	C	MPNo.	Measuring point No.		
66	D	Hsc	Current GC-corrected superior calorific value	s. K/21	
67	D	rnc	Current GC-corrected standard density	kg/m3	
68	D	CO2c	Current GC-corrected CO2 content	s. K/24	
69	D	Wsc	Current GC-corrected Wobbe index	s. K/22	

Current Output 1



direct

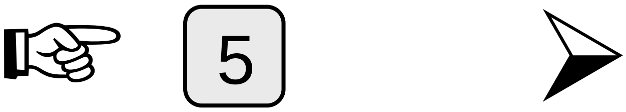
5

Output

		Column F	Description of coordinates	Unit	Comment(s)
1	D	Current1	Heading EMC current output 1		
2	D	I1O	Physical value for current output 1	var	3)
3	D	I1	Indication of current for output 1	mA	3)
4	**C**	**I1<**	**Meas. range minimum output current 1**	**var**	**1)**
5	**C**	**I1>**	**Meas. range maximum output current 1**	**var**	**1)**
6	C	I1C	Calibration current output 1	mA	
7	**C**	**I1O**	**Source for output current 1** ***Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws***		
8	S	I1-c	Correction factor for output 1		
9	C	I1-A	Averaging factor (damping) for output 1	var	
10	C	I1-mod	Mode current output 1 *0-20mA / 4-20mA / Calib. Curr. / OFF*		2)
11	C	C1S	Source of contact output 1 *Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws / General*		
12	C	C1mod	Type of contact output 1 *MIN cont. / MAX cont. / MIN+MAX cont. / Calib. cont. / Test cont. / GC Offset cont.*		
13	C	C1<	Contact range minimum, contact output 1	var	
14	C	C1>	Contact range maximum, contact output 1	var	

1) Assigning physical limits to 0 / 4 mA or 20 mA
2) On the menu, the output current mode can be changed from 0-20 mA to 4-20 mA or calibration current. In calibration current mode, a constant value is outputted which can be set in coordinate F-6.
3) If a fault occurs, the current displayed will not correspond to the converted physical value. Depending on the set mode, the current will be calculated from the default value or the last measured value, or it will be zero.

Current Output 2



indirect Output and once right

		Column G	Description of coordinates	Unit	Comment(s)
1	D	Current2	Heading EMC current output 2		
2	D	I2O	Physical value for current output 2	var	3)
3	D	I2	Indication of current for output 2	mA	3)
4	**C**	**I2<**	**Meas. range minimum output current 2**	**var**	**1)**
5	**C**	**I2>**	**Meas. range maximum output current 2**	**var**	**1)**
6	C	I2C	Calibration current output 2	mA	
7	**C**	**I2O**	**Source for output current 2** ***Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws***		
8	S	I2-c	Correction factor for output 2		
9	C	I2-A	Averaging factor (damping) for output 2	var	
10	C	I2-mod	Mode current output 2 *0-20mA / 4-20mA / Calib. Curr. / OFF*		2)
11	C	C2S	Source of contact output 2 *Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws / General*		
12	C	C2mod	Type of contact output 2 *MIN cont. / MAX cont. / MIN+MAX cont. / Calib. cont. / Test cont. / GC Offset cont.*		
13	C	C2<	Contact range minimum, contact output 2	var	
14	C	C2>	Contact range maximum, contact output 2	var	

1) Assigning physical limits to 0 / 4 mA or 20 mA
2) On the menu, the output current mode can be changed from 0-20 mA to 4-20 mA or calibration current. In calibration current mode, a constant value is outputted which can be set in coordinate G-6.
3) If a fault occurs, the current displayed will not correspond to the converted physical value. Depending on the set mode, the current will be calculated from the default value or the last measured value, or it will be zero.

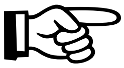
Current Output 3

indirect	5 Output	and twice	right

		Column H	Description of coordinates	Unit	Comment(s)
1	D	Current3	Heading EMC current output 3		
2	D	I3O	Physical value for current output 3	var	3)
3	D	I3	Indication of current for output 3	mA	3)
4	**C**	**I3<**	**Meas. range minimum output current 3**	**var**	**1)**
5	**C**	**I3>**	**Meas. range maximum output current 3**	**var**	**1)**
6	C	I3C	Calibration current output 3	mA	
7	**C**	**I3O**	**Source for output current 3** ***Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws***		
8	S	I3-c	Correction factor for output 3		
9	C	I3-A	Averaging factor (damping) for output 3	var	
10	C	I3-mod	Mode current output 3 *0-20mA / 4-20mA / Calib. Curr. / OFF*		2)
11	C	C3S	Source of contact output 3 *Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws / General*		
12	C	C3mod	Type of contact output 3 *MIN cont. / MAX cont. / MIN+MAX cont. / Calib. cont. / Test cont. / GC Offset cont.*		
13	C	C3<	Contact range minimum, contact output 3	var	
14	C	C3>	Contact range maximum, contact output 3	var	

1) Assigning physical limits to 0 / 4 mA or 20 mA
2) On the menu, the output current mode can be changed from 0-20 mA to 4-20 mA or calibration current. In calibration current mode, a constant value is outputted which can be set in coordinate H-6.
3) If a fault occurs, the current displayed will not correspond to the converted physical value. Depending on the set mode, the current will be calculated from the default value or the last measured value, or it will be zero.

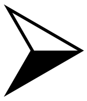
Current Output 4



indirect

Output

and three times

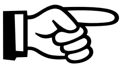


right

		Column I	Description of coordinates	Unit	Comment(s)
1	D	Current4	Heading EMC current output 4		
2	D	I4O	Physical value for current output 4	var	3)
3	D	I4	Indication of current for output 4	mA	3)
4	**C**	**I4<**	**Meas. range minimum output current 4**	**var**	**1)**
5	**C**	**I4>**	**Meas. range maximum output current 4**	**var**	**1)**
6	C	I4C	Calibration current output 4	mA	
7	**C**	**I4O**	**Source for output current 4** ***Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws***		
8	S	I4-c	Correction factor for output 4		
9	C	I4-A	Averaging factor (damping) for output 4	var	
10	C	I4-mod	Mode current output 4 *0-20mA / 4-20mA / Calib. Curr. / OFF*		2)
11	C	C4S	Source of contact output 4 *Sup.Cal.Value / Wobbe Index / Std. Density / Rel. Density / Inf.Cal.Value / Carbon Dioxide / Methane Number / GC-corr. Hs / GC-corr. rn / GC-corr. CO2 / GC-corr. Ws / General*		
12	C	C4mod	Type of contact output 4 *MIN cont. / MAX cont. / MIN+MAX cont. / Calib. cont. / Test cont. / GC Offset cont.*		
13	C	C4<	Contact range minimum, contact output 4	var	
14	C	C4>	Contact range maximum, contact output 4	var	

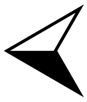
1) Assigning physical limits to 0 / 4 mA or 20 mA
2) On the menu, the output current mode can be changed from 0-20 mA to 4-20 mA or calibration current. In calibration current mode, a constant value is outputted which can be set in coordinate I-6.
3) If a fault occurs, the current displayed will not correspond to the converted physical value. Depending on the set mode, the current will be calculated from the default value or the last measured value, or it will be zero.

Serial Interfaces

 indirect

7 Gas Comp.

and once

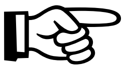
 left

		Column J	Description of coordinates	Unit	Comment(s)
1	D	RS-FRONT	Heading serial interface front panel		
2	C	Fr-Type	Front port type: *OFF*		1)
12	D	RS_LPT	Heading serial printer interface C1		
13	C	C1-Type	Port C1 type: *OFF / Line-PRT*		
14	C	C1-Baud	Port C1 baudrate: *9600 / 19200*		
21	D	RS_C2	Heading serial data interface C2		
22	S	C2-Type	Port C2 type: *OFF / DSfG*		
24	S	C2-Baud	Port C2 baudrate: *9600 / 19200 / 38400*		
35	D	RS_C3	Heading serial data interface C3		
36	**S**	**C3-Type**	**Port C3 type:** ***OFF / MB-SI.ASCII / MB-SI.RTU / RMG bus***		
37	S	C3-Baud	Port C3 baudrate: *9600 / 19200*		
38	S	C3-Bits	Port C3 number of bits: *7 / 8*		
39	S	C3-Pari	Port C3 parity: *None / Even / Odd*		
40	S	C3-Stop	Port C3 stop bits: *1 / 2*		
41	S	C3-Test	Port C3 modbus test *OFF / Mod I-10 UI / Val F-02 FL / No. Y-20 UL /* *Sim x-xx DL / Sim R-46 ST / Diagnostics*		2)
42	S	C3-UI	Port C3 unsigned int transmission: *1234 / 4321*		
43	S	C3-UL	Port C3 unsigned long transmission: *1234 / 4321*		
44	S	C3-FL	Port C3 float transmission: *1234 / 4321*		
45	S	C3-DB	Port C3 double transmission: *1234 / 4321*		
46	S	C3-MbAdd	Port C3 modbus address		
47	S	C3-Offs	Port C3 modbus register offset		
48	D	C3-Text	RMG bus reference text		
50	D	RS_C4	Heading serial data interface C4		
51	**S**	**C4-Type**	**Port C4 type:** ***OFF / MB-SI.ASCII / MB-SI.RTU / RMG bus***		
52	S	C4-Baud	Port C4 baudrate: *9600 / 19200*		
53	S	C4-Bits	Port C4 number of bits: *7 / 8*		
54	S	C4-Pari	Port C4 parity: *None / Even / Odd*		
55	S	C4-Stop	Port C4 stop bits: *1 / 2*		
56	S	C4-Test	Port C4 modbus test *OFF / Mod I-10 UI / Val F-02 FL / Nr. Y-20 UL /* *Sim x-xx DL / Sim R-46 ST / Diagnostics*		2)
57	S	C4-UI	Port C4 unsigned int transmission: *1234 / 4321*		
58	S	C4-UL	Port C4 unsigned long transmission: *1234 / 4321*		
59	S	C4-FL	Port C4 float transmission: *1234 / 4321*		
60	S	C4-DB	Port C4 double transmission: *1234 / 4321*		
61	S	C4-MbAdd	Port C4 modbus address		
62	S	C4-Offs	Port C4 modbus register offset		
63	D	C4-Text	RMG bus reference text		
65	D	RS_C5	Heading serial data interface C5		
66	S	C5-Type	Port C5 type: *OFF / EMC-Master*		

1) The operation of the front interface is not supported at the moment.

2) On this menu, test values can be transmitted through the Modbus interface. The computer behaves as if a field of the computer has been questioned by a specific query and then permanently outputs the value for the appropriate field. It is possible to test the formats unsigned int, float, unsigned long, double, string and the diagnostics command. In this version of the GC 9000-EMC, the formats double and string are not available!

Selection of Calculations



Direkt

7

Gas Comp.

		Column K	Description of coordinates	Unit	Comment(s)
1	D	MOD-EMC	Heading EMC mode column		
2	S	EMC-Hs	EMC superior calorific value calculation *OFF / ON*		
3	S	EMC-Ws	EMC Wobbe index calculation *OFF / ON*		
4	S	EMC-rn	EMC standard density calculation *OFF / ON*		
5	S	EMC-d	EMC relative density *OFF / ON*		
6	S	EMC-Hi	EMC inferior calorific value calculation *OFF / ON*		
7	S	EMC-CO2	EMC carbon dioxide content *OFF / ON / Constant Value*		
8	S	EMC-N2	EMC nitrogen content *OFF / ON*		
9	S	EMC-CH	EMC hydrocarbon content *OFF / ON*		
11	S	Hs-Value	EMC superior calorific value: start/fault condition *Default Value / Last Value*		
12	S	Ws-Wert	EMC Wobbe index: start/fault condition *Default Value / Last Value*		
13	S	rn- Value	EMC standard density: start/fault condition *Default Value / Last Value*		
14	S	d- Value	EMC relative density: start/fault condition *Default Value / Last Value*		
15	S	Hi- Value	EMC inferior calorific value: start/fault condition *Default Value / Last Value*		
16	S	CO2-Val.	EMC carbon dioxide content: start/fault condition *Default Value / Last Value*		
21	S	Hs-Dim	Unit of EMC superior calorific value *kWh/m3 / kcal/m3 / MJ/m3*		
22	S	Ws-Dim	Unit of EMC Wobbe index *kWh/m3 / kcal/m3 / MJ/m3*		
23	S	Hi-Dim	Unit of EMC inferior calorific value *kWh/m3 / kcal/m3 / MJ/m3*		
24	S	CO2-Dim	Unit of carbon dioxide content: mol%		
26	D	FHsL	Last valid EMC superior calorific value	s. K/21	
27	D	FWsL	Last valid EMC Wobbe index	s. K/22	
28	D	FrnL	Last valid EMC standard density	kg/m3	
29	D	FdL	Last valid EMC relative density		
30	D	FHiL	Last valid EMC inferior calorific value	s. K/23	
31	D	FCO2L	Last valid EMC carbon dioxide content	%	

Measured Values

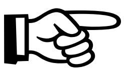
direct   9 Cal. Val.

		Column M	Description of coordinates	Unit	Comment(s)
1	D	Result	Heading result column		
2	**D**	***Hs**	**Calculated EMC superior calorific value**	**s. K/21**	
3	**D**	***rho,n**	**Calculated EMC standard density**	**kg/m3**	**1)**
4	D	Ws	Calculated EMC Wobbe index	s. K/22	
5	D	d	Calculated EMC relative density		
6	D	Hi	Calculated EMC inferior calorific value	s. K/23	
7	D	*CO2	Carbon dioxide content	s. K/24	
8	D	N2	Nitrogen content	Mol%	
9	D	CH	Hydrocarbon content	Mol%	
11	D	MNumber	Methane number		
12	**C**	**T-Gas**	**EMC test gas:** ***Test Gas OFF / Man. Test Gas / Auto. Test Gas***		
13	S	TGasTo	Maximum duration of test gas operation	min	
14	D	THs	Calculated EMC superior calorific value, test gas	s. K/21	
15	D	TWs	Calculated EMC Wobbe index, test gas	s. K/22	
16	D	Trho,n	Calculated EMC standard density, test gas	kg/m3	
17	D	Td	Calculated EMC relative density, test gas		
18	D	THi	Calculated EMC inferior calorific value, test gas	s. K/23	
19	D	TCO2	Carbon dioxide content, test gas	s. K/24	
20	D	TN2	Nitrogen content, test gas	Mol%	
21	D	TCH	Hydrocarbon content, test gas	Mol%	
24	D	TMNumber	Methane number, test gas		
27	D	HsA0c	Actual A0 value for superior calorific value	s. K/21	
28	S	Hsmin	Lower fault limit, EMC superior calorific value	s. K/21	
29	S	Hsmax	Upper fault limit, EMC superior calorific value	s. K/21	
30	C	Hs-def	Default value, EMC superior calorific value	s. K/21	
31	S	Hs-af	Averaging factor (damping), EMC superior calorific value		
34	D	WsA0c	Actual A0 value for Wobbe index	s. K/22	
35	S	Wsmin	Lower fault limit, EMC Wobbe index	s. K/22	
36	S	Wsmax	Upper fault limit, EMC Wobbe index	s. K/22	
37	C	Ws-def	Default value, EMC Wobbe index	s. K/22	
38	S	Ws-af	Averaging factor (damping), EMC Wobbe index		
41	D	rnA0c	Actual A0 value for standard density	kg/m3	
42	S	rnmin	Lower fault limit, EMC standard density	kg/m3	
43	S	rnmax	Upper fault limit, EMC standard density	kg/m3	
44	C	rn-def	Default value, EMC standard density	kg/m3	
45	S	rn-af	Averaging factor (damping), EMC standard density		
48	D	dA0c	Actual A0 value for relative density		
49	S	dmin	Lower fault limit, EMC relative density		
50	S	dmax	Upper fault limit, EMC relative density		
51	C	d-def	Default value, EMC relative density		
52	S	d-af	Averaging factor (damping), EMC relative density		
55	D	HiA0c	Actual A0 value for inferior calorific value	s. K/23	
56	S	Himin	Lower fault limit, EMC inferior calorific value	s. K/23	
57	S	Himax	Upper fault limit, EMC inferior calorific value	s. K/23	
58	C	Hi-def	Default value, EMC inferior calorific value	s. K/23	
59	S	Hi-af	Averaging factor (damping), EMC inferior calorific value		
63	D	CO2A0c	Actual A0 value for carbon dioxide content	s. K/24	
64	S	CO2min	Lower fault limit, carbon dioxide content	s. K/24	
65	S	CO2max	Upper fault limit, carbon dioxide content	s. K/24	
66	C	CO2-def	Default value, carbon dioxide content	s. K/24	
67	S	CO2-af	Averaging factor (damping), carbon dioxide content		

69	S	N2min	Lower fault limit, nitrogen content	Mol%	
70	S	N2max	Upper fault limit, nitrogen content	Mol%	
71	C	N2-def	Default value, nitrogen content	Mol%	
72	S	N2-af	Averaging factor (damping), nitrogen content		
73	S	CHmin	Lower fault limit, hydrocarbon content	Mol%	
74	S	CHmax	Upper fault limit, hydrocarbon content	Mol%	
75	C	CH-def	Default value, hydrocarbon content	Mol%	
76	S	CH-af	Averaging factor (damping), hydrocarbon content		
77	S	MN-min	Lower fault limit, methane number		
78	S	MN-max	Upper fault limit, methane number		

1) For fiscal metering in the mode EMC 500 (see Y25).

Printer Control



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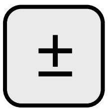
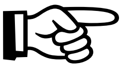


Print

		Column O	Description of coordinates	Unit	Comment(s)
1	D	MODE-TT	Heading EMC print column		
2	D	ManR.	Heading EMC manual report		
3	D	ChanR.	Heading EMC channel report		
6	C	LPT-1	EMC print mode 1 *Manual / Automatic*		
7	C	LPT-Dat.	EMC data report Hs, Ws, rn, d, Hi, CO2 *Print OFF / Mean Values / 15-Min.Data / Hourly Data*		
8	C	LPT-Cal.	EMC calibration report Hs, Ws, rn, d, Hi *Print OFF / Print ON*		
9	C	LPT-Rev.	EMC revision report Hs, Ws, rn, d, Hi, CO2 *Print OFF / Print ON*		
10	C	LPT-EMC	EMC data report sensors *Print OFF / Print ON*		
11	C	AutoRep	EMC automatic print repetition rate	min	
12	C	Rev-Rep	EMC revision print repetition rate	min	
13	D	L-P	Time of last EMC printout		

Date

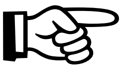


2

direct Date

		Column P	Description of coordinates	Unit	Comment(s)
1	D	Date	Heading of date display		
2	C	Date:	Date display		
3	C	Day:	Weekday		

Time

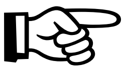


1

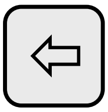
direct Time

		Column Q	Description of coordinates	Unit	Comment(s)
1	D	Time	Heading of time display		
2	C	Time:	Time display		
5	D	UnixS	Unix seconds since 01.01.1970 00:00	s	
6	D	UnixT	Date and time of Unix Time		

Fault



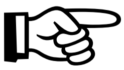
direct



Fault

		Column R	Description of coordinates	Unit	Comment(s)
1	D	FAULT	Heading fault		
2	D	F.	Fault indication at one-second intervals		
3	D	F.-Time	Time of the first fault occurring		
4	D	F.-Date	Date of the first fault occurring		
5	D	Reset	Time of last fault clearing		
6	C	NetRes	Power on reset failure signal: After Power on / After measure		
31	D	3200	Measuring element error, bit string 1		
31	D	3201	Measuring element error, bit string 2		
31	D	3202	Measuring element error, bit string 3		
31	D	3203	Measuring element error, bit string 4		
41	D	Warn-fl	Warning flag		
42	D	Fault-fl	Fault flag		
45	D	E-idx	Index events archive		
46	D	E-Arch.	Events archive		

EMC Sensor 1



direct

Input

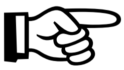
		Column T	Description of coordinates	Unit	Comment(s)
1	D	S1-EMC	Heading EMC sensor 1		
2	D	S1	EMC sensor 1	mV	
3	D	S1-in	Input value, EMC sensor 1	mV	
4	D	S1-Oc	Current offset, sensor 1	mV	
7	S	S1min	Lower fault limit, EMC sensor 1	mV	
8	S	S1max	Upper fault limit, EMC sensor 1	mV	
14	S	S1-af	Averaging factor (damping), EMC sensor 1		
18	S	S1-Trm	Mode, EMC sensor 1 *EMC*		
21	S	S1D1	Differential pressure correction factor, EMC sensor 1		
22	S	S1G1	Pressure correction factor, EMC sensor 1		
23	S	S1K1	Temperature correction factor, EMC sensor 1		
24	S	S1-Spec	Specified value for calibration gas, EMC sensor 1	mV	
25	S	S1-Tol	Max. deviation from specified value, EMC sensor 1	mV	
26	S	S1-dfO	Setting value offset, EMC sensor 1	mV	
29	D	Off-G1	Sensor 1 offset, base calibration	mV	
30	D	Off-D1	Sensor 1 diff. with regard to base calib.	%	
36	D	S1-1112	Measured value read from EMC, sensor 1		
37	D	S1-1012	Analog value read from EMC, sensor 1		

EMC Sensor 2

indirect | 6 Input | and once | right

		Column U	Description of coordinates	Unit	Comment(s)
1	D	S2-EMC	Heading EMC sensor 2		
2	D	S2	EMC sensor 2	mV	
3	D	S2-in	Input value EMC sensor 2	mV	
4	D	S2-Oc	Current offset sensor 2	mV	
7	S	S2min	Lower fault limit, EMC sensor 2	mV	
8	S	S2max	Upper fault limit, EMC sensor 2	mV	
14	S	S2-af	Averaging factor (damping), EMC sensor 2		
18	S	S2-Trm	Mode, EMC sensor 2 *EMC*		
21	S	S2D1	Differential pressure correction factor, EMC sensor 2		
22	S	S2G1	Pressure correction factor, EMC sensor 2		
23	S	S2K1	Temperature correction factor, EMC sensor 2		
24	S	S2-Spec	Specified value for calibration gas, EMC sensor 2	mV	
25	S	S2-Tol	Max. deviation from specified value, EMC sensor 2	mV	
26	S	S2-dfO	Setting value offset, EMC sensor 2	mV	
29	D	Off-G2	Sensor 2 offset, base calibration	mV	
30	D	Off-D2	Sensor 2 diff. with regard to base calib.	%	
36	D	S2-1114	Measured value read from EMC, sensor 2		
37	D	S2-1014	Analog value read from EMC, sensor 2		

EMC Pressure

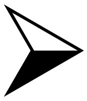


indirect

6

Input

and twice



right

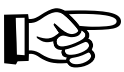
		Column V	Description of coordinates	Unit	Comment(s)
1	D	P1-EMC	Heading EMC pressure 1		
2	D	P1	EMC pressure 1	mbar	
3	D	P1-in	Input value, EMC pressure 1	mA	
4	D	CO2	EMC CO2	Mol%	
5	D	CO2-in	Input value, EMC CO2	mA	
6	D	CO2-Oc	Current offset CO2	%	
7	S	P1min	Lower fault limit, EMC pressure 1	mbar	
8	S	P1max	Upper fault limit, EMC pressure 1	mbar	
9	S	P1-def	Default value, EMC pressure 1	mbar	
11	S	P1-af	Averaging factor (damping), EMC pressure 1		
12	S	P1-Trm	Mode EMC pressure 1 *EMC*		
13	S	p1-C1	Temperature correction factor, pressure 1		
14	S	CO2C1	Temperature correction factor, CO2		
15	S	CO2G1	Pressure correction factor, CO2		
17	S	CO2-Tol	Max. deviation from specified value, CO2	%	
18	S	CO2-dfO	Setting value offset, EMC carbon dioxide CO2	%	
19	S	dp-spec	Lower limiting value, differential pressure		
20	S	dp-dev	Upper limiting value, differential pressure		
32	S	p2-min	Cut-off limit pressure 2		
33	S	Co2OP	Fixed carbon dioxide offset	%	
35	D	CO2-1100	Measured value read from EMC, carbon dioxide CO2		
36	D	CO2-1000	Analog value read from EMC, carbon dioxide CO2		
37	D	p1-1102	Measured value read from EMC, output pressure P1		
38	D	p1-1002	Analog value read from EMC, output pressure P1		
39	D	dp-1104	Measured value read from EMC, differential pressure DP		
40	D	dp-1004	Analog value read from EMC, differential pressure DP		

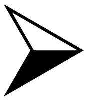
EMC Case Temperature

	6		
indirect	Input	and three times	right

		Column W	Description of coordinates	Unit	Comment(s)
1	D	tC-EMC	Heading EMC case temperature		
2	D	tC	EMC case temperature	°C	
3	D	tC-in	Input value, EMC case temperature	ohm	
7	S	tCmin	Lower fault limit, EMC case temperature	°C	
8	S	tCmax	Upper fault limit, EMC case temperature	°C	
10	S	tC-def	Default value, EMC case temperature	°C	
14	S	tC-af	Averaging factor (damping), EMC case temperature		
18	S	tC-Trm	Mode EMC case temperature *EMC*		
22	S	tC-Spec	Specified value, EMC case temperature	°C	
36	D	tC-1106	Measured value read from EMC, case temperature TC		
37	D	tC-1006	Analog value read from EMC, case temperature TC		

EMC Block Temperature



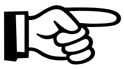



indirect Input and four times right

		Column X	Description of coordinates	Unit	Comment(s)
1	D	tB-EMC	Heading EMC block temperature		
2	D	tB	EMC block temperature	°C	
3	D	tB-in	Input value EMC block temperature	ohm	
7	S	tBmin	Lower fault limit, EMC block temperature	°C	
8	S	tBmax	Upper fault limit, EMC block temperature	°C	
10	S	tB-def	Default value, EMC block temperature	°C	
14	S	tB-af	Averaging factor (damping), EMC block temperature		
21	S	tB-Start	Start temp., target adjustment of EMC block temperature	°C	
22	S	tB-spec	Specified value, EMC block temperature	°C	
23	S	tB-Hyst	Hysteresis value, EMC block temperature	°C	
24	S	tB-Smin	Min. deviation from specified value of EMC block temperature	°C	
25	S	tB-Smax	Max. deviation from specified value of EMC block temperature	°C	
26	S	tB-SCyc	Start cycles, EMC block temperature		
27	S	tB-Time1	Start time, EMC block temperature Permissible values: ≥2 and ≤99 minutes (default: 30)	min	1)
28	S	TB-Time2	Start time, 2nd calibration, EMC block temperature Permissible values: ≥0 and ≤300 minutes (default: 180)	min	1) 2)
36	D	tB-1108	Measured value read from EMC, block temperature TB		
37	D	tB-1008	Analog value read from EMC, block temperature TB		

1) The changed setting will only become effective after a restart of the analytical computer
2) Attention: Input 0 is only allowed for testing operations. In normal measuring mode, start time 2 must be unequal 0!

Version Parameters



8

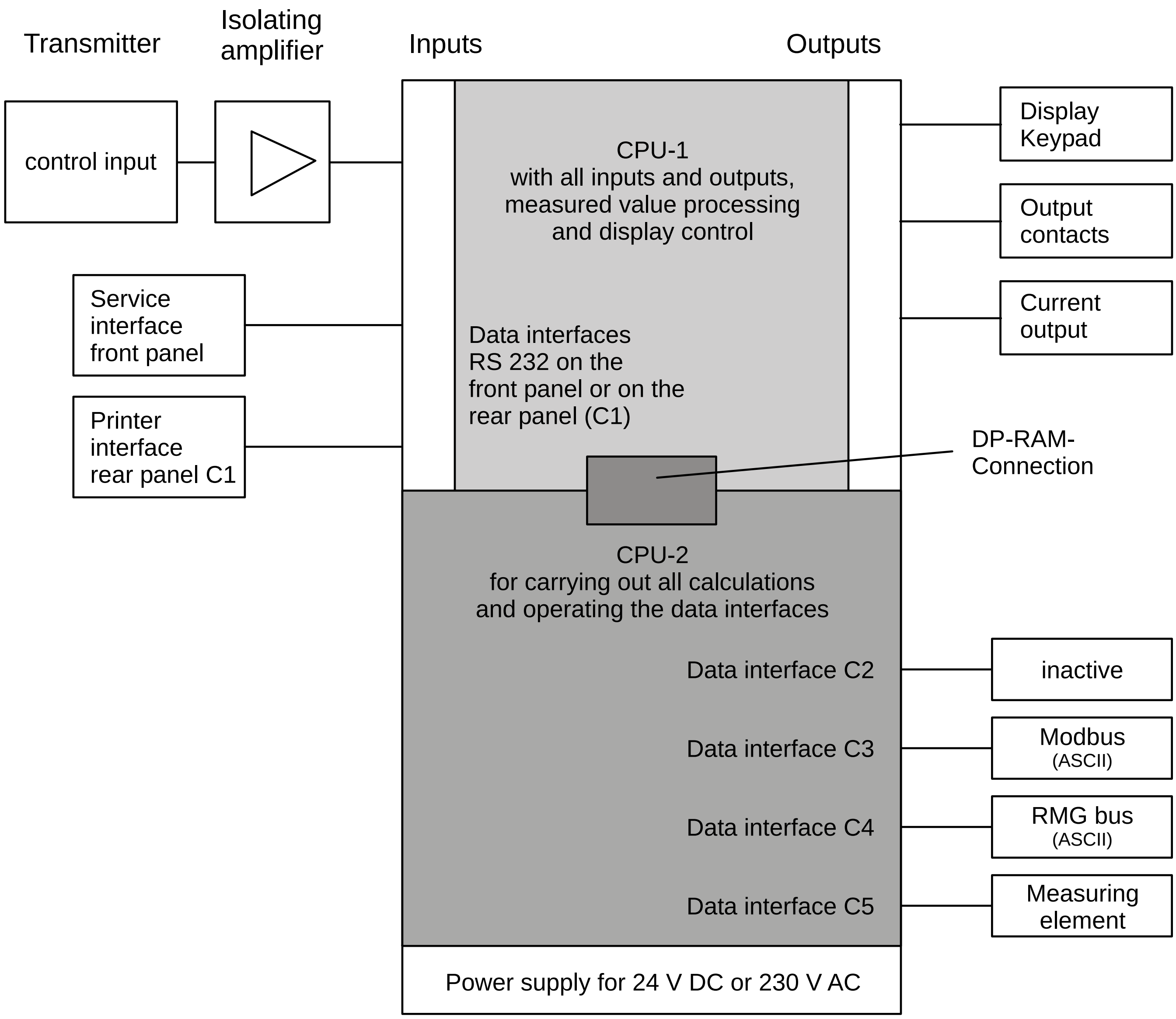
direct Max. Values

		Column Y	Description of coordinates	Unit	Comment(s)
1	D	EMC9000	Heading EMC device type		
2	D	RMG	Heading manufacturer		
3	D	TstS1	Test value, sensor 1		
4	D	CntS1	Test counts, sensor 1		
5	**S**	**Code**	**Code number to enable parameter input**		**1)**
6	D	Opr.Hrs.	Indication of operating hours since startup	h	
7	C	Year	Year of construction		
8	C	Commis.	Time of commissioning		
9	C	DispLev	Display level EMC: *Level 1 / Level 2 / Level 3 / Level 4*		
10	S	SetCO2	Test value, CO2		
11	S	SetP1	Test value, output pressure		
12	S	Setdp	Test value, differential pressure		
13	S	SetTC	Test value, case temperature		
14	S	SetTB	Test value, block temperature		
15	S	SetS1	Test value, sensor 1		
16	S	SetS2	Test value, sensor 2		
18	D	ERZ-CS	GC-9000-EMC checksum		
19	D	Ver-ERZ	GC-9000-EMC software version		
20	**S**	**ERZ-No.**	**GC-9000-EMC serial number**		
21	S	Reset	Reset EMC *OFF / Offset-Reset / Set A0 / EMC-Default / Hourly D. Arch. / Daily D. Arch. / Monthly D. Arch. / Min. D. Arch. / Event Reset*		
22	D	EMC-CS	EMC checksum		
23	D	Ver-EMC	EMC software version		
24	D	DataLogg	EMC data logger version		
25	**S**	**AirMode**	**Gas-type mode: *EMC 500 / EMC 500-L***		**2)**
26	**S**	**CGasmod**	**Calibration gas type mode: *Methane / Air***		
27	D	Lamp-Top	Lamp test of top line (all segments on)		
28	D	Lamp-Bot	Lamp test of bottom line (all segments on)		
29	**S**	**Mfr-No.**	**Manufacturer´s number**		
30	D	EMC-No.	EMC No. (must be identical with field Y-29)		
31	D	ST-FR	Front interface status		
32	D	ST-C1	Character number status, C1 interface		
…	D	…	…		
36	D	ST-C5	Character number status, C5 interface		
37	D	TR-FR	Transmit/receive character number, front		
38	D	TR-C1	Transmit/receive character number, C1		
…	D	…	…		
42	D	TR-C5	Transmit/receive character number, C5		
43	S	Test	Test: *OFF / Static ON / Ramp ON*		
44	S	GCMet	Calculated methane number: OFF / ON		3)
45	D	User-S.	Position of user switch		
46	D	Cal-S.	Position of calibration switch		
55	D	AM	Available memory DSfG		

1) User access via a 8-digit number. This number is only visible and changeable with open calibration switch.
2) For natural gases: EMC 500 (superior calorific value, standard density and CO_2 for custody transfer flow measurements)
For natural gases which have been conditioned with air: EMC 500-L (calorific value and CO2 for custody transfer flow measurements; standard density after special test for calculation of K number)
3) Calculated methane number with GC-corrected values. The methane number can only be calculated within the following ranges: Hs: 8.33 – 12.5 kWh/m^3, rho,n: 0.7 – 0.9 kg/m^3 and CO_2: 0 – 5 mol%

Annex

A Block Diagram for the GC 9000



B Technical Data

Analytical computer

Inputs

Digital inputs:	Status signals, passive contact mechanism (relay or open collector) load 5 V 20 mA

Outputs

Analog outputs:	14-bit resolution, accuracy ± 1 bit, load 800 ohms electrically isolated as plug-in module for each output The CPU can optionally be fitted with 1 to 4 analog outputs
Digital outputs:	Limit contacts electrically isolated open collector, 24 V 100 mA Fault / Warning contact assemblies (principle of closed-circuit current) max. 24 V 100 mA

Interfaces

Front panel:	RS 232 C, no hardware handshake lines transmission rates from 4800 to 9600 bd 1 start bit, 1 stop bit, 8-bit data, no parity 9-pin subminiature Cannon connector with short-circuit protection, varistor and transient absorber (TAZ diode).
Rear panel:	Five RS 232 C interfaces (C1 and C2), no hardware handshake lines C1 interface RS 232 for printer C2 interface RS 485 (inactive) or DSfG C3 interface RS 232 modbus (max. distance 15 m) C4 interface RS 485 RMG bus (changeable to RS 232) C5 interface RS 232 for communication with measuring element transmission rates from 1200 to 38400 bd 1 start bit, 1 stop bit, 8-bit data, no parity, 9-pin subminiature Cannon connector with short-circuit protection, varistor and transient absorber (TAZ diode).

CPU

CPU 1:	80C537 / 20 MHz
Memory areas:	a) Official data: non-volatile emeory C-MOS, 2 kByte b) User data: non-volatile emeory C-MOS, 2 kByte c) Program memory: EPROM 64 k / 128 k Byte
CPU 2:	80C186 / 10 MHz Data memory: 64 k / 256 k Byte + DPRAM 2 k Byte Program memory: EPROM 64 k / 786 kB + EEPROM 8 kB

Supply

	Switching power supply with 40 kHz cycle. All secondary voltages are electrically isolated. Charger for standby battery.	
Standard version:	24 VDC	21 V to 27 V
Special version:	230 VAC	-10% +6%
Power requirement:	ca. 31 W	

Rack-mounting unit

Dimensions:	Height 3 HE	Width 213 mm	Depth 295 mm
Weight excl. battery:	approx. 3.2 kg		

Measuring element

Measuring ranges (natural gas)

	secondary metering natural gas / other fuel gases	**fiscal metering** natural gas
Superior calorific value:	7 – 14 / 2 – 25 kWh/Nm^3	8.4 – 13.1 kWh/Nm^3
Standard density:	0.65 – 1.3 / 0.3 – 2 kg/Nm^3	0.71 – 0.970 kg/Nm^3
CO2 content:	0 – 20 / 0 – 20 mol%	0 – 5 or 0 – 20 mol%
Wobbe index:	8 – 16 / 3 – 25 kWh/m^3	
Inferior calorific value:	7 – 14 / 2 – 25 kWh/m^3	
Methane number (option)	40 – 100 / –	

The calculated methane number is only valid within the following ranges:
Hs: 8.33 – 12.5 kWh/m^3, rho,n: 0.7 – 0.9 kg/m^3 and CO2: 0 – 5 mol%.

Accuracy (natural gas): ±0.5% of the measured value for standard denity and superior calorific value
±0.5 mol% (absolute) for CO_2 content
With natural gases which have been conditioned with air (max. 20%) the measuring error for the standard density may reach ±1%.

Response times: T50: < 30 s
T90: < 60 s

Ambient temperature: -20°C to +55°C

Power supply: 24 VDC or 230 VAC or 115 VAC

Power requirement: 100 W

Dimensions: B x H x T = 475 x 720 x 340 mm

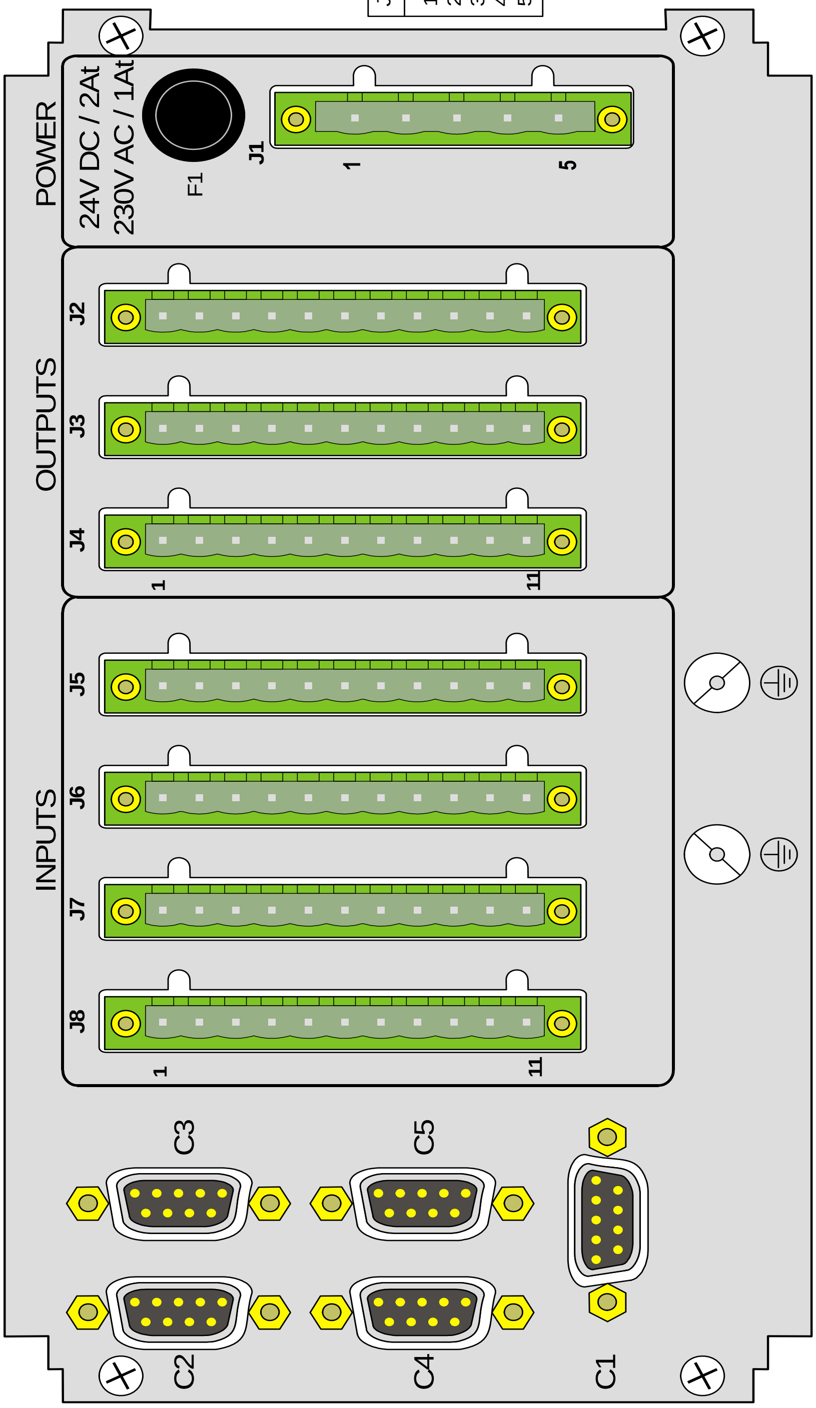
Degree of protection: IP 54 (Ex design)
IP 43 (Non-Ex design)

Inlet pressure range: 0.5-3.0 bar

Gas consumption: max. 15 Nℓ/h

C Pin Assignment Diagram for the GC 9000

J1	Assignment
1	110/230 VAC
2	110/230 VAC
3	+ 24 VDC
4	- 24 VDC
5	PE



C3: Modbus
C2: inactive
C5: Measuring element
C4: RMG bus
C1: LPT

J2	Assignment outputs
1	Reserve +
2	Reserve -
3	Reserve +
4	Reserve -
5	Reserve +
6	Reserve -
7	Reserve +
8	Reserve -
9	Warning
10	Warning
11	Warning

J3	Assignment outputs
1	Reserve +
2	Reserve -
3	Reserve +
4	Reserve -
5	Reserve +
6	Reserve -
7	Reserve +
8	Reserve -
9	Fault
10	Fault
11	Fault

J4	Assignment outputs
1	I1 out +
2	I1 out -
3	I2 out +
4	I2 out -
5	I3 out +
6	I3 out -
7	I4 out +
8	I4 out -
9	Ub -
10	Ub +
11	

J5	Assignment inputs
1	Reserve
2	Reserve +
3	Reserve -
4	Reserve +
5	Reserve -
6	Reserve
7	Reserve +
8	Reserve -
9	Reserve +
10	Reserve -
11	PE

J6	Assignment inputs
1	Reserve
2	Reserve
3	Reserve
4	Reserve
5	Reserve -
6	Reserve +
7	Reserve -
8	Reserve +
9	Reserve +
10	Reserve -
11	PE

J7	Assignment inputs
1	Reserve +
2	Reserve +
3	Reserve +
4	Reserve -
5	Reserve +
6	Reserve -
7	fV Reserve +
8	fV Reserve -
9	fV Reserve +
10	fV Reserve -
11	PE

J8	Assignment inputs
1	Reserve +
2	Reserve -
3	Reserve +
4	Reserve -
5	Reserve +
6	Reserve -
7	Reserve +
8	Reserve -
9	Reserve +
10	Reserve -
11	PE

D Fault List

Fault Messages

Designation
A = Fault
W = Warnung

Fault number

Fault short text
like in the display

Description

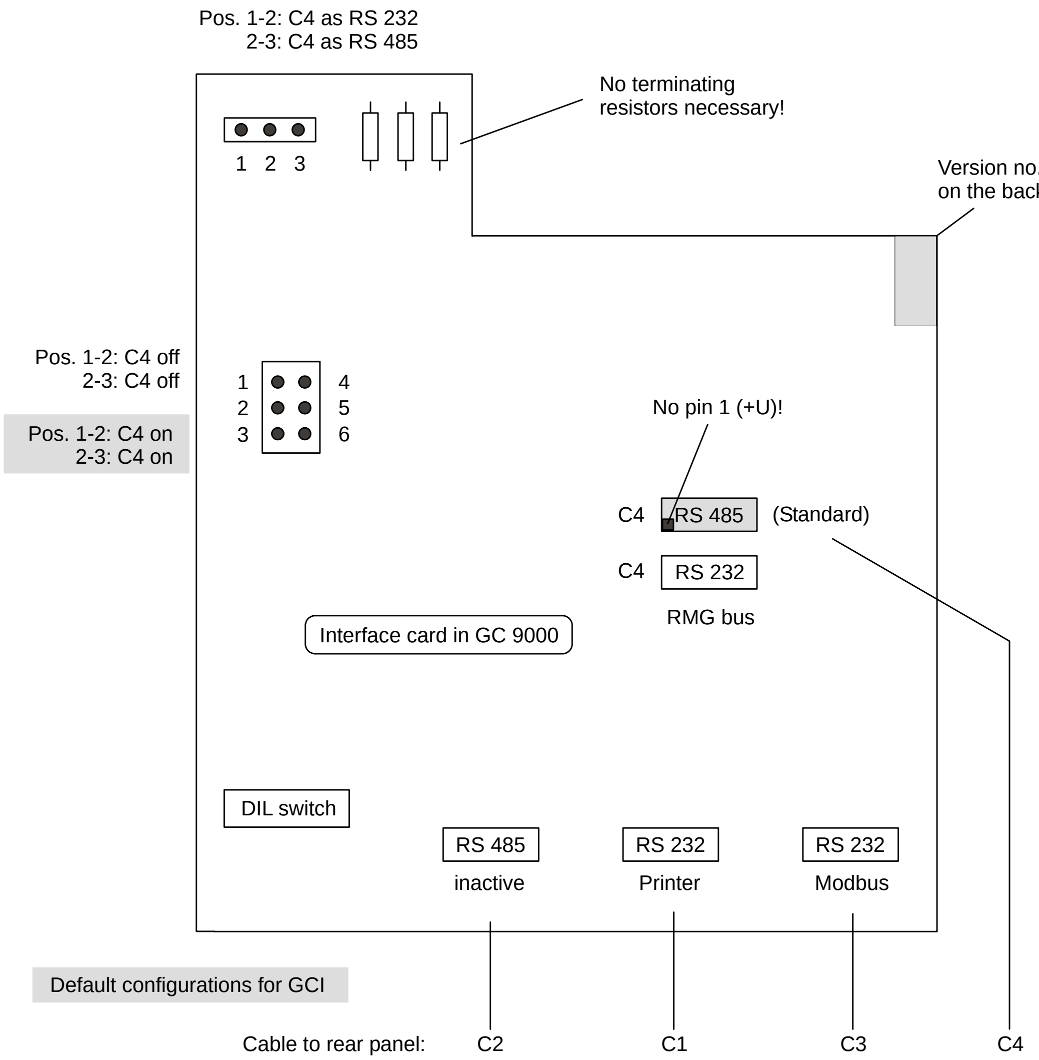
A	02-0	EMC d Calibr.	EMC relative density calibration
A	02-1	d Max Range	Relative density above max limit
A	02-2	d Min Range	Relative density below min limit
A	02-5	EMC CO2 Calibr.	EMC carbon dioxide calibration
A	03-1	N2 Max Limit	Nitrogen content above max limit
A	03-2	N2 Min Limit	Nitrogen content below min limit
A	03-3	CH Max Limit	Hydrocarbon content above max limit
A	03-4	CH Min Limit	Hydrocarbon content below min limit
A	13-0	EMC Hs Calibr.	EMC superior calorific value calibration
A	13-1	Hs Max Range	Superior calorific value above max limit
A	13-2	Hs Min Range	Superior calorific value below min limit
A	14-0	EMC Hi Calibr.	EMC inferior calorific value calibration
A	14-1	Hi Max Range	Inferior calorific value above max limit
A	14-2	Hi Min Range	Inferior calorific value below min limit
A	15-0	EMC rn Calibr.	EMC standard density calibration
A	15-1	rn Max Range	Standard density above max limit
A	15-2	rn Min Range	Standard density below min limit
A	16-0	EMC Ws Calibr.	EMC Wobbe index calibration
A	16-1	Ws Max Range	Wobbe index above max limit
A	16-2	Ws Min Range	Wobbe index below min limit
A	17-0	EMC S1 Failure	EMC sensor 1 failure
A	17-1	EMC S1 MaxRange	Sensor 1 above max limit
A	17-2	EMC S1 MinRange	Sensor 1 below min limit
A	18-0	EMC S2 Failure	EMC sensor 2 failure
A	18-1	EMC S2 MaxRange	Sensor 2 above max limit
A	18-2	EMC S2 MinRange	Sensor 2 below min limit
A	19-0	EMC P1 Failure	EMC pressure 1 failure
A	19-1	EMC P1 MaxRange	Pressure 1 above max limit
A	19-2	EMC P1 MinRange	Pressure 1 below min limit
A	20-0	EMC TC Failure	EMC case temperature failure
A	20-1	EMC TC MaxRange	Case temperature above max limit
A	20-2	EMC TC MinRange	Case temperature below min limit
A	21-0	EMC TB Failure	EMC block temperature failure
A	21-1	EMC TB MaxRange	Block temperature above max limit
A	21-2	EMC TB MinRange	Block temperature below min limit
A	22-0	EMC Calib. Gas	Calibration gas fault

A	22-1	EMC TimeSetting	Incorrectly set calibration time
A	22-2	EMC Recov.Time	Incorrectly set compensation time
A	22-3	EMC Gas Alarm	Gas alarm via contact input
A	22-4	Gas Flow Limit	Gas flow outside limits
A	23-0	CO2 Hardware	EMC CO2 measurement hardware failure
A	23-1	CO2 Max Range	Carbon dioxide content above max limit
A	23-2	CO2 Min Range	Carbon dioxide content below min limit
A	28-0	EMC Y30 to Y29?	Attribution GC-9000-EMC to WOM-02
A	29-0	Gas Flow Hardw.	Gas flow failure
A	50-0	Power Failure	Power failure
A	50-2	RAM Fault	Fault during check of the RAM
A	50-6	CPU1 to CPU2	Disturbed data exchange via the dual-port RAM
A	59-0	EMC500 Fault	General EMC-500 fault
A	59-1	EMC500 AD Fault	Fault A/D measurements EMC 500
A	59-2	EMC500 IO Error	Fault I/O signals EMC 500
A	59-3	EMC500 MV Fault	Fault measured values EMC 500
A	76-5	Modb.Failure C5	Modbus failure C5

Warnings

W	12-1	MethaneNo.Limit	Methane number outside limits
W	17-5	EMC S1 Offset	Sensor 1 hysteresis limit offset exceeded
W	18-5	EMC S2 Offset	Sensor 2 hysteresis limit offset exceeded
W	21-5	EMC TB Hyster.	Block temperature hysteresis limit exceeded
W	23-5	EMC CO2 Offset	Carbon dioxide hysteresis limit offset exceeded
W	35-1	Interface C1	Interface C1 out of order
W	35-2	Interface C2	Interface C2 out of order
W	35-3	Interface C3	Interface C3 out of order
W	35-4	Interface C4	Interface C4 out of order
W	35-5	Interface C5	Interface C5 out of order
W	72-5	Modb.Timeout C5	Timeout modbus C5
W	82-0	MB Function C2	Illegal function modbus C2
W	82-1	MB DataAddr. C2	Illegal data address modbus C2
W	82-2	MB DataValue C2	Illegal data value modbus C2
W	82-3	MB SlaveDev. C2	Slave device failure modbus C2
W	82-4	MB Acknowl. C2	Query understood, response pending, modbus C2
W	82-5	MB Busy C2	No response because device is busy, modbus C2
W	82-6	MB Neg.Ack. C2	Enquired function can not be started, modbus C2
W	82-7	MB Mem.Par. C2	Memory parity error modbus C2
W	83-0	MB Function C3	Illegal function modbus C3
W	83-1	MB DataAddr. C3	Illegal data address modbus C3
W	83-2	MB DataValue C3	Illegal data value modbus C3
W	83-3	MB SlaveDev. C3	Slave device failure modbus C3
W	83-4	MB Acknowl. C3	Query understood, response pending, modbus C3
W	83-5	MB Busy C3	No response because device is busy, modbus C3
W	83-6	MB Neg.Ack. C3	Enquired function can not be started, modbus C3
W	83-7	MB Mem.Par. C3	Memory parity error modbus C3
W	84-0	MB Function C4	Illegal function modbus C4
W	84-1	MB DataAddr. C4	Illegal data address modbus C4
W	84-2	MB DataValue C4	Illegal data value modbus C4
W	84-3	MB SlaveDev. C4	Slave device failure modbus C4
W	84-4	MB Acknowl. C4	Query understood, response pending, modbus C4
W	84-5	MB Busy C4	No response because device is busy, modbus C4
W	84-6	MB Neg.Ack. C4	Enquired function can not be started, modbus C4
W	84-7	MB Mem.Par. C4	Memory parity error modbus C4
W	85-0	MB Function C5	Illegal function modbus C5
W	85-1	MB DataAddr. C5	Illegal data address modbus C5
W	85-2	MB DataValue C5	Illegal data value modbus C5
W	85-3	MB SlaveDev. C5	Slave device failure modbus C5
W	85-4	MB Acknowl. C5	Query understood, response pending, modbus C5
W	85-5	MB Busy C5	No response because device is busy, modbus C5
W	85-6	MB Neg.Ack. C5	Enquired function can not be started, modbus C5
W	85-7	MB Mem.Par. C5	Memory parity error modbus C5

E Configuration of the Interfaces

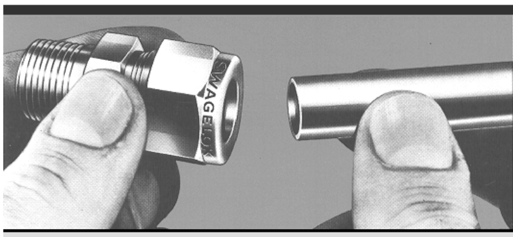


C4 needs external terminating resistors and a bus supply voltage (+5 V).
Select the mode for the interface C4 by the DIL switch 5 on the CPU card:
DIL 5 ON: RS 485
DIL 5 OFF: RS 232

F Assembly Instructions for Pipe Connections

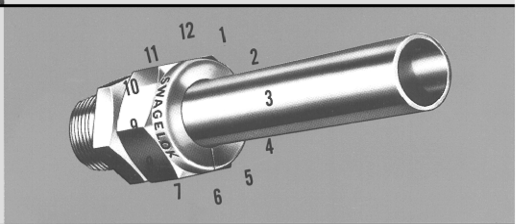
Swagelok®

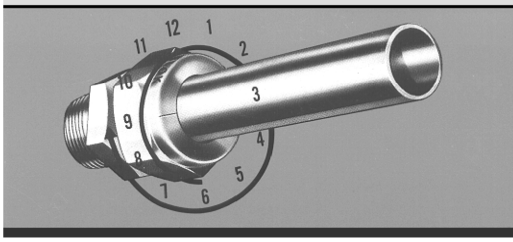
INITIAL ASSEMBLY



1 Cut pipe perpendicularly and remove fins. Insert pipe into fitting until stop is reached. Tighten nut with fingers only.

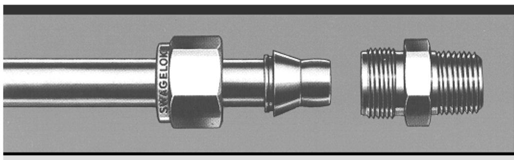
2 Prior to tightening the SWAGELOK nut, mark it in the 6 o'clock position.





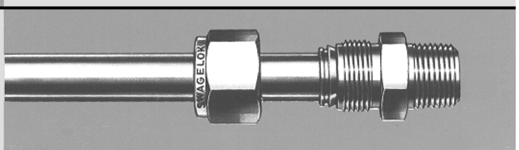
3 Then tighten nut with **1¼ turns*** until marking reaches the 9 o'clock position.

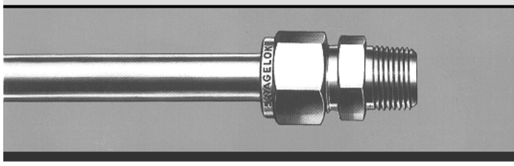
* For pipe connections sized 2, 3, 4 mm or 1/16", 1/8", 3/16", you must tighten the nut with a ¾ turn during initial assembly.



1 Removed fitting

2 Insert pipe with clamping rings into fitting until stop is reached.





3 Tighten nut with fingers only, then use wrench to tighten it with approximately ¼ turn.