ERZ 2000

Short Operating Instructions

CONTENTS

1 Overview of functions

Keys 0 to 9 have more than one function. The current function depends on the operating condition. In normal display mode, the text below the key applies and allows measured values or chapter headings and functions to be directly or indirectly accessed. In input mode, the text on the key itself applies. You can enter numbers and, in extended mode, also letters. Entering letters is similar to the method used for mobile phones.

Function keys	Key legend
▪ Measured values P,T..	1
▪ Analysis	2
▪ Orifice	3
▪ I/O (inputs/outputs)	4
▪ Archive	5
▪ Test	6
▪ Totalizer	7
▪ Flow rates	8
▪ Meter	9
▪ Mode	0
▪ ID	± ,
▪ Select (selects a chapter)	*
▪ Backspace function	🡐
▪ Alarms (displays or clears messages)	⚠

Use the keys 1, 2, 7 and 8 to directly display the most important measured values. Use the keys 3, 4, 5, 6, 9 and 0 to access the relevant headings and chapter overviews. The * key for "Select" will always show the current chapter. Use the 🡐 key to go back to the last 50 times you have pressed a key.

2 Explanation of the most important key functions, FAQs

2.1 Levels and rights of access

The ERZ 2000 system provides three access levels to change parameters or device settings. The lowest level is the user level which is protected by code. It is marked B, C or P in the documentation.
The second level is protected by the official calibration lock in the form of a sealable turn switch. It is marked E in the documentation.
The higher level is the special-purpose level (superuser) which is reserved for type changes, etc. The special-purpose level can be reached by entering the code and by additionally opening the calibration lock. It is marked S in the documentation.
A symbol (point, rhombus or blank) indicates whether a value displayed can be edited. The symbol is located between the line information and the text, e.g.

Any column, line 2:
02   Input value
↖ Blank: Value cannot be edited

Any column, line 9:
09 • Lower alarm limit
↖ Point: Value can be edited but is locked by means of the user code or the official calibration lock
09 ♦ Lower alarm limit
↖ Rhombus: Value has been enabled for editing.

2.1.1 Display modes, user profiles and visibility levels

Dynamic hiding or showing of displays in the coordinate system depends on several factors. Firstly, the device type set (ERZ 2004, ERZ 2104, etc.) determines which functions are relevant and only those are shown.
Secondly, there are visibility levels which can make further restrictions. These levels have been given names which correspond to the scope or range of displays shown.

The lowest level is the "Gas meter reader" who can access only a few useful displays or overviews via the keyboard while the rest cannot be accessed by him/her. This level can be selected by the user.

The next level up is the **standard setting** and is named "User". With this setting, all measured values, parameters, auxiliary quantities, etc. which are useful for the selected device type and the chosen operating modes are visible and can be edited.

Above this level there is another level which is called "Service". At the service level, there is no dynamic hiding or showing as with the "User" level and the service staff can view all values even those which are not directly needed in the current operating mode.

The topmost level is the "Developer" user profile. In this mode, additional auxiliary quantities and intermediate values are shown which may be useful for diagnostic purposes if a fault occurs.

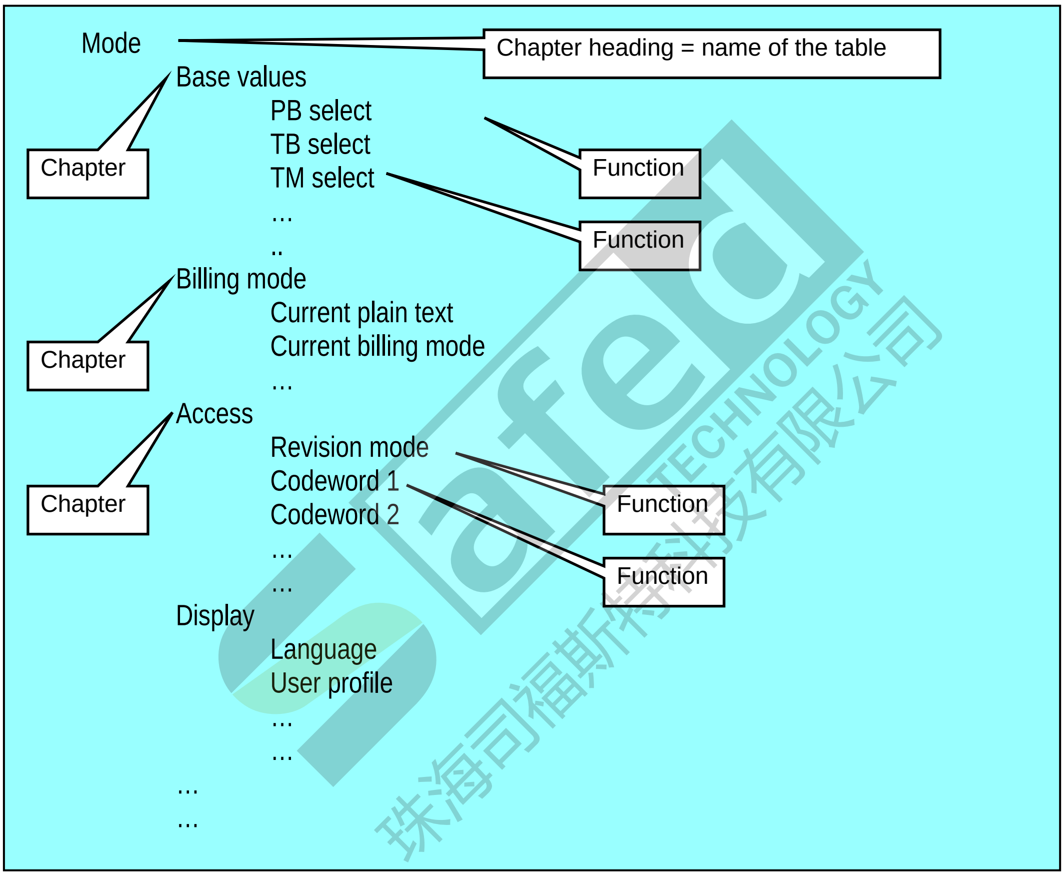
You can select the visibility level with the <0> ***Mode*** key in the **Display** chapter.

We would recommend setting the visibility level at "Service" before you start to parameterize the device.

2.2 Fundamentals for accessing data

All variables and measured and calculated values are grouped into several tables in order to show associated functions. Each table represents a matrix with fields from AA 01 to AZ 99, or BA 01 to BZ 99, or CA 01 to CZ 99, etc. All tables together form the coordinate system.

Tabular structure:
Each table has a name which appears as chapter heading.
Each column has a chapter name, while the fields (coordinates) are the functions.
Example:



The <0> ***Mode*** key shown in the example above enables central access to the chapter headings. When you press the <0> key, the ERZ 2000 will jump to table E and display the first chapter **Base values** and the following chapters which can be browsed through using the ***Cursor Up*** or ***Down*** key. When you browse through the chapters, an arrow → appearing in front of the chapter selected is used for orientation. Press ***Enter*** to access the functions of the chapter to which the arrow points.

Starting from the central point (table E) which you access by pressing the ***Mode*** key, you can easily browse through all tables from the beginning (A) to the end (P) using the ***Cursor Right*** or ***Left*** key.

The <*> ***Select*** key fulfils an important function as it helps you orient yourself in the coordinate system and select the desired chapter. Using this key, you can switch back from any location in the coordinate system to the current chapter with heading etc. If you press the <*> key once again, you are referred back to the function (coordinate) where you came from.

Whenever the device shows a view with a chapter heading, you can access all chapters of the entire system by pressing the ***Cursor Right*** or ***Left*** key. When you have reached the desired chapter heading, press the ***Cursor Up*** or ***Down*** key to access the chapter or press ***Enter*** to activate the function.

If you are inside a chapter (i.e. in a column of the table with the functions), you can also browse through all chapters of the complete coordinate system by pressing the ***Cursor Right*** or ***Left*** key. During the time you are browsing, the current coordinate is displayed for approx. 2 seconds in the fourth line.

Further guidance is provided by the option of permanently showing the coordinate of the current field together with each value displayed. To do this, press <0> ***Mode*** and browse downwards to **Display**. Then press ***Enter*** and the ***Cursor Up*** or ***Down*** key to access the **Coordinates** function and set the parameter to **"Yes"**. Now all fields will be displayed together with their coordinates. Since the 4-character coordinates will then appear, long texts exceeding 20 characters per line will be truncated on the display.

The function keys 1, 2, 7 and 8 represent a special case. When you press one of these keys, you make a first preselection which will result in an overview of measured values and results. Then use the ***Cursor Up*** or ***Down*** key to select the desired chapter and press ***Enter***.

Example:
If you press <2> ***Analysis***, the following overview will be displayed:

→AGA 8 92DC	
Z	**12.845**
K	**0.97211**
Zm	**0.969556**

The arrow is located on the first line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **AGA 8 92DC** chapter. A new window will open with the **Compressibility** heading. The contents of this chapter can be browsed using the cursor keys.

2.3 Entering the user code

The lowest access level is protected by the user code. The code is divided into two 4-character parts and has to be entered in two subsequent coordinates. In the operating instructions, the relevant data are marked B (for user lock). A special case is the marking C for the user code itself.
To enter the user code, press <0> ***Mode*** and enter the code in the **Access** chapter under the **Codeword 1** and **Codeword 2** functions.

Mode
Base values
Billing mode
→Access

The arrow is already located on the third line on Access. In this example, pressing ***Enter*** will select the correct chapter. A new window will open with the **Access** heading. Use the ***Cursor Down*** key to select the first codeword.

Then the following display appears:

Access
♦Codeword 1
****

The rhombus indicates that code entry has been enabled. The four asterisks stand for the first part of the 8-character code. After you have pressed ***Enter***, the display will turn a bit darker and the four asterisks will disappear. Now you have to enter the first four characters of the code correctly in the third line. Press ***Enter*** to terminate your inputs and use the ***Cursor Down*** key to browse to codeword 2. Now press ***Enter*** again to switch over the display to input mode (darker) and enter the second part of the codeword.

If the code has been entered correctly, the Power LED at the top left of the front panel will start to flash.

2.4 Setting the device type

If the device is not used for custody transfer applications, the ERZ 2000 which exists in the following variants

- gas volume corrector (ERZ 2004),
- superior calorific value corrector (ERZ 2104),
- density corrector (ERZ 2002) or
- density corrector with energy (ERZ 2102)

can be switched over from one version to another after the calibration lock has been opened.

To do this, you have to be on the topmost access level (superuser). Press <0> ***Mode***, select the **Identification** chapter and then the **Device type** function to browse the variants. Press ***Enter*** to confirm your selection or change over to another variant.

If the device is used for custody transfer applications, this changeover option is disabled and you can only operate the version which has been set in the factory and corresponds to the type plate fixed to the front panel.
The device can only be changed over from a gas volume corrector to a superior calorific value corrector if you change the software.
Use the front interface to load the software of the other device type into the device.

2.4.1 Description of the update procedure

- Connect the front interface of the ERZ 2000 to your PC's serial interface using a null modem cable.
- Start a terminal emulation program, e.g. under Windows Start / All Programs / Accessories / Communications / Hyperterminal. At the first start, establish a new connection with 115200, 8, no parity, 1, no handshake and save this setting.
- Set the ERZ 2000 to superuser mode.
  Enter codeword 1.
  Enter codeword 2.
  Open the calibration lock.
  Follow the above sequence of operations.
- Now prepare the ERZ 2000 for the update. Press <0> ***Mode*** and in the **Access** chapter set the **Software update** function to **ON**. The ERZ 2000 terminates the correction process and from now on it is only waiting for the software update to start. Observe the outputs on the ERZ display. You can still cancel the process initiated by pressing the <0> key of the ERZ. Watch the display output of the hyperterminal program. The character C should appear at one-second intervals.
- Now transfer the new application into the ERZ 2000. The program consists of a set of files which were packed in a ZIP archive. Select the ZIP archive under "Transfer/Send File" in Hyperterminal and send it using the "Ymodem" transfer protocol. Watch the progress bar in Hyperterminal and the associated display on the ERZ.
- After the transfer is complete, the ERZ 2000 checks the ZIP file for validity and consistency and reports the result on the Hyperterminal display. If the result is negative, the ZIP file will be destroyed in the ERZ so that the previous application is preserved. If the result is positive, the unpacking process will be integrated into the booting-up procedure of the ERZ 2000. So the new application will be automatically unpacked and activated with the next restart of the ERZ 2000.
- The ERZ 2000 will perform this restart automatically.

2.5 How to activate the device again following a software update?

Every software package contains an activation key which has to be communicated to the ERZ 2000 after a software update. The device verifies the key together with the new check number of the software and the ERZ 2000 will not be ready for normal operation until it has yielded a positive result. If the activation key is missing or is incorrect, the ERZ 2000 switches to permanent operation under fault conditions and thus signals that there is no activation. Corrector functions are performed normally, but only the disturbance totalizers are running.

Example:
Together with the new software, you also receive the new activation key which has to be entered as follows:

- Press <0> to select ***Mode*** and then press the ***Cursor Down*** key to browse to the **Software ID** chapter.
- Select the chapter with the ***Enter*** key and press the ***Cursor Down*** key until you reach the **Activation** function. Here you can find the old activation key which is no longer valid for the new software.
- After you have opened the calibration lock, press ***Enter*** again (the display will turn darker and indicate input mode). The old activation key will disappear and the ERZ 2000 will be waiting for the new key to be entered.
- Enter the new activation key and terminate your inputs with the ***Enter*** key.
- Now the device should no longer be under fault conditions but operate without any trouble.

An important function of the activation key is the verification of the program code which represents the official functions for custody transfer metering. The activation key is used for verifying the check number cyclically. The program can immediately detect a change in the official kernel whether it is caused by an unacceptable program version or a defect of the program memory which results in a modified check number. This function is important in order to separate the program into an official part for custody transfer metering and into an application part.

2.6 Entering texts

The keyboard layout allows texts to be entered in the same way as with mobile phones. To enter digits or capital or lowercase letters or switch over to the next position, single or double inverted commas are used.

1st example – Superior calorific value Hs:
You want to enter the company name RMG for the ID display of the PGC.

P	**13.068**	**bar**
T	**8.55**	**°C**
→Hs	**11.972**	**kWh/m3**
Rhon	**0.9695**	**kg/m3**

Use the ***Cursor Down*** key to locate the arrow on the third line. In this example, pressing ***Enter*** will select the **Superior calorific value** chapter. A new window will open with the **Superior calorific value** heading. The contents of this chapter can be browsed using the cursor keys.

In the **Superior calorific value** chapter browse until you reach the function (coordinate) with the text "Manufacturer".

- Open the calibration lock.
- Press ***Enter*** and the display will turn a bit darker.
- Two double inverted commas will appear side by side (" ").
- When you press the next key, the two inverted commas will be shifted apart and the value of the key pressed will appear in the middle of the inverted commas. At the same time, the double inverted commas will change into single inverted commas (' ').
- On key 7, there are also the letters p, q, r and s. Thus, the digit '7' will appear first.
- If you continue to press key 7 quickly, the letters p, q, r, s and then P, Q, R and S will appear consecutively.
- If you pause for approx. 1 second between pressing the keys, the two double inverted commas will appear again to indicate that the letter has now been accepted.
- With the next position, proceed in the same way until the whole text is complete.
- Errors which have occurred due to misentries or excessively long breaks during typing can be cleared using the ***Cursor Left*** key of the orange cursor block.
- As soon as the text is complete, accept it by pressing ***Enter***.

2nd example – Superior calorific value Hs:
You want to enter the serial number 12345 for the PGC's ID display.

- Open the calibration lock.
- Press ***Enter*** and the display will turn a bit darker.
- Two double inverted commas will appear side by side (" ").
- When you press the next key, the two inverted commas will be shifted apart and the value of the key pressed will appear in the middle of the inverted commas. At the same time, the double inverted commas will change into single inverted commas (' ').
- The letters which are also printed on the keys are of no importance here, since a number is to be entered. In this example, the first digit is '1'.
- After you have pressed 1, wait until the two double inverted commas appear, then enter the next digit (2) and proceed in this way until the whole number is complete.
- Errors which have occurred due to misentries or excessively long breaks during typing can be cleared using the ***Cursor Left*** key of the orange cursor block.
- As soon as the number is complete, accept it by pressing ***Enter***.

2.7 How to parameterize the pressure sensor?

The data of the pressure sensor used have to be communicated to the corrector as transmitter data. Apart from the parameters for measurement, the type, manufacturer, serial number, etc., have to be entered in the **Absolute pressure** chapter as well. Then these data will appear automatically in the ID display.
Example for data entry:
Press <1> ***Meas. P,T..***. The arrow (→) is already located on P. Press ***Enter*** and then the ***Cursor Down*** key to access the relevant values and enter the data.

→P	**13.068**	**bar**
T	**8.55**	**°C**
Hs	**11.972**	**kWh/m3**
Rhon	**0.9695**	**kg/m3**

The arrow is located on the first line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **Absolute pressure** chapter. A new window will open with the **Absolute pressure** heading. The contents of this chapter can be browsed using the cursor keys.

There are the following operating modes for transmitting measured values:

OFF	No measurement, input is switched off.
0-20mA limit	The min. and max. limits define the assignment of mA to pressure.
4-20mA limit	The min. and max. limits define the assignment of mA to pressure.
0-20mA coefficient	Coefficient 0 defines the min. range, coefficient 1 defines the max. range.
4-20mA coefficient	Coefficient 0 defines the min. range, coefficient 1 defines the max. range.
Polynomial 3rd order	Coefficients 0, 1 and 2 define the polynomial.
Polynomial 2nd order	Coefficients 0, 1 and 2 define the polynomial.
Polynomial 1st order	Coefficients 0, 1 and 2 define the polynomial.
Measured value = source value	HART on 4-20 mA loop in combination with a current input
from gauge pressure	The value is derived from the connected gauge pressure sensor.
Default	No measurement, fixed value.

Use the cursor key to browse to the **Operating mode** function. Set the desired operating mode there after having opened the calibration lock.

2.8 How to parameterize the temperature sensor?

The data of the temperature sensor used have to be communicated to the corrector as transmitter data. Apart from the parameters for measurement, the type, manufacturer, serial number, etc., have to be entered in the **Gas temperature** chapter as well. Then these data will appear automatically in the ID display.
Example for data entry:
Press <1> ***Meas. P,T..*** and set the arrow (→) to T. Press ***Enter*** and then the ***Cursor Down*** key to access the relevant values and enter the data.

P	**13.068**	**bar**
→T	**8.55**	**°C**
Hs	**11.972**	**kWh/m3**
Rhon	**0.9695**	**kg/m3**

The arrow is located on the first line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **Temperature** chapter. A new window will open with the **Gas temperature** heading. The contents of this chapter can be browsed using the cursor keys.

Transmitting measured values
There are the following operating modes:

OFF	No measurement, input is switched off.
0-20mA limit	The min. and max. limits define the assignment of mA to temperature.
4-20mA limit	The min. and max. limits define the assignment of mA to temperature.
0-20mA coefficient	Coefficient 0 defines the min. range, coefficient 1 defines the max. range.
4-20mA coefficient	Coefficient 0 defines the min. range, coefficient 1 defines the max. range.
PT100, 500, 1000	Polynomial according to Callendar van Dusen
Polynomial 3rd order	Coefficients 0, 1 and 2 define the polynomial.
Polynomial 2nd order	Coefficients 0, 1 and 2 define the polynomial.
Polynomial 1st order	Coefficients 0, 1 and 2 define the polynomial.
Measured value = source value	HART on 4-20 mA loop in combination with a current input
From RHMtemp.	Calculated from the density transducer temperature.
From VOStemp.	Calculated from the velocity of sound transducer temperature.
PT100 RMG	Calculation according to RMG polynomial.
Default	Fixed value, no measurement.

Use the cursor key to browse to the **Operating mode** function. Set the desired operating mode there after having opened the calibration lock.

2.9 Where are the gas meter parameters to be found?

The data of the gas meter used have to be communicated to the corrector as transmitter data. Apart from the parameters for measurement, the type, manufacturer, serial number, etc., have to be entered in the **Meter** chapter as well. Then these data will appear automatically in the ID display.
Example for data entry:
Press <9> ***Meter*** and set the arrow (→) to ***Flow rate parameters***. Press ***Enter*** and then the ***Cursor Down*** key to access the relevant values and enter the data.

Meter
→Flow rate parameters
kv factor
Characteristic

The arrow is located on the second line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **Flow rate parameters** chapter. A new window will open with the **Flow rate parameters** heading. The contents of this chapter can be browsed using the cursor keys.

2.10 Which operating modes of the gas meter are available?

The **Volume transmitter mode** function in the **Flow rate parameters** chapter defines the operating mode for calculating the volume at measurement conditions.
The following operating modes are available:

1.	Vo	Vm is calculated from Vo, ENCO[1] totalizer provides data via protocol.
2.	Vo, LF1-chan.	Vm is calculated from Vo, LF input is used for comparison.
3.	Vo, HF1-chan.	Vm is calculated from Vo, HF input is used for comparison.
4.	Vo, HF2-chan. 1/1	Vm is calculated from Vo, HF inputs are used for comparison.
5.	Vo, HF2-chan. X/Y	Vm is calculated from Vo, HF inputs are used for comparison.
6.	LF1-chan., Vo	Vm is calculated from the input signal, Vo is only used for comparison.
7.	HF1-chan., Vo	Vm is calculated from the input signal, Vo is only used for comparison.
8.	HF2-chan. 1/1, Vo	Vm is calculated from the input signal, Vo is only used for comparison.
9.	HF2-chan. X/Y, Vo	Vm is calculated from the input signal, Vo is only used for comparison.
10.	LF1-chan.	1-channel operation with LF input (only metering, no flow rate)
11.	HF1-chan.	1-channel operation with HF input
12.	HF2-chan. 1/1	2-channel operation with HF inputs of the same value
13.	HF2-chan. X/Y	2-channel operation with HF inputs of different value
14.	HF LF	2-channel operation with HF input (meas.) and LF input (comp.)
15.	DMT	Vm is supplied via DMT protocol.
16.	IGM	Activates the integrated ultrasonic controller (sensor data are supplied by the ultrasonic measuring head).

[1] ENCO = ENCODER / Electronic totalizer with digital interface

Operating mode:

As to the modes 1 to 9, the notation means: The first parameter applies to billing and the second parameter to comparison. If Vo stands at the beginning, for example, Vm increments are calculated from the telegram contents of the digital totalizer, i.e. the Vm totalizer is calculated from Vo information. However, if Vo stands at the end, Vm is calculated normally from HF or LF signals and Vo is displayed and archived only additionally. Note also the following with regard to signalling alarms or warnings: If Vo stands at the beginning of a 2-channel operating mode (operating mode 4 or 5), then as far as the HF measuring inputs stand at the end and if there is a missing pulse or a pulse comparison fault, no alarm will be outputted but a warning with a separate message number.

The Vo totalizers will become visible as soon as Vo is activated in one of the operating modes (1 to 9).

2.11 Special information about parameters for volume at measurement conditions

Some of the following functional descriptions are only visible if the service or developer access level has been activated. In order to provide a complete overview, they are listed here as well.

Missing pulses, reference pulses:
A differential connection alternately compares the counted pulses of the measuring and reference channels. Every deviation is accumulated by the internal missing pulse counter. An alarm is generated if the set limit (contents: *missing pulses*) is exceeded. If the limit is not exceeded within a settable period (contents: *reference pulses*), the missing pulse counter is set to zero.

Start-up pulses:
The start-up pulses parameter combines two functions:

- Suppression of fault messages of the volume input which can occur in the case of 2-channel volume measurement (1:1) when the gas meter is started up from standstill with signals which are **not** mechanically coupled with each other (e.g. vortex meter). Monitoring will not be activated until the *start-up pulses* have run out.
- Resetting fault messages of the volume input when the device has returned to untroubled operation after the *start-up pulses* have run out.

Starting up and shutting down a plant:
Start-up is troublefree if qm passes the range from the *creeping quantity limit* to the *lower alarm limit* during start-up and slow-down. An alarm is generated if qm is still below the *alarm limit* and above the *creeping quantity limit* after the start-up or slow-down time has been exceeded. The alarm is defined as going when the *lower alarm limit* is passed (when the plant is started up) or when the *creeping quantity limit* is passed (when the plant is shut down).

Start-up/slow-down time:
There is a separate **Start-up/Slow-down** chapter to be found under the <9> ***Meter*** key. Here you can see the momentary state, the current start-up and slow-down times and the parameters for the start-up and slow-down times.
Start-up and slow-down times are parameters for the time monitoring of the lower flow rate limit qm_{min}. The qm_{min} alarm is not triggered until one of these times has elapsed. These parameters are important for the start-up and slow-down phases. See also **Starting up and shutting down a plant**.

Creeping quantity limit:
The Vm and Vb totalizer readings are not increased as long as the flow rate at measurement conditions is below the *creeping quantity limit*.
The creeping quantity cut-off function prevents uncontrolled counting of pulses e.g. in the case of swinging movements when a turbine meter is at standstill or of pulses at zero drift in the case of other gas meters.

Creeping quantity mode:
There are the two following options:
Do not use the creeping quantities occurred ("discard").
Use the creeping quantities occurred and add them to normal quantities ("accumulate").

Some functions and parameters described here are visible only at the "Service" or "Developer" level.

Volume frequency source:
Display of the connected or active input.

Channel Qm determination:
It is shown whether Qm (flow rate) is formed from the measuring channel or the reference channel.

Channel Vm determination
It is shown from which channel Vm is calculated (measuring channel, reference channel, Vo).

Hardware pulse comparison:
It is shown whether the hardware comparison is active.

Vo effect of fault:
It is shown whether Vo protocol errors are signalled as alarm or warning or whether they are not signalled. This depends on the selected operating mode.

Reference quality:
It is shown how the corrector calculated the quality of the reference channel during software comparison. The result is calculated from the permanent monitoring of measuring and reference channels.

Main blades (X):
Display = integer ratio of Kv measuring channel to Kv reference channel, projected to approx. 200 pulses. The calculated values are automatically transferred to the hardware pulse comparison logic.

Reference blades (Y):
Display = integer ratio of Kv reference channel to Kv measuring channel, projected to approx. 200 pulses. The calculated values are automatically transferred to the hardware pulse comparison logic.

Better HF channel:
Display = comparison of the frequencies of the measuring and reference channels for the higher value.

Predictive reliability:
This parameter indicates how often the comparison from the *Better HF channel* function must provide the better value until a changeover is made.

Decision change:
It is shown how often the device has made a decision in favour of the other channel.

USZ effect of fault:
It is shown whether USZ protocol errors (DMT protocol) are signalled as alarm or warning or whether they are not signalled. This depends on the selected operating mode.

Monitoring of synchronous run (coordinates JK...)
There is a chapter **Synchronous run monitoring** to be found under the <0> ***Mode*** key. Here you can find the parameters for monitoring synchronous run, such as the *maximum deviation, termination short* and *termination quantity* and information displayed about the current state of the ongoing comparison.
Monitoring of synchronous run deals with the software comparison between the possible inputs for volume formation. Comparisons are always possible if 2 or 3 inputs are used.

Maximum deviation:
The permissible deviation in percent between the two comparative values is to be entered here. The *termination quantity* parameter defines the query limit.

Termination quantity:
Here a relative quantity is parameterized (in m³) for the comparison to which a totalizer deviation between the two channels to be compared is related. After this quantity has been reached, the verification is performed and then the volume meter is reset and a new comparative cycle started.

Termination short:
If the last comparison has resulted in an alarm, synchronous run can be tested with shorter cycles to observe the fault situation. This enables the alarm to be cleared more quickly. Note: Do not select too small a value, otherwise the quantity is too small to detect troublefree operation with the tolerance set (maximum deviation).

2.12 Logic of synchronous run

Monitoring of synchronous run is not only restricted to the comparison between Vo and HF input, but verifies all combinations with more than one input signal. The following table provides an overview of the functions in troublefree operation. In the case of a fault, the corrector uses the undisturbed signal or, if there are three input signals, it switches over to the relevant signal.

Operating mode	**Fault Vo**	**Fault DMT**	**HW comp.**	**SW comp.**	**Qm calculation**	**Vm calculation**	**kv use**
Vo	Alarm	OFF	OFF	OFF	Metering	Vo	Vo
Vo, LF1-chan.	Alarm	OFF	OFF	Vo -- LF1-chan.	Metering	Vo	Vo
LF1-chan., Vo	Warning	OFF	OFF	LF1-chan. -- Vo	Metering	LF	Meas. channel
Vo, HF-1chan.	Alarm	OFF	OFF	Vo -- HF-1chan.	HF signal	Vo	Vo
HF1-chan., Vo	Warning	OFF	OFF	HF1-chan. -- Vo	HF signal	HF signal	Meas. channel
Vo, HF2-chan. 1/1	Alarm	OFF	1:1	Vo – HF meas.	HF meas. signal	Vo	Vo
HF2-chan. 1/1, Vo	Warning	OFF	1:1	HF meas. -- Vo	HF meas. signal	HF meas. signal	Meas. channel
Vo, HF2-chan. X/Y	Alarm	OFF	X :Y	Vo – HF meas.	HF meas. signal	Vo	Vo
HF2-chan. X/Y, Vo	Warning	OFF	X :Y	HF meas. -- Vo	HF meas. signal	HF meas. signal	Meas. channel
HF2-chan. 1/1	OFF	OFF	1 :1	Meas. --- Comp.	HF meas. signal	HF meas. signal	Meas. channel
HF2-chan. X/Y	OFF	OFF	X:Y	Meas. --- Comp.	HF meas. signal	HF meas. signal	Meas. channel
HF LF	OFF	OFF	OFF	HF -- LF	HF signal	HF meas. signal	Meas. channel
HF1-chan.	OFF	OFF	OFF	OFF	HF signal	HF signal	Meas. channel
LF1-chan.	OFF	OFF	OFF	OFF	Metering	LF signal	Meas. channel
USZ	OFF	Alarm	OFF	OFF	DMT	DMT	DMT

2.13 How to activate error curve linearization?

Press <9> ***Meter***. The arrow (→) is located on "kv factor". Use the ***Cursor Down*** key until the arrow is located on the **Characteristic** chapter. Press ***Enter*** and use the ***Cursor Down*** key to access the relevant values and enter the data.

Meter **→Flow rate parameters** **kv factor** **Characteristic**

The arrow is located on the second line and can be moved upwards or downwards using the cursor keys. In this example, use the ***Cursor Down*** key to select the **Characteristic** chapter and press ***Enter***. A new window will open with the **Characteristic** heading. The contents of this chapter can be browsed using the cursor keys, in this case up to the **kv mode** function.

Characteristic **• kv mode** **Polynomial Q RMG**

The current kv mode is shown. In this example, a polynomial defined by RMG is calculated via the flow rate. The point before the kv mode indicates that the value can be edited (note the access level). If the calibration lock is opened, the point will turn into a rhombus ♦ and the value will be enabled.

There are the following options:

Kv=constant	No error curve linearization
Polynomial Q RMG	Correction with polynomial applied over the flow rate
Polynomial Re RMG	Correction with polynomial applied over the Reynolds number
Interpolation point RMG	Interpolation points as value pairs flow rate / deviation (max. 16)

2.14 How does error curve linearization function for volume measurement?

Error curve linearization:
The error curve linearization of the gas meter can optionally be performed using two different methods.

a) Error curve linearization with polynomial related to the flow rate
Correction is made using a quartic polynomial which reproduces the error curve of the gas meter as a function of the flow rate.

Error equation: $F = A_{-2}*Q_{Vm}^{-2}+A_{-1}*Q_{Vm}^{-1}+A_0+A_1*Q_{Vm}+A^2*Q_{Vm}^2$

F	= Deviation of the error curve [%]
Q_{Vm}	= Volumetric flow rate at measurement conditions [m3/h]
A_n	= Constants
K_V	= Constant meter factor

The polynomial coefficients A_n (n = -2 to n = 2) are calculated from the measured value pairs error Fi and flow rate Q_{vmi} . Instead of the constant meter factor K_V , the corrected meter factor K_{Vc} is used for further calculation or correction.

$$K_{Vc} = K_V * (1 + \frac{F}{100})$$

The polynomial coefficients A_n are supplied by the manufacturer of the turbine gas meter.

b) Error curve linearization with polynomial related to the Reynolds number
Correction is made using a quartic polynomial which reproduces the error curve of the gas meter as a function of the Reynolds number.

Error equation: $F_{Re} = A_{-2}*Re^{-2}+A_{-1}*Re^{-1}+A_0+A_1*Re+A^2*Re^2$
Reynolds number equation: $Re = 0.353677 * (Q_m / DN) * (\rho/\eta)$
where $\rho = \rho_b * ((P * Tb)/(Pb * T)) * (1/K)$

F_{Re}	= Deviation of the error curve [%]
Re	= Reynolds number
A_n	= Constants
K_V	= Constant meter factor

The polynomial coefficients A_n (n = -2 to n = 2) are calculated from the measured value pairs error Fi and flow rate Re_i . Instead of the constant meter factor K_V , the corrected meter factor K_{Vc} is used for further calculation or correction.
Further entries are: $\eta = V * 10^{-6}$ m²/s (V = constant, for natural gas V = 12)

$$K_{Vc} = K_V * (1 + \frac{F}{100})$$

The polynomial coefficients A_n are supplied by the manufacturer of the turbine gas meter.

c) Error curve linearization using the interpolation point method

This method uses 16 parameterizable interpolation points. The selected loads are to be entered on the X-axis (flow rate). For each interpolation point, the deviation from the zero line is to be entered. A linear interpolation is to be made between the individual points.

Instead of the constant meter factor K_V , the corrected meter factor K_{Vc} is used for further calculation or correction.

$$K_{Vc} = K_V * (1 + \frac{F}{100})$$

The interpolation points (load points) and the deviation from the zero line are to be taken from the error curve of the turbine gas meter.

Thus, the corrected volumetric flow rate at measurement conditions is calculated using the following formula:

$$Q_{Vmc} = \frac{f_v}{K_{Vc}} * 3600$$

Q_{Vmc} = Corrected volumetric flow rate at measurement conditions [m3/h]
K_{Vc} = Corrected meter factor of the gas meter [P/m3]
f_v = Frequency of the volume transducer of the gas meter [Hz]
K_V = Uncorrected meter factor of the gas meter [P/m3]

Entries can be made in any order since the volume corrector sorts them automatically.

2.15 How to activate direction switching?

Direction switching is integrated into the billing mode. As to the standard setting, billing mode 1 corresponds to direction 1, billing mode 2 to direction 2, etc. There are a total of four billing modes which can be controlled either via input contacts or limiting values.
When input contacts are used, there are the following options:

- 1 contact for 2 billing modes (2 directions are switched)
- 2 contacts for 2 billing modes (2 directions are switched)
- 2 contacts for 4 billing modes (4 directions are switched)
- 4 contacts for 4 billing modes (4 directions are switched)

  The contact inputs are defined with the **Source BM contact** function.

Further assignment options:

1. Measured value switches 2 billing modes
2. Measured value switches 3 billing modes
3. Measured value switches 4 billing modes

   The measured value is defined with the **Assignment** function, whereas the switching thresholds are defined in the subsequent functions (coordinates).

- Vo direction information switches 2 billing modes
- USZ direction information switches 2 billing modes

- Permanent assignment to billing mode 1
- Permanent assignment to billing mode 2
- Permanent assignment to billing mode 3
- Permanent assignment to billing mode 4

2.16 How to select a method for calculating the K coefficient?

Press <2> ***Analysis***. The arrow (→) is already located on ***AGA 8 92DC***, for example. Press ***Enter*** and use the ***Cursor Down*** key to access the relevant values and enter the data.

→AGA 8 92DC	
Z	**12.845**
K	**0.97211**
Zm	**0.969556**

> The arrow is located on the first line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **AGA 8 92DC** chapter. A new window will open with the **K coefficient** heading. The contents of this chapter can be browsed with the cursor keys.

The first item which appears in the **K coefficient** chapter is the **Billing mode** function with AGA 8 92DC being displayed. After you have opened the calibration lock, you can make your selections in input mode using the cursor keys:
K = constant / GERG 88S / AGA NX 19 L / AGA NX 19 H / AGA 8 (1985) / AGA 8 92 DC / Beattie&Bridgeman / Van der Waals / Ideal gas.
You **<u>cannot</u>** change over from one equation to another, since the device always calculates all equations one after the other. If you define an operating mode, you select only a calculation method. This method is used for correction and is displayed immediately when you press the relevant key. You can view the results of the other calculation methods by using the ***Cursor Left*** and ***Right*** keys.

2.17 How does the device process gas quality data?

The data of the measuring device used (e.g. gas chromatograph) have to be communicated to the corrector as transmitter data. Apart from the parameters for measurement, the type, manufacturer, serial number, etc., have also to be entered in the relevant function of the chapter concerned, e.g. **Superior calorific value**. Then these data appear automatically in the ID display. This also applies to the other chapters such as **Standard density** and **CO2**, where the ID data have to be entered repeatedly. In the case of AGA 8 92 DC, this applies to all components as well.
Example for data entry:
Press <1> ***Meas. P,T..*** and locate the arrow (→) on Hs. Press ***Enter*** and then the ***Cursor Down*** key to access the functions (coordinates) with the text fields and enter the relevant data.

P	**13.068**	**bar**
T	**8.55**	**°C**
→Hs	**11.972**	**kWh/m3**
Rhon	**0.9695**	**kg/m3**

The arrow is located on the first line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **Superior calorific value** chapter. A new window will open with the **Superior calorific value** heading. The contents of this chapter can be browsed using the cursor keys.

Transmitting measured values
There are different ways of measuring and transmitting the gas quality data (superior calorific value and standard density) and the individual components. In Germany, the standard is transmission via the DSfG interface.
There are the following operating modes for the superior calorific value, for example: / OFF / Default / DSfG / Linear frequency response / Polynomial 1st order / Polynomial 2nd order / Polynomial 3rd order / 0-20mA limit / 4-20 mA limit / 0-20mA coefficient / 4-20 mA coefficient / Table value / ISO 6976
Use the cursor key to browse to the **Operating mode** function where you can set the desired operating mode after having opened the calibration lock.
Depending on the input quantities, there may be further operating modes, e.g. for standard density: / From relative density / Single frequency input / RMG standard density transmitter, etc.

2.18 Changing units

2.18.1 How to change over totalizers to another unit?

Press <7> ***Totalizer*** to access the overview. The standard setting of Vm and Vb totalizers is m^3 with nine characters being displayed without a fraction. To select the unit, there are texts and conversion functions available for each totalizer.

Note! As soon as the new unit is set, the totalizer increments are calculated with the new unit and added to the previous totalizer reading (thus, mixed values are formed).

In addition, it is also possible to shift the decimal separator and select "Totalizer reading" mode * 10 (100, 1000) m^3.
For example, you want to select a new representation mode or unit for the Vb totalizer.
Press <7> ***Totalizer*** and use the <*> ***Select*** key to switch to the chapter which is currently selected. In this case, the **Totalizers** chapter will be displayed as current chapter. Now use the ***Cursor Down*** key to browse to the **Cycle quantities** chapter and press ***Enter***. Browse until you reach the **Vol. base unit** function and set the desired representation mode or unit there.
Note! To make this setting, the topmost access level (superuser) has to be enabled, i.e. the user code has to be entered and the calibration lock has to be open.

2.18.2 How to change over measured values to another unit?

Measured values, such as pressure, temperature, superior calorific value, etc., can be changed over to another unit without an automatic conversion being performed. In contrast to totalizers, the assignment of the minimum and maximum values determines the calculation of the physical quantity from the input value. Thus, changing the unit means merely changing the text.
For example, you want to change the pressure at measurement conditions displayed from bar to psi (activate the superuser access level, i.e. input the user code and open the calibration lock).
After you have pressed <1> ***Meas. P,T..,*** the following display appears:

→P	**13.068**	**bar**
T	**8.55**	**°C**
Hs	**11.972**	**kWh/m3**
Rhon	**0.9695**	**kg/m3**

The arrow is located on the first line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **Pressure** chapter. A new window will open with the **Absolute Pressure** heading. The contents of this chapter can be browsed using the cursor keys.

Use the ***Cursor Down*** key to browse to the **Unit** function. Then press ***Enter*** to change over to input mode and select the desired unit using the cursor keys. Press ***Enter*** to terminate your entries and close the calibration lock again. All the other functions and displays related to the Pressure value will have been changed over to the new unit automatically.

2.19 Where to set the DSfG parameters?

If the ERZ 2000 is to be operated as a user of a DSfG bus, you have to enter the relevant parameters. Press ***Mode*** and then four times the ***Cursor Right*** key below the **Communications** heading to reach the chapter relating to the DSfG issue. There are the **DSfG corrector, DSfG recording, DSfG RDT** and **DSfG master** chapters. Here you can find the settings for the bus access and the entities.

After you have pressed <0> ***Mode*** and four times the ***Cursor Right*** key, the following display appears:

Communications
→TCP/IP network
Serial COMs
DSfG corrector

The arrow is located on the second line and can be moved upwards or downwards using the cursor keys. In this example, you have to use the ***Cursor Down*** key until DSfG corrector appears. Then press ***Enter*** to select the **DSfG corrector** chapter. A new window will open with the **DSfG corrector** heading. The contents of this chapter can be browsed using the cursor keys.

Communications
DSfG corrector
DSfG recording
→DSfG RDT

In the **DSfG corrector** chapter, you can make your settings for the corrector entity.
In the **DSfG recording** chapter, you can make your settings for the recording entity.
In the **DSfG RDT** chapter, you can find all parameters for integrated DSfG remote data transmission (RDT), such as the RDT entity, RDT address, display of the modem state, bus identification, RDT ID, PTB time service, etc.
In the **DSfG master** chapter, you can find all parameters for the master functions.

2.20 Time system

The time system consists of a battery-backed quartz-controlled real time clock (RTC) module which provides the time basis for the ERZ 2000.

The clock module can be synchronized by a higher-level timing element (external synchronization input). The internal time basis can be changed via the keyboard or the DSfG interface but only within the scope of the relevant access rights. If there is a telephone connection via MODEM available, the ERZ 2000 can use PTB's time service and synchronize its clock (and that of all users of the bus) with its integrated remote data transmission feature.

In the operating mode conforming to PTB, the clock can be synchronized only once a day if the calibration lock is closed. The synchronization window is +/-20 seconds. If there are greater deviations, the clock will no longer be put back or forward! This applies to synchronization via the synchronization input, the synchronization telegrams (DSfG bus). If the clock is changed manually, it is necessary in each case to open the user lock. Other operating modes are possible. See the relevant function, press <0> ***Mode*** and then six times the ***Cursor Right*** key to browse to the **Times** chapter.

The clock operates on the UTC (coordinated universal time) basis and the volume corrector converts the time into local time. For this reason, the correct time zone has to be set on the device. The selection menu comprises all time zones of the world. The time is changed automatically from normal time to daylight saving time and vice versa in accordance with the currently applicable official rules of the time zone set. If "Europe / Berlin" has been set for Germany, time is changed from CET to CEST on the last Sunday of March at 2 o'clock and thus the clock is put forward one hour. The time is changed from CEST to CET on the last Sunday of October at 3 o'clock and thus the clock is put back one hour.

2.21 Where to set base values for pressure and temperature?

If the K coefficient is calculated in accordance with GERG 88S or AGA NX 19 with H group gas, the *temperature at base conditions* can only be changed step by step according to the ISO table of countries (0, 15, 20, 25 degrees C).

From: ISO/DIS 12213-3, page 32

Reference pressure = 101.325 kPa = 1.01325 bar_{abs}

Country	Hs reference temperature °C combustion TC	Temperature at base conditions °C gas measurement Tb
User-specific setting	0, 15, 20, 25	0, 15, 20, 25

In the same way, the *Hs reference temperature* can be changed only step by step in accordance with the ISO table of countries. (0, 15, 20, 25 degrees C)

Example: ISO/DIS 12213-3, page 32

Reference pressure = 101.325 kPa = 1.01325 bar_{abs}

Country	Hs reference temperature °C combustion TC	Temperature at base conditions °C gas measurement Tb
User-specific setting	0, 15, 20, 25	0, 15, 20, 25

2.22 Special information about test functions

Under the < 6> ***Test*** key, all chapters and functions for checking the device are combined. There are the following functions:
On-the-fly calibration, Freeze, Computing cycle, Calibration Rhon/Hs, Functional test, Hardware test, Ultrasonic diagnosis, and **Test cabinet (internal).**

2.22.1 On-the-fly calibration

If you have selected the **On-the-fly calibration** function, you can start this function by pressing ***Enter***. All totalizers are displayed in high resolution together with a stopwatch. If you press ***Enter*** again, the totalizers and the stopwatch will be stopped. If you press ***Enter*** once again, all values will be reset to zero and the procedure will be restarted.

2.22.2 Freeze

If manual freeze has been set in Freeze mode, a freeze procedure is started every time the ***Test*** key is pressed. All values marked F.. are stored synchronously when the ***Test*** key is pressed. The measured values stored will be retained until the next freeze procedure is initiated. The following freeze modes are possible: OFF / Manual / Contact / Cyclic / Gas day / Every day / Every hour / Every second / Every minute. For the "cyclic" operating mode, it is possible to set the interval.

2.22.3 Calibration standard density / superior calorific value

Formation of correction values for the standard density and superior calorific value measuring inputs. It is possible to define or assign functions to buttons and set the maximum monitoring time. The measuring gas / test gas button initiates the formation of the holding value and the button for forming the correction value initiates the calculation of the correction value. The procedure is monitored for maximum limits and maximum time.

2.22.4 Functional test

Similar to the DSfG revision, there are four points of time which define the start, the interval and the end of a data recording procedure. When the first point of time is reached, the volume corrector automatically starts data recording, forms the mean values, etc. until the next point of time is reached and stops recording when the last point of time is reached. **The results can be accessed only with the PC (browser).**

You can find the **Functional test** chapter under the Test heading (<***6***> key).
Status shows the current state: **"Stopped"** or **"Running"**.
For **Time stamps 1 to 4**, you can anticipatorily enter four points of time when a test run is to be performed automatically.
Test time defines the duration of testing (in the case of a manual test run).
Time forerun/tracking defines the time between the first and second or third and fourth points of time (in the case of a manual test run).
Delay defines the delayed start up to the first point of time from the moment ***Enter*** was pressed (in the case of a manual test run).
Automatic test run: Set four points of time. The start is performed automatically.
Manually controlled test run: Select the **Status** function and press ***Enter***.

2.22.5 Hardware test

Option for testing all inputs and outputs of the device.
If the function is set to **"Inactive"**, only the momentary state is displayed while browsing.
If the function is set to **"Active"**, the input or output displayed is affected while browsing. E.g. the alarm contacts are operated and the current outputs are set to fixed values: current output 1 to 10mA, 2 to 11 mA, 3 to 12mA, 4 to 13mA and the pulse outputs are operated: pulse output 1 with 1 pulse per sec., 2 with 2 pulses per sec., 3 with 3 pulses per sec., 4 with 4 pulses per sec.

2.23 Special information about analog measuring inputs

Press <4> ***I/O*** and the ***Cursor Right*** key once to reach the **Current input 1** to **Current input 8** chapters. Here the calibration of input measurement is performed in the factory and the power supply of the transmitter is activated. No assignments are made to physical quantities yet.
If you continue to browse, you will reach the **Resistance input 1** and **Resistance input 2** chapters. Here the calibration of the input measurement is performed in the factory. No assignments are made to physical quantities yet.
If you continue to browse, you will reach the **Frequency input 1** to **Frequency input 8** chapters. Here the recording of the input measurement is performed. No assignments are made to physical quantities yet.

Special case of contact inputs:
If you continue to browse, you will reach the **Contact inputs** chapter. Here the recording of the 8 inputs (ON/OFF) and the assignments to functions are shown (e.g. Freeze contact, Direction change, etc.).

2.24 Special information about outputs

2.24.1 Current outputs

Press <4> ***I/O*** to reach the **Current input 1 to 4** chapters. There all important values for parameterization and display are combined. By using the relevant features, all appropriate data, calculated values, etc. can be selected and thus mapped on the current output.

Outputs
Overview
→Current output 1
Current output 2

The arrow is located on the third line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **Current output 1** chapter. A new window will open with the **Current output 1** heading. The contents of this chapter can be browsed using the cursor keys.

There are two parameters for assigning a measured value to an output quantity:

1st assignment	optimizes the pressure, temperature and all flow rate values for control purposes.
2nd assignment	extended selection of all the other values which can be mapped as a current output.

If a parameter is selected under *Assignment*, it will be shown under *Physical value* together with its correct unit. Its output value is seized by a correction factor calculated from the *lower* and *upper calibration values* which is mapped on its limit ranges (*upper and lower mapping*) and the *operating mode* set. If the *physical value* exceeds the defined value, a warning is generated. There is an option to output a constant current *(test current)* for test purposes which is independent of a measured value. Enter the desired value in the *Test current* parameter and activate it under *Operating mode*.

The same applies to current outputs 2, 3 and 4.

2.24.2 Pulse outputs

Press <4> ***I/O*** and browse downwards until you reach the **Pulse output 1 to 4** chapters. There all important values for parameterization and display are combined. By using the relevant features, all appropriate data, calculated values, etc. can be selected and thus mapped on the pulse output.

Outputs
→Pulse output 1
Pulse output 2
Pulse output 3

The arrow is located on the second line and can be moved upwards or downwards using the cursor keys. In this example, pressing ***Enter*** will select the **Pulse output 1** chapter. A new window will open with the **Pulse output 1** heading. The contents of this chapter can be browsed using the cursor keys.

The same applies to pulse outputs 2, 3 and 4.

There are the following *Selection options*:

- Volume at measurement conditions
- Corrected volume at measurement conditions
- Volume at base conditions
- Energy flow rate
- Mass totalizer

- Vo totalizer
- Cycle pulses
- Test pulses (duration)
- Test pulses (groups)
- OFF

Test pulses:
There are two options for outputting test pulses:
1. A specified number of pulses per second is permanently outputted (duration).
2. A specified number of pulses is outputted once with the set output frequency and is then stopped (group).

2.24.3 Contact outputs

There are eight contact outputs available which can be used universally for outputs, messages, etc.
Press <4> ***I/O*** and browse downwards until you reach the **Contact output 1** to **Contact output 8** chapters. There all important values for parameterization and display are combined. By using the relevant features, all appropriate data, calculated values, etc. can be selected and thus mapped on the contact output.

2.25 Miscellaneous

2.25.1 Where is the revision switch to be found?

Function of the revision switch:

If the revision switch is switched on, the pulse outputs of the corrector are switched off. In addition, the revision bit is activated in the data records from the DSfG interface. You can activate the revision switch by selecting an operating mode under the <0> ***Mode*** key in the **Access** chapter. Before you activate the revision switch, you have to enable entries at least with the user code. If you select the **Access** chapter, **Revision mode** will be the first function to appear. Press ***Enter*** to switch to input mode (the display will turn darker) and then use the ***Cursor Up*** or ***Down*** key to change from operation to revision. Press ***Enter*** again to terminate your entries.

2.25.2 Determination of correction factors to calibrate current inputs

The current inputs for measuring the pressure, temperature, etc., are processed by an A/D converter with an upstream measuring-point selector. The alignment on the mA side is performed in the factory. Any subsequent corrections are made by directly offsetting the input quantities of pressure, temperature, etc.

<u>Example:</u>
You want to determine the correction factor for the input of the pressure at measuring conditions which is to be measured in a range from 20 to 70 bar.

1st step	Parameterize the *lower alarm limit* at 20 bar (assigned to the metrological zero 0 or 4 mA).
2nd step	Parameterize the *upper alarm limit* at 70 bar (assigned to the metrological upper range value of 20 mA).
3rd step	Parameterize the offset correction at 0.
4th step	Apply the pressure signal or check the current input with a calibrated measuring instrument and read the measured quantity (display of the measured pressure input in bar).
5th step	Form the difference between the actually supplied measuring signal and the measured quantity displayed.
6th step	Enter this difference as offset in the offset correction parameter.
7th step	Check the display for pressure as measured quantity.

The same procedure applies to all analog inputs.

2.25.3 Display settings

How to determine the ON time for the display?
To allow the display to be read under optimum conditions, it has been permanently set to maximum brightness. In input mode, the line to be edited will turn darker to indicate that input mode is active. To increase the service life of the display, the ERZ 2000 switches its display dark as soon as a settable period of time has elapsed after the last key was pressed.
You can find the function where you can set this time under <0> ***Mode***, **Display** chapter, **Screen saver** function.

2.25.4 Special information about the ID display

You can access the device data via the <±> ***ID display*** key. They can only be displayed here. There is no option for inputting data if the ID display is shown. If you want to enter values, you have to enter them together with the parameters of the associated transmitter device in the appropriate chapter (or column of the coordinate system). For example, the ID display data of the pressure sensor have to be entered in the **Pressure** chapter, while those of the temperature sensor have to be entered in the **Temperature** chapter**,** etc.

2.25.5 Resetting the slave pointers

The ERZ 2000 has two slave pointers each – one for the minimum value and one for the maximum value – for all measured values (pressure, temperature, flow rates, etc.). The slave pointers record the maximum values and can be reset in two different ways. To reset the slave pointers, you have to enable entries at least with the user code.

1. Selective resetting
   To reset each individual maximum value separately from the other values:
   Select the maximum value and press ***Enter***. The selected slave pointer will be reset and then updated again automatically.

2. Resetting all slave pointers
   To reset all maximum values with one command:
   Press <0> ***Mode*** to select the **Delete procedures** chapter and then press ***Enter*** to confirm your entry.
   Use the ***Cursor Down*** key to browse to the **Delete slave pointers** function and here set the parameter to **"Yes"**.

2.26 Interfaces

2.26.1 Front panel Com-F

Com-F interface:	RS 232 reserved for program updates (flash) only. In normal operating mode, the interface is switched off and has no function whatsoever. Only if "Program update" mode is selected will the computer terminate the correction program and activate the interface. For a description, see chapter 2.4.1. **NOTE: This function can only be activated after the calibration lock has been opened.**

2.26.2 Rear panel COM 1 to COM 5

COM 1 interface:	Switchable from RS 232 to RS 422 or RS 485; different protocols can be used optionally; MODBUS ASCII and RTU protocols are available.
COM 2 interface:	RS 232 not switchable, DMT protocol used (connected to US 9000).
COM 3 interface:	Switchable from RS 232 with handshake to RS 485 conforming to DSfG. MODBUS or DSfG master can be assigned.
COM 4 interface:	Switchable from RS 232 without handshake to RS 485 conforming to DSfG. DSfG function for corrector and recording entities or RMG bus function can be assigned.
COM 5 interface:	RS 232 with handshake plus carrier plus ring. Usable for MODEM (RDT).

2.26.3 Rear panel CAN bus

A CAN bus connection is optionally available which can be used for customer-specific or plant-specific extensions. No function is stored at the moment.

2.26.4 Rear panel Ethernet

Network connection for various applications. Linking of devices, integration into customer networks (Intranet) or, as important issues, the remote operation and visualization of the ERZ 2000 with a laptop computer.

Here a separate description is available (see the operating instructions for the ***ERZ 2000_Remote_Operation***).

3 MODBUS concept of the ERZ 2000

In the ERZ 2000, there is a user-configurable area with 50 MODBUS registers which have 25 default values of 4 bytes each set in the factory. The contents of these 50 registers can be changed by the user at any time.
The user-configurable area is called MODBUS superblock. All data in the superblock are stored at subsequent register addresses. Thus, fast data transmission is possible without a lot of individual queries. An offset can be assigned to the superblock.
In addition, there is a fixed area which is used for data of the utmost importance to the user. These registers cannot be changed by configuration. The fixed area is directly attached to the superblock and is automatically shifted with the offset.

Changing data of the superblock:
When positions in the superblock are edited, the coordinate of the variable is used as the most important selection support tool beside the name of the variable.
The coordinate can be directly read off the device. To do this, select the desired value and press the * (Select) key. The coordinate will appear in the second line in front of the name of the measured value displayed. You can also look for the coordinate in the documentation (Annex A of the operating instructions), or you can use the PC and the download method via the Ethernet interface to read it.
Configuration of the superblock is always to be performed with the PC and configuration of operation via the Ethernet interface using the html download.

If you want the volumetric flow rate at measurement conditions to appear in the first place of the superblock, you should proceed as follows:
Connect the PC via crossover network cable. Establish connection and access the MODBUS superblock (html download). Then enter the user code and at the first item, click the **Edit** function. On the menu displayed, go to the previously selected coordinate and click on it. Upload the changed setting and click **"Continue"**. Close the user code again. That's all. Now the newly entered measured value will be displayed in the first place of the MODBUS superblock.

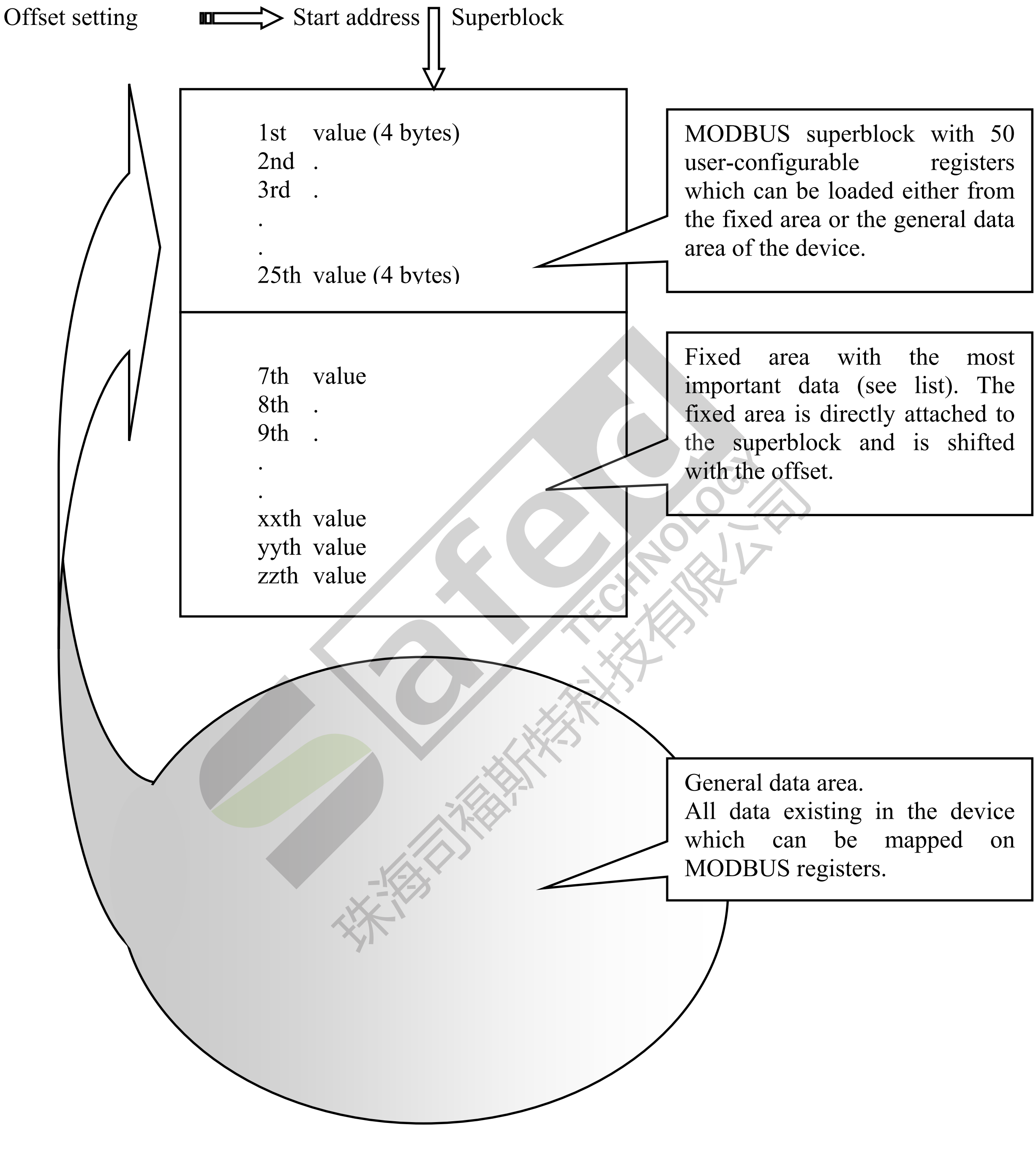
For more details concerning remote control via PC, see separate documentation.

Additional parameters for the MODBUS interface:
The ERZ 2000 is a MODBUS slave.
Its address can be set between 1 and 247.
Implemented functions: Read data only, function code 3

The interface parameters for COM 1 are to be set under "Serial COMs" in coordinates IB 01 and IB 02.

The MODBUS interface can optionally be run in RTU or ASCII mode.
Depending on the design version used, MODBUS is available at COM 1 (RS 232, 422 or 485 depending on the hardware setting) and additionally at COM 3 (RS 232 or 485). There is a third MODBUS interface available as MODBUS IP at the RJ45 connector, Ethernet TCP/IP.
The MODBUS address and register offset parameters and the superblock definitions jointly apply to all three MODBUS interfaces.

Graphical representation of the MODBUS structure:



The following pages include a list of the settings of the superblock made in the factory and a description of the fixed data area.

3.1 MODBUS registers

Register	Bytes	Data type	Access	Column	Line	Group	Designation	Value (display)	Value (Modbus)
0	4	=>unsigned integer 32-bit	R	II	1	Modbus superblock	=>LB11	33776 m3	00 00 83 F0
2	4	=>float IEEE 754	R	II	2	Modbus superblock	=>HD01	667,43 m3/h	44 26 DB C2
4	4	=>float IEEE 754	R	II	3	Modbus superblock	=>AB01	6,000 bar	40 C0 00 00
6	4	=>float IEEE 754	R	II	4	Modbus superblock	=>AC01	15,00 °C	41 70 00 00
8	4	=>float IEEE 754	R	II	5	Modbus superblock	=>AD01	11,415 kWh/m3	41 36 A3 D7
10	4	=>float IEEE 754	R	II	6	Modbus superblock	=>BB01	1,260 mole%	3F A1 47 AE
12	4	=>float IEEE 754	R	II	7	Modbus superblock	=>BD01	0,000 mole%	00 00 00 00
14	4	=>float IEEE 754	R	II	8	Modbus superblock	=>BC01	0,000 mole%	00 00 00 00
16	4	=>float IEEE 754	R	II	9	Modbus superblock	=>HD01	667,43 m3/h	44 26 DB C2
18	4	=>float IEEE 754	R	II	10	Modbus superblock	=>HB01	7618,8 kW	45 EE 16 0C
20	4	=>float IEEE 754	R	II	11	Modbus superblock	=>HE01	117,589 m3/h	42 EB 2D C8
22	4	=>float IEEE 754	R	II	12	Modbus superblock	=>HF01	117,589 m3/h	42 EB 2D C8
24	4	=>float IEEE 754	R	II	13	Modbus superblock	=>HC01	533,21 kg/h	44 05 4D 9F
26	4	=>float IEEE 754	R	II	14	Modbus superblock	=>GC01	6123,00000 P/m3	45 BF 58 00
28	4	=>float IEEE 754	R	II	15	Modbus superblock	=>CC01	0,98896	3F 7D 2C 45
30	4	=>float IEEE 754	R	II	16	Modbus superblock	=>CB03	5,6760	40 B5 A1 87
32	4	=>unsigned integer 32-bit	R	II	17	Modbus superblock	=>LB09	1187876 kg	00 12 20 24
34	4	=>unsigned integer 32-bit	R	II	18	Modbus superblock	=>LB01	1497051 m3	00 16 D7 DB
36	4	=>unsigned integer 32-bit	R	II	19	Modbus superblock	=>LB03	56989 GJ	00 00 DE 9D
38	4	=>unsigned integer 32-bit	R	II	20	Modbus superblock	=>LB11	33776 m3	00 00 83 F0
40	4	=>unsigned integer 32-bit	R	II	21	Modbus superblock	=>LD09	320347 kg	00 04 E3 5B
42	4	=>unsigned integer 32-bit	R	II	22	Modbus superblock	=>LD01	404812 m3	00 06 2D 4C
44	4	=>unsigned integer 32-bit	R	II	23	Modbus superblock	=>LD03	15030 GJ	00 00 3A B6
46	4	=>unsigned integer 32-bit	R	II	24	Modbus superblock	=>LD11	7684 m3	00 00 1E 04
48	4	=>unsigned integer 32-bit	R	II	25	Modbus superblock	=>KA02	30-01-2007 12:26:34	45 BF 39 7A

Error message registers

100	2	unsigned integer 16-bit	R	JB	1	Message registers	Message 0...15	0000 hex	00 00
						A00-0	T loss	= BIT-0	
						A00-1	T<l.alarm lim.	= BIT-1	
						A00-2	T>up.alarm lim.	= BIT-2	
						A00-3	T jump	= BIT-3	
						W00-4	T<l.warn.lim.	= BIT-4	
						W00-5	T>up.warn.lim.	= BIT-5	
						H00-9	T param.error	= BIT-6	
						A01-0	TS loss	= BIT-7	
						A01-1	TS<l.alarm lim.	= BIT-8	
						A01-2	TS>up.alarm lim.	= BIT-9	
						A01-3	TS jump	= BIT-10	
						W01-4	TS<l.warn.lim.	= BIT-11	
						W01-5	TS>up.warn.lim.	= BIT-12	
						H01-9	TS param.error	= BIT-13	

						A02-0	TD loss	= BIT-14	
						A02-1	TD<l.alarm lim.	= BIT-15	
101	2	unsigned integer 16-bit	R	JB	2	Message registers	Message 16...31	0000 hex	00 00
						A02-2	TD>up.alarm lim.	= BIT-0	
						A02-3	TD jump	= BIT-1	
						W02-4	TD<l.warn.lim.	= BIT-2	
						W02-5	TD>up.warn.lim.	= BIT-3	
						H02-9	TD param.error	= BIT-4	
						A03-0	Pa loss	= BIT-5	
						A03-1	Pa<l.alarm lim.	= BIT-6	
						A03-2	Pa>up.alarm lim.	= BIT-7	
						A03-3	Pa jump	= BIT-8	
						W03-4	Pa<l.warn.lim.	= BIT-9	
						W03-5	Pa>up.warn.lim.	= BIT-10	
						H03-9	Pa param.error	= BIT-11	
						A04-0	Rn loss	= BIT-12	
						A04-1	Rn<l.alarm lim.	= BIT-13	
						A04-2	Rn>up.alarm lim.	= BIT-14	
						A04-3	Rn jump	= BIT-15	
102	2	unsigned integer 16-bit	R	JB	3	Message registers	Message 32...47	0000 hex	00 00
						W04-4	Rn<l.warn.limit	= BIT-0	
						W04-5	Rn>up.warn.lim.	= BIT-1	
						W04-6	Vo warning	= BIT-2	
						A04-7	HW pulse comp.	= BIT-3	
						W04-8	Run deviation	= BIT-4	
						H04-9	Rn param.error	= BIT-5	
						A05-0	R loss	= BIT-6	
						A05-1	R<l.alarm lim.	= BIT-7	
						A05-2	R>up.alarm lim.	= BIT-8	
						A05-3	R jump	= BIT-9	
						W05-4	R<l.warn.lim.	= BIT-10	
						W05-5	R>up.warn.lim.	= BIT-11	
						A05-6	R comp.error	= BIT-12	
						W05-7	Acc.puls.>max.	= BIT-13	
						A05-8	Vo alarm	= BIT-14	
						H05-9	R param.error	= BIT-15	
103	2	unsigned integer 16-bit	R	JB	4	Message registers	Message 48...65	0000 hex	00 00
						A06-0	Hs loss	= BIT-0	
						A06-1	Hs<l.alarm lim.	= BIT-1	
						A06-2	Hs>up.alarm lim.	= BIT-2	
						A06-3	Hs jump	= BIT-3	
						W06-4	Hs<l.warn.lim.	= BIT-4	
						W06-5	Hs>up.warn.lim.	= BIT-5	
						H06-9	Hs param.error	= BIT-6	
						A07-0	CO2 loss	= BIT-7	
						A07-1	CO2<l.alarm lim.	= BIT-8	
						A07-2	CO2>up.alarm lim.	= BIT-9	
						A07-3	CO2 jump	= BIT-10	
						W07-4	CO2<l.warn.lim.	= BIT-11	
						W07-5	CO2>up.warn.lim.	= BIT-12	

						H07-9	CO2 param.error	= BIT-13	
						A08-0	VSM loss	= BIT-14	
						A08-1	VSM<l.alarm lim.	= BIT-15	
104	2	unsigned integer 16-bit	R	JB	5	Message registers	Message 64...79	0000 hex	00 00
						A08-2	VSM>up.alarm lim.	= BIT-0	
						A08-3	VSM jump	= BIT-1	
						W08-4	VSM<l.warn.lim.	= BIT-2	
						W08-5	VSM>up.warn.lim.	= BIT-3	
						H08-9	VSM param.error	= BIT-4	
						A09-0	H2 loss	= BIT-5	
						A09-1	H2<l.alarm lim.	= BIT-6	
						A09-2	H2>up.alarm lim.	= BIT-7	
						A09-3	H2 jump	= BIT-8	
						W09-4	H2<l.warn.lim.	= BIT-9	
						W09-5	H2>up.warn.lim.	= BIT-10	
						H09-9	H2 param.error	= BIT-11	
						W10-8	Def. channel 1	= BIT-12	
						W10-9	Def. channel 2	= BIT-13	
						W11-0	Start-up>max.	= BIT-14	
						W11-1	Slow-down>max.	= BIT-15	
105	2	unsigned integer 16-bit	R	JB	6	Message registers	Message 80...95	0000 hex	00 00
						A12-0	VSB loss	= BIT-0	
						A12-1	VSB<l.alarm lim.	= BIT-1	
						A12-2	VSB>up.alarm lim.	= BIT-2	
						A12-3	VSB jump	= BIT-3	
						W12-4	VSB<l.warn.lim.	= BIT-4	
						W12-5	VSB>up.warn.lim.	= BIT-5	
						H12-9	VSB param.error	= BIT-6	
						A13-0	Pg loss	= BIT-7	
						A13-1	Pg<l.alarm lim.	= BIT-8	
						A13-2	Pg>up.alarm lim.	= BIT-9	
						A13-3	Pg jump	= BIT-10	
						W13-4	Pg<l.warn.lim.	= BIT-11	
						W13-5	Pg>up.warn.lim.	= BIT-12	
						H13-9	Pg param.error	= BIT-13	
						A19-0	N2 loss	= BIT-14	
						A19-1	N2<l.alarm lim.	= BIT-15	
106	2	unsigned integer 16-bit	R	JB	7	Message registers	Message 96..111	0000 hex	00 00
						A19-2	N2>up.alarm lim.	= BIT-0	
						A19-3	N2 jump	= BIT-1	
						W19-4	N2<l.warn.lim.	= BIT-2	
						W19-5	N2>up.warn.lim.	= BIT-3	
						H19-9	N2 param.error	= BIT-4	
						H30-0	Malloc error	= BIT-5	
						H31-9	CAN fault	= BIT-6	
						H32-0	CAN overflow	= BIT-7	
						A32-1	BM failure	= BIT-8	
						A32-2	CRC12 error	= BIT-9	
						H32-3	GC syntax	= BIT-10	
						H32-4	GC comm.	= BIT-11	

						R40-7	Rebooted	= BIT-12	
						R42-1	RTC defective	= BIT-13	
						A43-2	Def.tot.	= BIT-14	
						H45-0	I1 inp.param.	= BIT-15	
107	2	unsigned integer 16-bit	R	JB	8	Message registers	Message 112..127	0000 hex	00 00
						H45-1	I2 inp.param.	= BIT-0	
						H45-2	I3 inp.param.	= BIT-1	
						H45-3	I4 inp.param.	= BIT-2	
						H45-4	I5 inp.param.	= BIT-3	
						H45-5	I6 inp.param.	= BIT-4	
						H45-8	PT1 inp.param.	= BIT-5	
						H45-9	PT2 inp.param.	= BIT-6	
						A50-0	T<>GERG lim.	= BIT-7	
						A50-1	P<>GERG lim.	= BIT-8	
						A50-2	rd<>GERG lim.	= BIT-9	
						A50-3	CO2<>GERG lim.	= BIT-10	
						A50-4	N2<>GERG lim.	= BIT-11	
						A50-5	Hs<>GERG lim.	= BIT-12	
						A50-6	H2<>GERG lim.	= BIT-13	
						A50-8	GERG iter.max	= BIT-14	
						A51-0	T<>AGA limit	= BIT-15	
108	2	unsigned integer 16-bit	R	JB	9	Message registers	Message 128..143	0800 hex	08 00
						A51-1	P<>AGA limit	= BIT-0	
						A51-2	rd<>AGA limit	= BIT-1	
						A51-3	CO2<>AGA limit	= BIT-2	
						A51-4	N2<>AGA limit	= BIT-3	
						A51-5	Hs<>AGA limit	= BIT-4	
						A51-6	H2<>AGA limit	= BIT-5	
						A51-7	AGA oth.errors	= BIT-6	
						A51-8	AGA-pi,tau	= BIT-7	
						A51-9	Interp.pt.probl.	= BIT-8	
						A52-0	Q<Qmin	= BIT-9	
						A52-1	Q>Qmax	= BIT-10	
						M54-0	Calibr. lock	= BIT-11	
						M54-1	User lock	= BIT-12	
						M54-2	Revision	= BIT-13	
						M54-3	Red.GQM active	= BIT-14	
						W54-4	GQM1 failure	= BIT-15	
109	2	unsigned integer 16-bit	R	JB	10	Message registers	Message 144..159	0000 hex	00 00
						W54-5	GQM2 failure	= BIT-0	
						W54-6	Rn GBH1 failure	= BIT-1	
						W54-7	Rn GBH2 failure	= BIT-2	
						W54-8	Ho GQM1 failure	= BIT-3	
						W54-9	Ho GQM2 failure	= BIT-4	
						W55-0	CO2 GQM1 failure	= BIT-5	
						W55-1	CO2 GQM2 failure	= BIT-6	
						W55-2	H2 GQM1 failure	= BIT-7	
						W55-3	H2 GQM2 failure	= BIT-8	
						W55-4	N2 GQM1 failure	= BIT-9	
						W55-5	N2 GQM2 failure	= BIT-10	

						W55-6	VOS<>theory	= BIT-11	
						W55-7	Master clock	= BIT-12	
						W55-8	Dv GQM1 failure	= BIT-13	
						W55-9	Dv GQM2 failure	= BIT-14	
						R56-0	Channel 1 fault	= BIT-15	
110	2	unsigned integer 16-bit	R	JB	11	Message registers	Message 160..175	0000 hex	00 00
						R56-1	Channel 2 fault	= BIT-0	
						A56-2	Tc/Tb comb.	= BIT-1	
						H56-3	CAN check	= BIT-2	
						H56-4	Service request	= BIT-3	
						H56-5	Old time	= BIT-4	
						H56-6	New time	= BIT-5	
						R56-7	Power OFF	= BIT-6	
						W70-0	Pulse 1 >max	= BIT-7	
						W70-1	Pulse 2 >max	= BIT-8	
						W70-2	Pulse 3 >max	= BIT-9	
						W70-3	Pulse 4 >max	= BIT-10	
						W70-6	I1 outp.<min	= BIT-11	
						W70-7	I2 outp.<min	= BIT-12	
						W70-8	I3 outp.<min	= BIT-13	
						W70-9	I4 outp.<min	= BIT-14	
						W71-0	I1 outp.>max	= BIT-15	
111	2	unsigned integer 16-bit	R	JB	12	Message registers	Message 176..191	0000 hex	00 00
						W71-1	I2 outp.>max	= BIT-0	
						W71-2	I3 outp.>max	= BIT-1	
						W71-3	I4 outp.>max	= BIT-2	
						H73-0	I1 outp.param.	= BIT-3	
						H73-1	I2 outp.param.	= BIT-4	
						H73-2	I3 outp.param.	= BIT-5	
						H73-3	I4 outp.param.	= BIT-6	
						H74-0	K1 outp.param.	= BIT-7	
						H74-1	K2 outp.param.	= BIT-8	
						H74-2	K3 outp.param.	= BIT-9	
						H74-3	K4 outp.param.	= BIT-10	
						H74-4	K5 outp.param.	= BIT-11	
						H74-5	K6 outp.param.	= BIT-12	
						H74-6	K7 outp.param.	= BIT-13	
						H74-7	K8 outp.param.	= BIT-14	
						W75-0	t>Rn corr.time	= BIT-15	
112	2	unsigned integer 16-bit	R	JB	13	Message registers	Message 192..207	0000 hex	00 00
						W75-1	Rncorr signal	= BIT-0	
						W75-2	Rncorr>perm.(W)	= BIT-1	
						W75-3	t>Hs corr.time	= BIT-2	
						W75-4	Hscorr signal	= BIT-3	
						W75-5	Hscorr>perm.(W)	= BIT-4	
						A80-0	dkvk>max.	= BIT-5	
						R90-0	F1 failure	= BIT-6	
						R90-1	F2 failure	= BIT-7	
						R91-0	I1 failure	= BIT-8	
						R91-1	I2 failure	= BIT-9	

						R91-2	I3 failure	= BIT-10	
						R91-3	I4 failure	= BIT-11	
						R91-4	I5 failure	= BIT-12	
						R91-5	I6 failure	= BIT-13	
						R92-0	PT1 failure	= BIT-14	
						R92-1	PT2 failure	= BIT-15	
113	2	unsigned integer 16-bit	R	JB	14	Message registers	Message 208..223	0000 hex	00 00
						R93-0	Def.cont.inp.	= BIT-0	
						H93-1	Hscorr>perm.(N)	= BIT-1	
						H93-2	Rncorr>perm.(N)	= BIT-2	
						R95-0	Math.problem	= BIT-3	
						A96-0	rd loss	= BIT-4	
						A96-1	rd<l.alarm lim.	= BIT-5	
						A96-2	rd>up.alarm lim.	= BIT-6	
						A96-3	rd jump	= BIT-7	
						W96-4	rd<l.warn.lim.	= BIT-8	
						W96-5	rd>up.warn.lim.	= BIT-9	
						H96-6	rd param.error	= BIT-10	
						A96-7	Hs GC timeout	= BIT-11	
						A96-8	Rn GC timeout	= BIT-12	
						A96-9	rd GC timeout	= BIT-13	
						A97-0	CO2 GC timeout	= BIT-14	
						A97-1	N2 GC timeout	= BIT-15	
114	2	unsigned integer 16-bit	R	JB	15	Message registers	Message 224..239	0000 hex	00 00
						A97-2	H2 GC timeout	= BIT-0	
						A97-3	Hs GC alarm	= BIT-1	
						A97-4	Rn GC alarm	= BIT-2	
						A97-5	rd GC alarm	= BIT-3	
						A97-6	CO2 GC alarm	= BIT-4	
						A97-7	N2 GC alarm	= BIT-5	
						A97-8	H2 GC alarm	= BIT-6	
						A97-9	Beattie alarm	= BIT-7	
						A98-0	CH4 loss	= BIT-8	
						A98-1	CH4<l.alarm lim.	= BIT-9	
						A98-2	CH4>up.alarm lim.	= BIT-10	
						A98-3	CH4 jump	= BIT-11	
						W98-4	CH4<l.warn.lim.	= BIT-12	
						W98-5	CH4>up.warn.lim.	= BIT-13	
						H98-6	CH4 param.error	= BIT-14	
						A98-7	Comp.normaliz.	= BIT-15	
115	2	unsigned integer 16-bit	R	JB	16	Message registers	Message 240..255	0000 hex	00 00
						A98-8	Inval.act.key	= BIT-0	
						H99-1	TCP after boot	= BIT-1	
						A99-2	CH4 GC timeout	= BIT-2	
						A99-3	CH4 GC alarm	= BIT-3	
						H99-4	Adjusted float	= BIT-4	
						A99-5	VOS corr.error	= BIT-5	
						W99-6	C fac.comp.	= BIT-6	
						A99-7	AGA8 alarm	= BIT-7	
						A99-8	AGA892DC alarm	= BIT-8	

						W99-9	Comp.<>AGA 8	= BIT-9	
						H45-6	I7 inp.param.	= BIT-10	
						H45-7	I8 inp.param.	= BIT-11	
						R91-6	I7 failure	= BIT-12	
						R91-7	I8 failure	= BIT-13	
						H32-5	Overheating	= BIT-14	
						H32-6	Undercooling	= BIT-15	
116	2	unsigned integer 16-bit	R	JB	17	Message registers	Message 256..271	0000 hex	00 00
						A32-7	V.d.Waals alarm	= BIT-0	
						H46-0	Cont.param.error	= BIT-1	
						H46-1	Vo defective	= BIT-2	
						H46-2	Vo timeout	= BIT-3	
						H46-3	Vo protocol	= BIT-4	
						H46-4	Deleted pulses	= BIT-5	
						A91-8	GC components	= BIT-6	
						H91-9	Def.display	= BIT-7	
						H93-3	Function test	= BIT-8	
						H93-4	USZ implaus.	= BIT-9	
						A93-5	USZ alarm	= BIT-10	
						A93-6	USZ timeout	= BIT-11	
						W93-7	Vo1 implaus.	= BIT-12	
						W93-8	Vo2 implaus.	= BIT-13	
						W93-9	Vo1D implaus.	= BIT-14	
						W94-0	Vo2D implaus.	= BIT-15	
117	2	unsigned integer 16-bit	R	JB	18	Message registers	Message 272..287	0000 hex	00 00
						H94-1	Time sync.para.	= BIT-0	
						R90-2	F3 failure	= BIT-1	
						R90-3	F4 failure	= BIT-2	
						R56-8	Channel 3 fault	= BIT-3	
						R56-9	Channel 4 fault	= BIT-4	
						H57-0	HF param.error	= BIT-5	
						M52-2	Call	= BIT-6	
						M52-3	PTB time	= BIT-7	
						W47-0	Qm<l.warn.lim.	= BIT-8	
						W47-1	Qm>up.warn.lim.	= BIT-9	
						W47-2	Qc<l.warn.lim.	= BIT-10	
						W47-3	Qc>up.warn.lim.	= BIT-11	
						W47-4	Qb<l.warn.lim.	= BIT-12	
						W47-5	Qb>up.warn.lim.	= BIT-13	
						W47-6	Qe<l.warn.lim.	= BIT-14	
						W47-7	Qe>up.warn.lim.	= BIT-15	
118	2	unsigned integer 16-bit	R	JB	19	Message registers	Message 288..303	0000 hex	00 00
						W47-8	Qm<l.warn.lim.	= BIT-0	
						W47-9	Qm>up.warn.lim.	= BIT-1	
						A48-0	CAN timeout	= BIT-2	
						H48-1	Def.modem	= BIT-3	
						M48-2	Factory state	= BIT-4	
						H48-3	PT1 open circ.	= BIT-5	
						H48-4	PT2 open circ.	= BIT-6	
						A48-5	C fact.failure	= BIT-7	

						W60-0	Ethane<l.warn.lim.	= BIT-8	
						W60-1	Ethane>up.warn.lim.	= BIT-9	
						W60-2	C3H8<l.warn.lim.	= BIT-10	
						W60-3	C3H8>up.war.lim.	= BIT-11	
						W60-4	N-C4<l.warn.lim.	= BIT-12	
						W60-5	N-C4>up.warn.lim.	= BIT-13	
						W60-6	I-C4<l.warn.lim.	= BIT-14	
						W60-7	I-C4>up.warn.lim.	= BIT-15	
119	2	unsigned integer 16-bit	R	JB	20	Message registers	Message 304..319	0000 hex	00 00
						W60-8	N-C5<l.warn.lim.	= BIT-0	
						W60-9	N-C5>up.warn.lim.	= BIT-1	
						W61-0	I-C5<l.warn.lim.	= BIT-2	
						W61-1	I-C5>up.warn.lim.	= BIT-3	
						W61-2	NeoC5<l.warn.lim.	= BIT-4	
						W61-3	NeoC5>up.warn.lim.	= BIT-5	
						W61-4	Hexane<l.warn.lim.	= BIT-6	
						W61-5	Hexane>up.warn.lim.	= BIT-7	
						W61-6	Heptane<l.warn.lim.	= BIT-8	
						W61-7	Heptane>up.war.lim.	= BIT-9	
						W61-8	Octane<l.warn.lim.	= BIT-10	
						W61-9	Octane>up.warn.lim.	= BIT-11	
						W62-0	Nonane<l.warn.lim.	= BIT-12	
						W62-1	Nonane>up.warn.lim.	= BIT-13	
						W62-2	Decane<l.warn.lim.	= BIT-14	
						W62-3	Decane>up.warn.lim.	= BIT-15	
120	2	unsigned integer 16-bit	R	JB	21	Message registers	Message 320..335	0000 hex	00 00
						W62-4	H2S<l.warn.lim.	= BIT-0	
						W62-5	H2S>up.warn.lim.	= BIT-1	
						W62-6	H2O<l.warn.lim.	= BIT-2	
						W62-7	H2O>up.warn.lim.	= BIT-3	
						W62-8	He<l.warn.lim.	= BIT-4	
						W62-9	He>up.warn.lim.	= BIT-5	
						W63-0	O2<l.warn.lim.	= BIT-6	
						W63-1	O2>up.warn.lim.	= BIT-7	
						W63-2	CO<l.warn.lim.	= BIT-8	
						W63-3	CO>up.warn.lim.	= BIT-9	
						W63-4	Ethene<l.warn.lim.	= BIT-10	
						W63-5	Ethene>up.warn.lim.	= BIT-11	
						W63-6	C3H6<l.warn.lim.	= BIT-12	
						W63-7	C3H6>up.war.lim.	= BIT-13	
						W63-8	Ar<l.warn.lim.	= BIT-14	
						W63-9	Ar>up.warn.lim.	= BIT-15	
121	2	unsigned integer 16-bit	R	JB	22	Message registers	Message 336..351	0000 hex	00 00
						H64-0	RMGB missing	= BIT-0	
						H64-1	RMGB param.err.	= BIT-1	
						H64-2	DSfG param.err.	= BIT-2	
						H64-3	TCPIP fault	= BIT-3	
						H64-4	buggy software	= BIT-4	
						H64-5	file system	= BIT-5	
						H64-6	DSfG unex. char	= BIT-6	

						H64-7	DSfG overflow	= BIT-7	
						H64-8	DSfG checksum	= BIT-8	
						H64-9	DSfG broadcast	= BIT-9	
						H65-0	DSfG broadc ign	= BIT-10	
						H65-1	DSfG busterm.	= BIT-11	
						R90-4	F5 failure	= BIT-12	
						R90-5	F6 failure	= BIT-13	
						R90-6	F7 failure	= BIT-14	
						R90-7	F8 failure	= BIT-15	
122	2	unsigned integer 16-bit	R	JB	23	Message registers	Message 352..367	0000 hex	00 00
						R92-2	HART1 failure	= BIT-0	
						R92-3	HART2 failure	= BIT-1	
						R92-4	HART3 failure	= BIT-2	
						R92-5	HART4 failure	= BIT-3	
						R92-6	HART5 failure	= BIT-4	
						R92-7	HART6 failure	= BIT-5	
						R92-8	Corrupt param.	= BIT-6	
						A95-1	Corrupt code	= BIT-7	
						A95-2	Alarm volume	= BIT-8	
						W95-3	Warning volume	= BIT-9	
						A80-1	IGM SV invalid	= BIT-10	
						A80-2	Path failure >max	= BIT-11	
						H80-3	AGA8<>range	= BIT-12	
						A80-4	Eta loss	= BIT-13	
						A80-5	Eta<l.alarm lim.	= BIT-14	
						A80-6	Eta>up.alarm lim.	= BIT-15	
123	2	unsigned integer 16-bit	R	JB	24	Message registers	Message 368..383	0000 hex	00 00
						W80-7	Eta<l.warn.lim.	= BIT-0	
						W80-8	Eta>up.warn.lim.	= BIT-1	
						H80-9	Eta param.error	= BIT-2	
						A81-0	Eta jump	= BIT-3	
						W81-1	Path 1 measurem.	= BIT-4	
						W81-2	Path 2 measurem.	= BIT-5	
						W81-3	Path 3 measurem.	= BIT-6	
						W81-4	Path 4 measurem.	= BIT-7	
						W81-5	Path 5 measurem.	= BIT-8	
						W81-6	Path 6 measurem.	= BIT-9	
						W81-7	Path 7 measurem.	= BIT-10	
						W81-8	Path 8 measurem.	= BIT-11	
						W81-9	Path 1 communic	= BIT-12	
						W82-0	Path 2 communic	= BIT-13	
						W82-1	Path 3 communic	= BIT-14	
						W82-2	Path 4 communic	= BIT-15	
124	2	unsigned integer 16-bit	R	JB	25	Message registers	Message 384..399	0000 hex	00 00
						W82-3	Path 5 communic	= BIT-0	
						W82-4	Path 6 communic	= BIT-1	
						W82-5	Path 7 communic	= BIT-2	
						W82-6	Path 8 communic	= BIT-3	
						H82-7	Path 1 VOS	= BIT-4	
						H82-8	Path 2 VOS	= BIT-5	

						H82-9	Path 3 VOS	= BIT-6	
						H83-0	Path 4 VOS	= BIT-7	
						H83-1	Path 5 VOS	= BIT-8	
						H83-2	Path 6 VOS	= BIT-9	
						H83-3	Path 7 VOS	= BIT-10	
						H83-4	Path 8 VOS	= BIT-11	
						W52-4	Bus-ID<>12	= BIT-12	
						W52-5	RDT ID<>16	= BIT-13	
						A52-6	illegal	= BIT-14	
						H65-2	Restart archive	= BIT-15	
125	2	unsigned integer 16-bit	R	JB	26	Message registers	reserved	0000 hex	00 00
						W65-3	EAV1 failed	= BIT-0	
						W65-4	EAV1<l.warn.lim.	= BIT-1	
						W65-5	EAV1>up.warn.lim.	= BIT-2	
						A65-6	Rn failure 2IV	= BIT-3	
						W65-7	EAV1 fail. 2IV	= BIT-4	
						H85-0	msg1	= BIT-5	
						H85-1	msg2	= BIT-6	
						H85-2	msg3	= BIT-7	
						H85-3	msg4	= BIT-8	
						W86-0	msg1	= BIT-9	
						W86-1	msg2	= BIT-10	
						W86-2	msg3	= BIT-11	
						W86-3	msg4	= BIT-12	
						A87-0	msg1	= BIT-13	
						A87-1	msg2	= BIT-14	
						A87-2	msg3	= BIT-15	
126	2	unsigned integer 16-bit	R	JB	27	Message registers	reserved	0000 hex	00 00
						A87-3	msg4	= BIT-0	
						W65-8	EAV2 failed	= BIT-1	
						W65-9	EAV2<l.warn.lim.	= BIT-2	
						W66-0	EAV2>up.warn.lim.	= BIT-3	
						W66-1	EAV2 fail. 2IV	= BIT-4	
						W66-2	EAV3 failed	= BIT-5	
						W66-3	EAV3<l.warn.lim.	= BIT-6	
						W66-4	EAV3>up.warn.lim.	= BIT-7	
						W66-5	EAV3 fail. 2IV	= BIT-8	
						W66-6	EAV4 failed	= BIT-9	
						W66-7	EAV4<l.warn.lim.	= BIT-10	
						W66-8	EAV4>up.warn.lim.	= BIT-11	
						W66-9	EAV4 fail. 2IV	= BIT-12	
						W67-0	EAV5 failed	= BIT-13	
						W67-1	EAV5<l.warn.lim.	= BIT-14	
						W67-2	EAV5>up.warn.lim.	= BIT-15	
127	2	unsigned integer 16-bit	R	JB	28	Message registers	reserved	0000 hex	00 00
						W67-3	EAV5 fail. 2IV	= BIT-0	
						W67-4	EAV6 failed	= BIT-1	
						W67-5	EAV6<l.warn.lim.	= BIT-2	
						W67-6	EAV6>up.warn.lim.	= BIT-3	
						W67-7	EAV6 fail. 2IV	= BIT-4	

						W67-8	EAV7 failed	= BIT-5	
						W67-9	EAV7<l.warn.lim.	= BIT-6	
						W68-0	EAV7>up.warn.lim.	= BIT-7	
						W68-1	EAV7 fail. 2IV	= BIT-8	
						W68-2	EAV8 failed	= BIT-9	
						W68-3	EAV8<l.warn.lim.	= BIT-10	
						W68-4	EAV8>up.warn.lim.	= BIT-11	
						W68-5	EAV8 fail. 2IV	= BIT-12	
						H88-0	param.ignored	= BIT-13	
						H85-4	msg5	= BIT-14	
						H85-5	msg6	= BIT-15	
128	2	unsigned integer 16-bit	R	JB	29	Message registers	reserved	0000 hex	00 00
						H85-6	msg7	= BIT-0	
						H85-7	msg8	= BIT-1	
						W86-4	msg5	= BIT-2	
						W86-5	msg6	= BIT-3	
						W86-6	msg7	= BIT-4	
						W86-7	msg8	= BIT-5	
						A87-4	msg5	= BIT-6	
						A87-5	msg6	= BIT-7	
						A87-6	msg7	= BIT-8	
						A87-7	msg8	= BIT-9	
						H88-1	LCD-Type/Speech	= BIT-10	
						W95-4	Time sync fail	= BIT-11	
						H95-5	Nettime error	= BIT-12	
						R95-6	HART9 failure	= BIT-13	
						R95-7	HART10 failure	= BIT-14	
						R95-8	HART11 failure	= BIT-15	
129	2	unsigned integer 16-bit	R	JB	30	Message registers	reserved	0000 hex	00 00
						R95-9	HART12 failure	= BIT-0	
						H46-5	I9 inp.param.	= BIT-1	
						H46-6	I10 inp.param.	= BIT-2	
						H46-7	I11 inp.param.	= BIT-3	
						H46-8	I12 inp.param.	= BIT-4	
						R94-2	I9 failure	= BIT-5	
						R94-3	I10 failure	= BIT-6	
						R94-4	I11 failure	= BIT-7	
						R94-5	I12 failure	= BIT-8	
						H48-6	PT3 inp.param.	= BIT-9	
						H48-7	PT4 inp.param.	= BIT-10	
						R94-6	PT3 failure	= BIT-11	
						R94-7	PT4 failure	= BIT-12	
						R71-4	NMA ADC	= BIT-13	
						R71-5	NMA overload	= BIT-14	
						R71-6	NMA OC PT100	= BIT-15	
130	2	unsigned integer 16-bit	R	JB	31	Message registers	reserved	0000 hex	00 00
						R71-7	NMA OC mainch.	= BIT-0	
						R71-8	NMA OC ref.ch.	= BIT-1	
						R71-9	NMA OC ENCO	= BIT-2	
						R72-0	NMB ADC	= BIT-3	

						R72-1	NMB overload	= BIT-4	
						R72-2	NMB OC PT100	= BIT-5	
						R72-3	NMB OC Messk.	= BIT-6	
						R72-4	NMB OC Vgl.k.	= BIT-7	
						R72-5	NMB OC ENCO	= BIT-8	
						H76-0	Module 1A false	= BIT-9	
						H76-1	Module 1B false	= BIT-10	
						H76-2	Module 2A false	= BIT-11	
						H76-3	Module 2B false	= BIT-12	
						H76-4	Module 3A false	= BIT-13	
						H76-5	Module 3B false	= BIT-14	
131	2	unsigned integer 16-bit	R	JB	32	Message registers	reserved	0000 hex	00 00
132	2	unsigned integer 16-bit	R	JB	33	Message registers	reserved	0000 hex	00 00
133	2	unsigned integer 16-bit	R	JB	34	Message registers	reserved	0000 hex	00 00
134	2	unsigned integer 16-bit	R	JB	35	Message registers	reserved	0000 hex	00 00
135	2	unsigned integer 16-bit	R	JB	36	Message registers	reserved	0000 hex	00 00
136	2	unsigned integer 16-bit	R	JB	37	Message registers	reserved	0000 hex	00 00
137	2	unsigned integer 16-bit	R	JB	38	Message registers	reserved	0000 hex	00 00
138	2	unsigned integer 16-bit	R	JB	39	Message registers	reserved	0000 hex	00 00
139	2	unsigned integer 16-bit	R	JB	40	Message registers	reserved	0000 hex	00 00
140	2	unsigned integer 16-bit	R	JB	41	Message registers	reserved	0000 hex	00 00
141	2	unsigned integer 16-bit	R	JB	42	Message registers	reserved	0000 hex	00 00
142	2	unsigned integer 16-bit	R	JB	43	Message registers	reserved	0000 hex	00 00
143	2	unsigned integer 16-bit	R	JB	44	Message registers	reserved	0000 hex	00 00
144	2	unsigned integer 16-bit	R	JB	45	Message registers	reserved	0000 hex	00 00
145	2	unsigned integer 16-bit	R	JB	46	Message registers	reserved	0000 hex	00 00
146	2	unsigned integer 16-bit	R	JB	47	Message registers	reserved	0000 hex	00 00
147	2	unsigned integer 16-bit	R	JB	48	Message registers	reserved	0000 hex	00 00
148	2	unsigned integer 16-bit	R	JB	49	Message registers	reserved	0000 hex	00 00
149	2	unsigned integer 16-bit	R	JB	50	Message registers	reserved	0000 hex	00 00

Standard register block

200	4	float IEEE 754	R	HB	1	Energy flow rate	Measured value	7618,8 kW	45 EE 16 0C
202	4	float IEEE 754	R	HC	1	Mass flow rate	Measured value	533,21 kg/h	44 05 4D 9F
204	4	float IEEE 754	R	HD	1	Vol.flow rate(B)	Measured value	667,43 m3/h	44 26 DB C2
206	4	float IEEE 754	R	HE	1	Flow rate(M)	Measured value	117,589 m3/h	42 EB 2D C8
208	4	float IEEE 754	R	HF	1	Corr.flow rate(M)	Measured value	117,589 m3/h	42 EB 2D C8
210	4	float IEEE 754	R	GG	1	Flow	Reynolds number	78577	47 99 78 A2
212	4	float IEEE 754	R	GG	2	Flow	Flow velocity	1,040 m/s	3F 85 15 80
214	4	float IEEE 754	R	GC	1	kv factor	Cur.kv factor	6123,00000 P/m3	45 BF 58 00
216	4	float IEEE 754	R	LL	1	Synchronous run	Comparative error	0,0000 %	00 00 00 00
218	4	float IEEE 754	R	CC	1	K coefficient	K coefficient	0,98896	3F 7D 2C 45
220	4	float IEEE 754	R	CC	2	K coefficient	Compr.factor(M)	0,986195	3F 7C 77 46
222	4	float IEEE 754	R	CC	3	K coefficient	Compr.factor(B)	0,997207	3F 7F 48 FC
224	4	float IEEE 754	R	CB	1	C factor	Conversion factor	5,6760	40 B5 A1 87
300	4	float IEEE 754	R	AB	1	Absolute pressure	Measured value	6,000 bar	40 C0 00 00
302	4	float IEEE 754	R	AC	1	Gas temperature	Measured value	15,00 °C	41 70 00 00
304	4	float IEEE 754	R	AD	1	Sup.calorific val.	Measured value	11,415 kWh/m3	41 36 A3 D7

306	4	float IEEE 754	R	AE	1	Standard density	Measured value	0,7989 kg/m3	3F 4C 84 B6
308	4	float IEEE 754	R	AF	1	Relative density	Measured value	0,6179	3F 1E 2E D7
310	4	float IEEE 754	R	AG	1	Density	Measured value	35,000 kg/m3	42 0C 00 00
312	4	float IEEE 754	R	AH	1	Dens.transd.temp.	Measured value	10,00 °C	41 20 00 00
314	4	float IEEE 754	R	AI	1	VOS temperature	Measured value	10,00 °C	41 20 00 00
316	4	float IEEE 754	R	AJ	1	Vel. of sound(M)	Measured value	431,100 m/s	43 D7 8C CD
318	4	float IEEE 754	R	AK	1	Vel. of sound(B)	Measured value	431,100 m/s	43 D7 8C CD
320	4	float IEEE 754	R	AM	1	Viscosity	Measured value	12,0000 µPas	41 40 00 00
400	4	float IEEE 754	R	BB	1	Carbon dioxide	Norm.mol.fraction	1,260 mole%	3F A1 47 AE
402	4	float IEEE 754	R	BC	1	Hydrogen	Norm.mol.fraction	0,000 mole%	00 00 00 00
404	4	float IEEE 754	R	BD	1	Nitrogen	Norm.mol.fraction	0,000 mole%	00 00 00 00
406	4	float IEEE 754	R	BE	1	Methane	Norm.mol.fraction	98,740 mole%	42 C5 7A E1
408	4	float IEEE 754	R	BF	1	Ethane	Norm.mol.fraction	0,000 mole%	00 00 00 00
410	4	float IEEE 754	R	BG	1	Propane	Norm.mol.fraction	0,000 mole%	00 00 00 00
412	4	float IEEE 754	R	BH	1	N-butane	Norm.mol.fraction	0,000 mole%	00 00 00 00
414	4	float IEEE 754	R	BI	1	I-butane	Norm.mol.fraction	0,000 mole%	00 00 00 00
416	4	float IEEE 754	R	BJ	1	N-pentane	Norm.mol.fraction	0,000 mole%	00 00 00 00
418	4	float IEEE 754	R	BK	1	I-pentane	Norm.mol.fraction	0,000 mole%	00 00 00 00
420	4	float IEEE 754	R	BL	1	Neo-pentane	Norm.mol.fraction	0,000 mole%	00 00 00 00
422	4	float IEEE 754	R	BM	1	Hexane	Norm.mol.fraction	0,000 mole%	00 00 00 00
424	4	float IEEE 754	R	BN	1	Heptane	Norm.mol.fraction	0,000 mole%	00 00 00 00
426	4	float IEEE 754	R	BO	1	Octane	Norm.mol.fraction	0,000 mole%	00 00 00 00
428	4	float IEEE 754	R	BP	1	Nonane	Norm.mol.fraction	0,000 mole%	00 00 00 00
430	4	float IEEE 754	R	BQ	1	Decane	Norm.mol.fraction	0,000 mole%	00 00 00 00
432	4	float IEEE 754	R	BR	1	Hydrogen sulphide	Norm.mol.fraction	0,000 mole%	00 00 00 00
434	4	float IEEE 754	R	BS	1	Water	Norm.mol.fraction	0,000 mole%	00 00 00 00
436	4	float IEEE 754	R	BT	1	Helium	Norm.mol.fraction	0,000 mole%	00 00 00 00
438	4	float IEEE 754	R	BU	1	Oxygen	Norm.mol.fraction	0,000 mole%	00 00 00 00
440	4	float IEEE 754	R	BV	1	Carbon monoxide	Norm.mol.fraction	0,000 mole%	00 00 00 00
442	4	float IEEE 754	R	BW	1	Ethene	Norm.mol.fraction	0,000 mole%	00 00 00 00
444	4	float IEEE 754	R	BX	1	Propene	Norm.mol.fraction	0,000 mole%	00 00 00 00
446	4	float IEEE 754	R	BY	1	Argon	Norm.mol.fraction	0,000 mole%	00 00 00 00
450	4	signed integer 32-bit	R	JA	3	Fault messages	No. of alarms	0	00 00 00 00
452	4	signed integer 32-bit	R	JA	4	Fault messages	No. of warnings	0	00 00 00 00
454	4	signed integer 32-bit	R	JA	5	Fault messages	No. of notes	1	00 00 00 01
456	4	signed integer 32-bit	R	EC	2	Billing mode	Current bill. mode	1	00 00 00 01
458	4	signed integer 32-bit	R	ED	4	Access	Current access	Calibration lock	00 00 00 03
							Options:	Closed	= 0
								Single code	= 1
								Double code	= 2
								Calibration lock	= 3
								Super user	= 4
460	4	signed integer 32-bit	R	EF	1	Tables	Selected table	1	00 00 00 01
462	4	signed integer 32-bit	R/W	EL	1	Description site	Measuring priority	Main measurement	00 00 00 00
							Options:	Main measurement	= 0
								Comparison meas.	= 1
464	4	signed integer 32-bit	R/W	EL	16	Description site	Line number	1	00 00 00 01
466	4	unsigned integer 32-bit	R	FD	3	Computing cycle	Cycle counter	126432	00 01 ED E0
468	4	unsigned integer 32-bit	R	KA	2	Times	UTC	30-01-2007 12:26:34	45 BF 39 7A
470	4	signed integer 32-bit	R	KA	3	Times	Diff. to UTC	3600 s	00 00 0E 10

472	4	unsigned integer 32-bit	R	KA	5	Times	Seconds since start	6287 s	00 00 18 8F
500	4	unsigned integer 32-bit	R	LB	1	Totalizer BM1	Vol. at base cond.	1497051 m3	00 16 D7 DB
502	4	float IEEE 754	R	LB	2	Totalizer BM1	Vol.base fraction	,750747 m3	3F 40 30 FD
504	4	unsigned integer 32-bit	R	LB	3	Totalizer BM1	Quantity of energy	56989 GJ	00 00 DE 9D
506	4	float IEEE 754	R	LB	4	Totalizer BM1	QOE fraction	,634364 GJ	3F 22 65 B4
508	4	unsigned integer 32-bit	R	LB	5	Totalizer BM1	Corr.vol.meas.	34901 m3	00 00 88 55
510	4	float IEEE 754	R	LB	6	Totalizer BM1	Corr.vol.meas.frac.	,736567 m3	3F 3C 8F A2
512	4	unsigned integer 32-bit	R	LB	7	Totalizer BM1	Original totalizer	0 m3	00 00 00 00
514	4	float IEEE 754	R	LB	8	Totalizer BM1	Orig.tot.fraction	,000000 m3	00 00 00 00
516	4	unsigned integer 32-bit	R	LB	9	Totalizer BM1	Mass	1187876 kg	00 12 20 24
518	4	float IEEE 754	R	LB	10	Totalizer BM1	Mass fraction	,693079 kg	3F 31 6D 9F
520	4	unsigned integer 32-bit	R	LB	11	Totalizer BM1	Vol. at meas.cond.	33776 m3	00 00 83 F0
522	4	float IEEE 754	R	LB	12	Totalizer BM1	Vol.meas.fraction	,798301 m3	3F 4C 5D 76
550	4	unsigned integer 32-bit	R	LC	1	Dist.tot. BM1	Vol. at base cond.	92268 m3	00 01 68 6C
552	4	float IEEE 754	R	LC	2	Dist.tot. BM1	Vol.base fraction	,888237 m3	3F 63 63 81
554	4	unsigned integer 32-bit	R	LC	3	Dist.tot. BM1	Quantity of energy	3449 GJ	00 00 0D 79
556	4	float IEEE 754	R	LC	4	Dist.tot. BM1	QOE fraction	,789996 GJ	3F 4A 3D 2C
558	4	unsigned integer 32-bit	R	LC	5	Dist.tot. BM1	Corr.vol.meas.	2519 m3	00 00 09 D7
560	4	float IEEE 754	R	LC	6	Dist.tot. BM1	Corr.vol.meas.frac.	,912625 m3	3F 69 A1 C3
562	4	unsigned integer 32-bit	R	LC	7	Dist.tot. BM1	Orig. totalizer	0 m3	00 00 00 00
564	4	float IEEE 754	R	LC	8	Dist.tot. BM1	Orig.tot.fraction	,000000 m3	00 00 00 00
566	4	unsigned integer 32-bit	R	LC	9	Dist.tot. BM1	Mass	70535 kg	00 01 13 87
568	4	float IEEE 754	R	LC	10	Dist.tot. BM1	Mass fraction	,788256 kg	3F 49 CB 1F
570	4	unsigned integer 32-bit	R	LC	11	Dist.tot. BM1	Vol. at meas.cond.	2519 m3	00 00 09 D7
572	4	float IEEE 754	R	LC	12	Dist.tot. BM1	Vol.meas.fraction	,912625 m3	3F 69 A1 C3
600	4	unsigned integer 32-bit	R	LD	1	Totalizer BM2	Vol. at base cond.	404812 m3	00 06 2D 4C
602	4	float IEEE 754	R	LD	2	Totalizer BM2	Vol.base fraction	,102208 m3	3D D1 52 9B
604	4	unsigned integer 32-bit	R	LD	3	Totalizer BM2	Quantity of energy	15030 GJ	00 00 3A B6
606	4	float IEEE 754	R	LD	4	Totalizer BM2	QOE fraction	,698563 GJ	3F 32 D5 0C
608	4	unsigned integer 32-bit	R	LD	5	Totalizer BM2	Corr.vol.meas.	7684 m3	00 00 1E 04
610	4	float IEEE 754	R	LD	6	Totalizer BM2	Corr.vol.meas.frac.	,185367 m3	3E 3D D0 C4
612	4	unsigned integer 32-bit	R	LD	7	Totalizer BM2	Original totalizer	0 m3	00 00 00 00
614	4	float IEEE 754	R	LD	8	Totalizer BM2	Orig.tot.fraction	,000000 m3	00 00 00 00
616	4	unsigned integer 32-bit	R	LD	9	Totalizer BM2	Mass	320347 kg	00 04 E3 5B
618	4	float IEEE 754	R	LD	10	Totalizer BM2	Mass fraction	,226074 kg	3E 67 7F EE
620	4	unsigned integer 32-bit	R	LD	11	Totalizer BM2	Vol. at meas.cond.	7684 m3	00 00 1E 04
622	4	float IEEE 754	R	LD	12	Totalizer BM2	Vol.meas.fraction	,185367 m3	3E 3D D0 C4
650	4	unsigned integer 32-bit	R	LE	1	Dist.tot. BM2	Vol. at base cond.	2535 m3	00 00 09 E7
652	4	float IEEE 754	R	LE	2	Dist.tot. BM2	Vol.base fraction	,629117 m3	3F 21 0D CE
654	4	unsigned integer 32-bit	R	LE	3	Dist.tot. BM2	Quantity of energy	94 GJ	00 00 00 5E
656	4	float IEEE 754	R	LE	4	Dist.tot. BM2	QOE fraction	,778777 GJ	3F 47 5D EF
658	4	unsigned integer 32-bit	R	LE	5	Dist.tot. BM2	Corr.vol.meas.	109 m3	00 00 00 6D
660	4	float IEEE 754	R	LE	6	Dist.tot. BM2	Corr.vol.meas.frac.	,587947 m3	3F 16 83 B3
662	4	unsigned integer 32-bit	R	LE	7	Dist.tot. BM2	Orig. totalizer	0 m3	00 00 00 00
664	4	float IEEE 754	R	LE	8	Dist.tot. BM2	Orig.tot.fraction	,000000 m3	00 00 00 00
666	4	unsigned integer 32-bit	R	LE	9	Dist.tot. BM2	Mass	2034 kg	00 00 07 F2
668	4	float IEEE 754	R	LE	10	Dist.tot. BM2	Mass fraction	,886222 kg	3F 62 DF 6D
670	4	unsigned integer 32-bit	R	LE	11	Dist.tot. BM2	Vol. at meas.cond.	109 m3	00 00 00 6D
672	4	float IEEE 754	R	LE	12	Dist.tot. BM2	Vol.meas.fraction	,587947 m3	3F 16 83 B3
700	4	unsigned integer 32-bit	R	LF	1	Totalizer AB3	Vol. at base cond.	0 m3	00 00 00 00

702	4	float IEEE 754	R	LF	2	Totalizer AB3	Vol.base fraction	,000000 m3	00 00 00 00
704	4	unsigned integer 32-bit	R	LF	3	Totalizer AB3	Quantity of energy	0 GJ	00 00 00 00
706	4	float IEEE 754	R	LF	4	Totalizer AB3	QOE fraction	,000000 GJ	00 00 00 00
708	4	unsigned integer 32-bit	R	LF	5	Totalizer AB3	Corr.vol.meas.	0 m3	00 00 00 00
710	4	float IEEE 754	R	LF	6	Totalizer AB3	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
712	4	unsigned integer 32-bit	R	LF	7	Totalizer AB3	Original totalizer	0 m3	00 00 00 00
714	4	float IEEE 754	R	LF	8	Totalizer AB3	Orig.tot.fraction	,000000 m3	00 00 00 00
716	4	unsigned integer 32-bit	R	LF	9	Totalizer AB3	Mass	0 kg	00 00 00 00
718	4	float IEEE 754	R	LF	10	Totalizer AB3	Mass fraction	,000000 kg	00 00 00 00
720	4	unsigned integer 32-bit	R	LF	11	Totalizer AB3	Vol. at meas.cond.	0 m3	00 00 00 00
722	4	float IEEE 754	R	LF	12	Totalizer AB3	Vol.meas.fraction	,000000 m3	00 00 00 00
750	4	unsigned integer 32-bit	R	LG	1	Dist.tot. BM3	Vol. at base cond.	0 m3	00 00 00 00
752	4	float IEEE 754	R	LG	2	Dist.tot. BM3	Vol.base fraction	,000000 m3	00 00 00 00
754	4	unsigned integer 32-bit	R	LG	3	Dist.tot. BM3	Quantity of energy	0 GJ	00 00 00 00
756	4	float IEEE 754	R	LG	4	Dist.tot. BM3	QOE fraction	,000000 GJ	00 00 00 00
758	4	unsigned integer 32-bit	R	LG	5	Dist.tot. BM3	Corr.vol.meas.	0 m3	00 00 00 00
760	4	float IEEE 754	R	LG	6	Dist.tot. BM3	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
762	4	unsigned integer 32-bit	R	LG	7	Dist.tot. BM3	Orig. totalizer	0 m3	00 00 00 00
764	4	float IEEE 754	R	LG	8	Dist.tot. BM3	Orig.tot.fraction	,000000 m3	00 00 00 00
766	4	unsigned integer 32-bit	R	LG	9	Dist.tot. BM3	Mass	0 kg	00 00 00 00
768	4	float IEEE 754	R	LG	10	Dist.tot. BM3	Mass fraction	,000000 kg	00 00 00 00
770	4	unsigned integer 32-bit	R	LG	11	Dist.tot. BM3	Vol. at meas.cond.	0 m3	00 00 00 00
772	4	float IEEE 754	R	LG	12	Dist.tot. BM3	Vol.meas.fraction	,000000 m3	00 00 00 00
800	4	unsigned integer 32-bit	R	LH	1	Totalizer BM4	Vol. at base cond.	0 m3	00 00 00 00
802	4	float IEEE 754	R	LH	2	Totalizer BM4	Vol.base fraction	,000000 m3	00 00 00 00
804	4	unsigned integer 32-bit	R	LH	3	Totalizer BM4	Quantity of energy	0 GJ	00 00 00 00
806	4	float IEEE 754	R	LH	4	Totalizer BM4	QOE fraction	,000000 GJ	00 00 00 00
808	4	unsigned integer 32-bit	R	LH	5	Totalizer BM4	Corr.vol.meas.	0 m3	00 00 00 00
810	4	float IEEE 754	R	LH	6	Totalizer BM4	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
812	4	unsigned integer 32-bit	R	LH	7	Totalizer BM4	Original totalizer	0 m3	00 00 00 00
814	4	float IEEE 754	R	LH	8	Totalizer BM4	Orig.tot.fraction	,000000 m3	00 00 00 00
816	4	unsigned integer 32-bit	R	LH	9	Totalizer BM4	Mass	0 kg	00 00 00 00
818	4	float IEEE 754	R	LH	10	Totalizer BM4	Mass fraction	,000000 kg	00 00 00 00
820	4	unsigned integer 32-bit	R	LH	11	Totalizer BM4	Vol. at meas.cond.	0 m3	00 00 00 00
822	4	float IEEE 754	R	LH	12	Totalizer BM4	Vol.meas.fraction	,000000 m3	00 00 00 00
850	4	unsigned integer 32-bit	R	LI	1	Dist.tot. BM4	Vol. at base cond.	0 m3	00 00 00 00
852	4	float IEEE 754	R	LI	2	Dist.tot. BM4	Vol.base fraction	,000000 m3	00 00 00 00
854	4	unsigned integer 32-bit	R	LI	3	Dist.tot. BM4	Quantity of energy	0 GJ	00 00 00 00
856	4	float IEEE 754	R	LI	4	Dist.tot. BM4	QOE fraction	,000000 GJ	00 00 00 00
858	4	unsigned integer 32-bit	R	LI	5	Dist.tot. BM4	Corr.vol.meas.	0 m3	00 00 00 00
860	4	float IEEE 754	R	LI	6	Dist.tot. BM4	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
862	4	unsigned integer 32-bit	R	LI	7	Dist.tot. BM4	Orig. totalizer	0 m3	00 00 00 00
864	4	float IEEE 754	R	LI	8	Dist.tot. BM4	Orig.tot.fraction	,000000 m3	00 00 00 00
866	4	unsigned integer 32-bit	R	LI	9	Dist.tot. BM4	Mass	0 kg	00 00 00 00
868	4	float IEEE 754	R	LI	10	Dist.tot. BM4	Mass fraction	,000000 kg	00 00 00 00
870	4	unsigned integer 32-bit	R	LI	11	Dist.tot. BM4	Vol. at meas.cond.	0 m3	00 00 00 00
872	4	float IEEE 754	R	LI	12	Dist.tot. BM4	Vol.meas.fraction	,000000 m3	00 00 00 00
900	4	float IEEE 754	R	MB	1	Current output 1	Current	5,068 mA	40 A2 2C 30
902	4	float IEEE 754	R	MC	1	Current output 2	Current	19,000 mA	41 98 00 00
904	4	float IEEE 754	R	MD	1	Current output 3	Current	19,000 mA	41 98 00 00

906	4	float IEEE 754	R	ME	1	Current output 4	Current	19,000 mA	41 98 00 00
908	4	signed integer 32-bit	R	FG	2	Hardware test	Alarm contact	0	00 00 00 00
910	4	signed integer 32-bit	R	FG	3	Hardware test	Warning contact	0	00 00 00 00
912	4	float IEEE 754	R	MR	1	Frequency output 1	Cur. frequency	200,000 Hz	43 48 00 00
914	4	signed integer 32-bit	R	FG	7	Hardware test	Power LED	Flashes	00 00 00 02
							Options:	OFF	= 0
								ON	= 1
								Flashes	= 2
916	4	signed integer 32-bit	R	FG	8	Hardware test	Run LED	ON	00 00 00 01
							Options:	OFF	= 0
								ON	= 1
								Flashes	= 2
918	4	signed integer 32-bit	R	FG	9	Hardware test	Warning LED	OFF	00 00 00 00
							Options:	OFF	= 0
								ON	= 1
								Flashes	= 2
920	4	signed integer 32-bit	R	FG	10	Hardware test	Alarm LED	ON	00 00 00 01
							Options:	OFF	= 0
								ON	= 1
								Flashes	= 2
922	2	unsigned integer 16-bit	R	MF	1	Pulse output 1	Pulse totalizer	0 pulses	00 00
923	2	unsigned integer 16-bit	R	MG	1	Pulse output 2	Pulse totalizer	11 pulses	00 0B
924	2	unsigned integer 16-bit	R	MH	1	Pulse output 3	Pulse totalizer	0 pulses	00 00
925	2	unsigned integer 16-bit	R	MI	1	Pulse output 4	Pulse totalizer	11 pulses	00 0B
926	2	unsigned integer 16-bit	R	FG	4	Hardware test	Contact output	0001 hex	00 01
948	2	unsigned integer 16-bit	R	NT	2	Contact inputs	Input pattern	51	00 33
949	2	signed integer 16-bit	R	FG	12	Hardware test	Calibration lock	1	00 01
950	4	float IEEE 754	R	NA	1	Current input 1	Current 1	0,0000 mA	00 00 00 00
952	4	float IEEE 754	R	NB	1	Current input 2	Current 2	0,0000 mA	00 00 00 00
954	4	float IEEE 754	R	NC	1	Current input 3	Current 3	0,0001 mA	38 9C F1 30
956	4	float IEEE 754	R	ND	1	Current input 4	Current 4	0,0000 mA	00 00 00 00
958	4	float IEEE 754	R	NE	1	Current input 5	Current 5	0,0000 mA	00 00 00 00
960	4	float IEEE 754	R	NF	1	Current input 6	Current 6	0,0000 mA	00 00 00 00
962	4	float IEEE 754	R	NG	1	Current input 7	Current 7	0,0000 mA	00 00 00 00
964	4	float IEEE 754	R	NH	1	Current input 8	Current 8	0,0000 mA	00 00 00 00
966	4	float IEEE 754	R	NI	1	Resist.inp. 1	Resistance 1	109,96 Ω	42 DB EC E4
968	4	float IEEE 754	R	NJ	1	Resist.inp. 2	Resistance 2	0,00 Ω	00 00 00 00
970	4	float IEEE 754	R	NL	1	Frequency input 1	Frequency 1	200,0000 Hz	43 48 00 00
972	4	float IEEE 754	R	NM	1	Frequency input 2	Frequency 2	0,0000 Hz	00 00 00 00
974	4	float IEEE 754	R	NN	1	Frequency input 3	Frequency 3	0,0000 Hz	00 00 00 00
976	4	float IEEE 754	R	NO	1	Frequency input 4	Frequency 4	0,0000 Hz	00 00 00 00
978	4	float IEEE 754	R	NP	1	Frequency input 5	Frequency 5	0,0000 Hz	00 00 00 00
980	4	float IEEE 754	R	NQ	1	Frequency input 6	Frequency 6	0,0000 Hz	00 00 00 00
982	4	float IEEE 754	R	NR	1	Frequency input 7	Frequency 7	0,0000 Hz	00 00 00 00
984	4	float IEEE 754	R	NS	1	Frequency input 8	Frequency 8	0,0000 Hz	00 00 00 00
986	4	float IEEE 754	R	NA	2	Current input 1	HART measured value	0	00 00 00 00
988	4	float IEEE 754	R	NB	2	Current input 2	HART measured value	0	00 00 00 00
990	4	float IEEE 754	R	NC	2	Current input 3	HART measured value	0	00 00 00 00

992	4	float IEEE 754	R	ND	2	Current input 4	HART measured value	0	00 00 00 00
994	4	float IEEE 754	R	NE	2	Current input 5	HART measured value	0	00 00 00 00
996	4	float IEEE 754	R	NF	2	Current input 6	HART measured value	0	00 00 00 00
998	4	float IEEE 754	R	AL	1	Device temperature	Measured value	28,1 °C	41 E0 A4 11
1100	4	float IEEE 754	R	AB	35	Absolute pressure	Minute mean	6,000 bar	40 C0 00 00
1102	4	float IEEE 754	R	AC	35	Gas temperature	Minute mean	15,00 °C	41 70 00 00
1104	4	float IEEE 754	R	AD	35	Sup.calorific val.	Minute mean	11,415 kWh/m3	41 36 A3 D7
1106	4	float IEEE 754	R	AE	35	Standard density	Minute mean	0,7989 kg/m3	3F 4C 84 B6
1108	4	float IEEE 754	R	AF	35	Relative density	Minute mean	0,6179	3F 1E 2E D7
1110	4	float IEEE 754	R	AG	35	Density	Minute mean	35,000 kg/m3	42 0C 00 00
1112	4	float IEEE 754	R	AH	35	Dens.transd.temp.	Minute mean	10,00 °C	41 20 00 00
1114	4	float IEEE 754	R	AI	35	VOS temperature	Minute mean	10,00 °C	41 20 00 00
1116	4	float IEEE 754	R	AJ	35	Vel. of sound(M)	Minute mean	431,100 m/s	43 D7 8C CD
1118	4	float IEEE 754	R	AK	35	Vel. of sound(B)	Minute mean	431,100 m/s	43 D7 8C CD
1120	4	float IEEE 754	R	BB	35	Carbon dioxide	Minute mean	1,260 mole%	3F A1 47 AE
1122	4	float IEEE 754	R	BC	35	Hydrogen	Minute mean	0,000 mole%	00 00 00 00
1124	4	float IEEE 754	R	BD	35	Nitrogen	Minute mean	0,000 mole%	00 00 00 00
1126	4	float IEEE 754	R	CB	35	C factor	Minute mean	5,6760	40 B5 A1 87
1128	4	float IEEE 754	R	CC	35	K coefficient	Minute mean	0,98896	3F 7D 2C 45
1130	4	float IEEE 754	R	HB	35	Energy flow rate	Minute mean	7618,8 kW	45 EE 16 0C
1132	4	float IEEE 754	R	HC	35	Mass flow rate	Minute mean	533,21 kg/h	44 05 4D 9F
1134	4	float IEEE 754	R	HD	35	Vol.flow rate(B)	Minute mean	667,43 m3/h	44 26 DB C2
1136	4	float IEEE 754	R	HE	35	Flow rate(M)	Minute mean	117,589 m3/h	42 EB 2D C8
1138	4	float IEEE 754	R	HF	35	Corr.flow rate(M)	Minute mean	117,589 m3/h	42 EB 2D C8
1140	4	float IEEE 754	R	AM	35	Viscosity	Minute mean	12,0000 µPas	41 40 00 00
1200	4	float IEEE 754	R	AB	36	Absolute pressure	Hourly mean	6,000 bar	40 C0 00 00
1202	4	float IEEE 754	R	AC	36	Gas temperature	Hourly mean	15,00 °C	41 70 00 00
1204	4	float IEEE 754	R	AD	36	Sup.calorific val.	Hourly mean	11,415 kWh/m3	41 36 A3 D7
1206	4	float IEEE 754	R	AE	36	Standard density	Hourly mean	0,7989 kg/m3	3F 4C 84 B6
1208	4	float IEEE 754	R	AF	36	Relative density	Hourly mean	0,6179	3F 1E 2E D7
1210	4	float IEEE 754	R	AG	36	Density	Hourly mean	35,000 kg/m3	42 0C 00 00
1212	4	float IEEE 754	R	AH	36	Dens.transd.temp.	Hourly mean	10,00 °C	41 20 00 00
1214	4	float IEEE 754	R	AI	36	VOS temperature	Hourly mean	10,00 °C	41 20 00 00
1216	4	float IEEE 754	R	AJ	36	Vel. of sound(M)	Hourly mean	431,100 m/s	43 D7 8C CD
1218	4	float IEEE 754	R	AK	36	Vel. of sound(B)	Hourly mean	431,100 m/s	43 D7 8C CD
1220	4	float IEEE 754	R	BB	36	Carbon dioxide	Hourly mean	1,260 mole%	3F A1 47 AE
1222	4	float IEEE 754	R	BC	36	Hydrogen	Hourly mean	0,000 mole%	00 00 00 00
1224	4	float IEEE 754	R	BD	36	Nitrogen	Hourly mean	0,000 mole%	00 00 00 00
1226	4	float IEEE 754	R	CB	36	C factor	Hourly mean	5,6760	40 B5 A1 87
1228	4	float IEEE 754	R	CC	36	K coefficient	Hourly mean	0,98896	3F 7D 2C 45
1230	4	float IEEE 754	R	HB	36	Energy flow rate	Hourly mean	7618,8 kW	45 EE 16 0A
1232	4	float IEEE 754	R	HC	36	Mass flow rate	Hourly mean	533,21 kg/h	44 05 4D 9F
1234	4	float IEEE 754	R	HD	36	Vol.flow rate(B)	Hourly mean	667,43 m3/h	44 26 DB C1
1236	4	float IEEE 754	R	HE	36	Flow rate(M)	Hourly mean	117,589 m3/h	42 EB 2D C6
1238	4	float IEEE 754	R	HF	36	Corr.flow rate(M)	Hourly mean	117,589 m3/h	42 EB 2D C6
1240	4	float IEEE 754	R	AM	36	Viscosity	Hourly mean	12,0000 µPas	41 40 00 00
1500	4	unsigned integer 32-bit	R	LB	61	Freeze TOT BM1	Vol. at base cond.	0 m3	00 00 00 00
1502	4	float IEEE 754	R	LB	62	Freeze TOT BM1	Vol.base fraction	,000000 m3	00 00 00 00

1504	4	unsigned integer 32-bit	R	LB	63	Freeze TOT BM1	Quantity of energy	0 GJ	00 00 00 00
1506	4	float IEEE 754	R	LB	64	Freeze TOT BM1	QOE fraction	,000000 GJ	00 00 00 00
1508	4	unsigned integer 32-bit	R	LB	65	Freeze TOT BM1	Corr.vol.meas.	0 m3	00 00 00 00
1510	4	float IEEE 754	R	LB	66	Freeze TOT BM1	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1512	4	unsigned integer 32-bit	R	LB	67	Freeze TOT BM1	Orig. totalizer	0 m3	00 00 00 00
1514	4	float IEEE 754	R	LB	68	Freeze TOT BM1	Orig.tot.frac.	,000000 m3	00 00 00 00
1516	4	unsigned integer 32-bit	R	LB	69	Freeze TOT BM1	Mass	0 kg	00 00 00 00
1518	4	float IEEE 754	R	LB	70	Freeze TOT BM1	Mass fraction	,000000 kg	00 00 00 00
1520	4	unsigned integer 32-bit	R	LB	71	Freeze TOT BM1	Vol. at meas.cond.	0 m3	00 00 00 00
1522	4	float IEEE 754	R	LB	72	Freeze TOT BM1	Vol.meas.fraction	,000000 m3	00 00 00 00
1550	4	unsigned integer 32-bit	R	LC	61	Freeze DTOT BM1	Vol. at base cond.	0 m3	00 00 00 00
1552	4	float IEEE 754	R	LC	62	Freeze DTOT BM1	Vol.base fraction	,000000 m3	00 00 00 00
1554	4	unsigned integer 32-bit	R	LC	63	Freeze DTOT BM1	Quantity of energy	0 GJ	00 00 00 00
1556	4	float IEEE 754	R	LC	64	Freeze DTOT BM1	QOE fraction	,000000 GJ	00 00 00 00
1558	4	unsigned integer 32-bit	R	LC	65	Freeze DTOT BM1	Corr.vol.meas.	0 m3	00 00 00 00
1560	4	float IEEE 754	R	LC	66	Freeze DTOT BM1	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1562	4	unsigned integer 32-bit	R	LC	67	Freeze DTOT BM1	Orig. totalizer	0 m3	00 00 00 00
1564	4	float IEEE 754	R	LC	68	Freeze DTOT BM1	Orig.tot.fraction	,000000 m3	00 00 00 00
1566	4	unsigned integer 32-bit	R	LC	69	Freeze DTOT BM1	Mass	0 kg	00 00 00 00
1568	4	float IEEE 754	R	LC	70	Freeze DTOT BM1	Mass fraction	,000000 kg	00 00 00 00
1570	4	unsigned integer 32-bit	R	LC	71	Freeze DTOT BM1	Vol. at meas.cond.	0 m3	00 00 00 00
1572	4	float IEEE 754	R	LC	72	Freeze DTOT BM1	Vol.meas.fraction	,000000 m3	00 00 00 00
1600	4	unsigned integer 32-bit	R	LD	61	Freeze TOT BM2	Vol. at base cond.	0 m3	00 00 00 00
1602	4	float IEEE 754	R	LD	62	Freeze TOT BM2	Vol.base fraction	,000000 m3	00 00 00 00
1604	4	unsigned integer 32-bit	R	LD	63	Freeze TOT BM2	Quantity of energy	0 GJ	00 00 00 00
1606	4	float IEEE 754	R	LD	64	Freeze TOT BM2	QOE fraction	,000000 GJ	00 00 00 00
1608	4	unsigned integer 32-bit	R	LD	65	Freeze TOT BM2	Corr.vol.meas.	0 m3	00 00 00 00
1610	4	float IEEE 754	R	LD	66	Freeze TOT BM2	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1612	4	unsigned integer 32-bit	R	LD	67	Freeze TOT BM2	Orig. totalizer	0 m3	00 00 00 00
1614	4	float IEEE 754	R	LD	68	Freeze TOT BM2	Orig.tot.frac.	,000000 m3	00 00 00 00
1616	4	unsigned integer 32-bit	R	LD	69	Freeze TOT BM2	Mass	0 kg	00 00 00 00
1618	4	float IEEE 754	R	LD	70	Freeze TOT BM2	Mass fraction	,000000 kg	00 00 00 00
1620	4	unsigned integer 32-bit	R	LD	71	Freeze TOT BM2	Vol. at meas.cond.	0 m3	00 00 00 00
1622	4	float IEEE 754	R	LD	72	Freeze TOT BM2	Vol.meas.fraction	,000000 m3	00 00 00 00
1650	4	unsigned integer 32-bit	R	LE	61	Freeze DTOT BM2	Vol. at base cond.	0 m3	00 00 00 00
1652	4	float IEEE 754	R	LE	62	Freeze DTOT BM2	Vol.base fraction	,000000 m3	00 00 00 00
1654	4	unsigned integer 32-bit	R	LE	63	Freeze DTOT BM2	Quantity of energy	0 GJ	00 00 00 00
1656	4	float IEEE 754	R	LE	64	Freeze DTOT BM2	QOE fraction	,000000 GJ	00 00 00 00
1658	4	unsigned integer 32-bit	R	LE	65	Freeze DTOT BM2	Corr.vol.meas.	0 m3	00 00 00 00
1660	4	float IEEE 754	R	LE	66	Freeze DTOT BM2	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1662	4	unsigned integer 32-bit	R	LE	67	Freeze DTOT BM2	Orig. totalizer	0 m3	00 00 00 00
1664	4	float IEEE 754	R	LE	68	Freeze DTOT BM2	Orig.tot.fraction	,000000 m3	00 00 00 00
1666	4	unsigned integer 32-bit	R	LE	69	Freeze DTOT BM2	Mass	0 kg	00 00 00 00
1668	4	float IEEE 754	R	LE	70	Freeze DTOT BM2	Mass fraction	,000000 kg	00 00 00 00
1670	4	unsigned integer 32-bit	R	LE	71	Freeze DTOT BM2	Vol. at meas.cond.	0 m3	00 00 00 00
1672	4	float IEEE 754	R	LE	72	Freeze DTOT BM2	Vol.meas.fraction	,000000 m3	00 00 00 00
1700	4	unsigned integer 32-bit	R	LF	61	Freeze TOT BM3	Vol. at base cond.	0 m3	00 00 00 00
1702	4	float IEEE 754	R	LF	62	Freeze TOT BM3	Vol.base fraction	,000000 m3	00 00 00 00
1704	4	unsigned integer 32-bit	R	LF	63	Freeze TOT BM3	Quantity of energy	0 GJ	00 00 00 00
1706	4	float IEEE 754	R	LF	64	Freeze TOT BM3	QOE fraction	,000000 GJ	00 00 00 00

1708	4	unsigned integer 32-bit	R	LF	65	Freeze TOT BM3	Corr.vol.meas.	0 m3	00 00 00 00
1710	4	float IEEE 754	R	LF	66	Freeze TOT BM3	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1712	4	unsigned integer 32-bit	R	LF	67	Freeze TOT BM3	Orig. totalizer	0 m3	00 00 00 00
1714	4	float IEEE 754	R	LF	68	Freeze TOT BM3	Orig.tot.frac.	,000000 m3	00 00 00 00
1716	4	unsigned integer 32-bit	R	LF	69	Freeze TOT BM3	Mass	0 kg	00 00 00 00
1718	4	float IEEE 754	R	LF	70	Freeze TOT BM3	Mass fraction	,000000 kg	00 00 00 00
1720	4	unsigned integer 32-bit	R	LF	71	Freeze TOT BM3	Vol. at meas.cond.	0 m3	00 00 00 00
1722	4	float IEEE 754	R	LF	72	Freeze TOT BM3	Vol.meas.fraction	,000000 m3	00 00 00 00
1750	4	unsigned integer 32-bit	R	LG	61	Freeze DTOT BM3	Vol. at base cond.	0 m3	00 00 00 00
1752	4	float IEEE 754	R	LG	62	Freeze DTOT BM3	Vol.base fraction	,000000 m3	00 00 00 00
1754	4	unsigned integer 32-bit	R	LG	63	Freeze DTOT BM3	Quantity of energy	0 GJ	00 00 00 00
1756	4	float IEEE 754	R	LG	64	Freeze DTOT BM3	QOE fraction	,000000 GJ	00 00 00 00
1758	4	unsigned integer 32-bit	R	LG	65	Freeze DTOT BM3	Corr.vol.meas.	0 m3	00 00 00 00
1760	4	float IEEE 754	R	LG	66	Freeze DTOT BM3	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1762	4	unsigned integer 32-bit	R	LG	67	Freeze DTOT BM3	Orig. totalizer	0 m3	00 00 00 00
1764	4	float IEEE 754	R	LG	68	Freeze DTOT BM3	Orig.tot.fraction	,000000 m3	00 00 00 00
1766	4	unsigned integer 32-bit	R	LG	69	Freeze DTOT BM3	Mass	0 kg	00 00 00 00
1768	4	float IEEE 754	R	LG	70	Freeze DTOT BM3	Mass fraction	,000000 kg	00 00 00 00
1770	4	unsigned integer 32-bit	R	LG	71	Freeze DTOT BM3	Vol. at meas.cond.	0 m3	00 00 00 00
1772	4	float IEEE 754	R	LG	72	Freeze DTOT BM3	Vol.meas.fraction	,000000 m3	00 00 00 00
1800	4	unsigned integer 32-bit	R	LH	61	Freeze TOT BM4	Vol. at base cond.	0 m3	00 00 00 00
1802	4	float IEEE 754	R	LH	62	Freeze TOT BM4	Vol.base fraction	,000000 m3	00 00 00 00
1804	4	unsigned integer 32-bit	R	LH	63	Freeze TOT BM4	Quantity of energy	0 GJ	00 00 00 00
1806	4	float IEEE 754	R	LH	64	Freeze TOT BM4	QOE fraction	,000000 GJ	00 00 00 00
1808	4	unsigned integer 32-bit	R	LH	65	Freeze TOT BM4	Corr.vol.meas.	0 m3	00 00 00 00
1810	4	float IEEE 754	R	LH	66	Freeze TOT BM4	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1812	4	unsigned integer 32-bit	R	LH	67	Freeze TOT BM4	Orig. totalizer	0 m3	00 00 00 00
1814	4	float IEEE 754	R	LH	68	Freeze TOT BM4	Orig.tot.frac.	,000000 m3	00 00 00 00
1816	4	unsigned integer 32-bit	R	LH	69	Freeze TOT BM4	Mass	0 kg	00 00 00 00
1818	4	float IEEE 754	R	LH	70	Freeze TOT BM4	Mass fraction	,000000 kg	00 00 00 00
1820	4	unsigned integer 32-bit	R	LH	71	Freeze TOT BM4	Vol. at meas.cond.	0 m3	00 00 00 00
1822	4	float IEEE 754	R	LH	72	Freeze TOT BM4	Vol.meas.fraction	,000000 m3	00 00 00 00
1850	4	unsigned integer 32-bit	R	LI	61	Freeze DTOT BM4	Vol. at base cond.	0 m3	00 00 00 00
1852	4	float IEEE 754	R	LI	62	Freeze DTOT BM4	Vol.base fraction	,000000 m3	00 00 00 00
1854	4	unsigned integer 32-bit	R	LI	63	Freeze DTOT BM4	Quantity of energy	0 GJ	00 00 00 00
1856	4	float IEEE 754	R	LI	64	Freeze DTOT BM4	QOE fraction	,000000 GJ	00 00 00 00
1858	4	unsigned integer 32-bit	R	LI	65	Freeze DTOT BM4	Corr.vol.meas.	0 m3	00 00 00 00
1860	4	float IEEE 754	R	LI	66	Freeze DTOT BM4	Corr.vol.meas.frac.	,000000 m3	00 00 00 00
1862	4	unsigned integer 32-bit	R	LI	67	Freeze DTOT BM4	Orig. totalizer	0 m3	00 00 00 00
1864	4	float IEEE 754	R	LI	68	Freeze DTOT BM4	Orig.tot.fraction	,000000 m3	00 00 00 00
1866	4	unsigned integer 32-bit	R	LI	69	Freeze DTOT BM4	Mass	0 kg	00 00 00 00
1868	4	float IEEE 754	R	LI	70	Freeze DTOT BM4	Mass fraction	,000000 kg	00 00 00 00
1870	4	unsigned integer 32-bit	R	LI	71	Freeze DTOT BM4	Vol. at meas.cond.	0 m3	00 00 00 00
1872	4	float IEEE 754	R	LI	72	Freeze DTOT BM4	Vol.meas.fraction	,000000 m3	00 00 00 00

Special block of data (fixed)

5000	2	unsigned integer 16-bit	R/W	IJ	1	Imp. GQ-Modb. Main	Trigger Werne	0	00 00
5001	4	unsigned integer 32-bit	R/W	IJ	2	Imp. GQ-Modb. Main	Bit string	0	00 00 00 00

5003	4	float IEEE 754	R/W	IJ	3	Imp. GQ-Modb. Main	Calorific value	0,000 kWh/m3	00 00 00 00
5005	4	float IEEE 754	R/W	IJ	4	Imp. GQ-Modb. Main	Relative density	0,0000	00 00 00 00
5007	4	float IEEE 754	R/W	IJ	5	Imp. GQ-Modb. Main	standard density	0,0000 kg/m3	00 00 00 00
5009	4	float IEEE 754	R/W	IJ	6	Imp. GQ-Modb. Main	CO2	0,000 mole%	00 00 00 00
5011	4	float IEEE 754	R/W	IJ	7	Imp. GQ-Modb. Main	H2	0,000 mole%	00 00 00 00
5013	4	float IEEE 754	R/W	IJ	8	Imp. GQ-Modb. Main	N2	0,000 mole%	00 00 00 00
5015	4	float IEEE 754	R/W	IJ	9	Imp. GQ-Modb. Main	Methane	0,000 mole%	00 00 00 00
5017	4	float IEEE 754	R/W	IJ	10	Imp. GQ-Modb. Main	Ethane	0,000 mole%	00 00 00 00
5019	4	float IEEE 754	R/W	IJ	11	Imp. GQ-Modb. Main	Propane	0,000 mole%	00 00 00 00
5021	4	float IEEE 754	R/W	IJ	12	Imp. GQ-Modb. Main	N-Butane	0,000 mole%	00 00 00 00
5023	4	float IEEE 754	R/W	IJ	13	Imp. GQ-Modb. Main	I-Butane	0,000 mole%	00 00 00 00
5025	4	float IEEE 754	R/W	IJ	14	Imp. GQ-Modb. Main	N-Pentane	0,000 mole%	00 00 00 00
5027	4	float IEEE 754	R/W	IJ	15	Imp. GQ-Modb. Main	I-Pentane	0,000 mole%	00 00 00 00
5029	4	float IEEE 754	R/W	IJ	16	Imp. GQ-Modb. Main	Neo-Pentane	0,000 mole%	00 00 00 00
5031	4	float IEEE 754	R/W	IJ	17	Imp. GQ-Modb. Main	Hexane	0,000 mole%	00 00 00 00
5033	4	float IEEE 754	R/W	IJ	18	Imp. GQ-Modb. Main	Heptane	0,000 mole%	00 00 00 00
5035	4	float IEEE 754	R/W	IJ	19	Imp. GQ-Modb. Main	Octane	0,000 mole%	00 00 00 00
5037	4	float IEEE 754	R/W	IJ	20	Imp. GQ-Modb. Main	Nonane	0,000 mole%	00 00 00 00
5039	4	float IEEE 754	R/W	IJ	21	Imp. GQ-Modb. Main	Decane	0,000 mole%	00 00 00 00
5041	4	float IEEE 754	R/W	IJ	22	Imp. GQ-Modb. Main	H2S	0,000 mole%	00 00 00 00
5043	4	float IEEE 754	R/W	IJ	23	Imp. GQ-Modb. Main	H2O	0,000 mole%	00 00 00 00
5045	4	float IEEE 754	R/W	IJ	24	Imp. GQ-Modb. Main	Helium	0,000 mole%	00 00 00 00
5047	4	float IEEE 754	R/W	IJ	25	Imp. GQ-Modb. Main	O2	0,000 mole%	00 00 00 00
5049	4	float IEEE 754	R/W	IJ	26	Imp. GQ-Modb. Main	CO	0,000 mole%	00 00 00 00
5051	4	float IEEE 754	R/W	IJ	27	Imp. GQ-Modb. Main	Ethene	0,000 mole%	00 00 00 00
5053	4	float IEEE 754	R/W	IJ	28	Imp. GQ-Modb. Main	Propene	0,000 mole%	00 00 00 00
5055	4	float IEEE 754	R/W	IJ	29	Imp. GQ-Modb. Main	Argon	0,000 mole%	00 00 00 00
5057	4	unsigned integer 32-bit	R/W	IJ	30	Imp. GQ-Modb. Main	Id. GQ-source	0	00 00 00 00
5059	2	unsigned integer 16-bit	R/W	IJ	31	Imp. GQ-Modb. Main	main/backup	0	00 00
5060	2	unsigned integer 16-bit	R/W	IJ	32	Imp. GQ-Modb. Main	GQ type	0	00 00
5061	4	unsigned integer 32-bit	R/W	IJ	33	Imp. GQ-Modb. Main	Ord.No Analysis	0	00 00 00 00
5063	4	unsigned integer 32-bit	R/W	IJ	34	Imp. GQ-Modb. Main	time stamp	01-01-1970 01:00:00	00 00 00 00
5065	2	unsigned integer 16-bit	R/W	IJ	35	Imp. GQ-Modb. Main	CRC12 protection	0	00 00
5100	2	unsigned integer 16-bit	R/W	IK	1	Imp. GQ-Modb. Back	Trigger Werne	0	00 00
5101	4	unsigned integer 32-bit	R/W	IK	2	Imp. GQ-Modb. Back	Bit string	0	00 00 00 00
5103	4	float IEEE 754	R/W	IK	3	Imp. GQ-Modb. Back	Calorific value	0,000 kWh/m3	00 00 00 00
5105	4	float IEEE 754	R/W	IK	4	Imp. GQ-Modb. Back	Relative density	0,0000	00 00 00 00
5107	4	float IEEE 754	R/W	IK	5	Imp. GQ-Modb. Back	standard density	0,0000 kg/m3	00 00 00 00
5109	4	float IEEE 754	R/W	IK	6	Imp. GQ-Modb. Back	CO2	0,000 mole%	00 00 00 00
5111	4	float IEEE 754	R/W	IK	7	Imp. GQ-Modb. Back	H2	0,000 mole%	00 00 00 00
5113	4	float IEEE 754	R/W	IK	8	Imp. GQ-Modb. Back	N2	0,000 mole%	00 00 00 00
5115	4	float IEEE 754	R/W	IK	9	Imp. GQ-Modb. Back	Methane	0,000 mole%	00 00 00 00
5117	4	float IEEE 754	R/W	IK	10	Imp. GQ-Modb. Back	Ethane	0,000 mole%	00 00 00 00
5119	4	float IEEE 754	R/W	IK	11	Imp. GQ-Modb. Back	Propane	0,000 mole%	00 00 00 00
5121	4	float IEEE 754	R/W	IK	12	Imp. GQ-Modb. Back	N-Butane	0,000 mole%	00 00 00 00
5123	4	float IEEE 754	R/W	IK	13	Imp. GQ-Modb. Back	I-Butane	0,000 mole%	00 00 00 00
5125	4	float IEEE 754	R/W	IK	14	Imp. GQ-Modb. Back	N-Pentane	0,000 mole%	00 00 00 00
5127	4	float IEEE 754	R/W	IK	15	Imp. GQ-Modb. Back	I-Pentane	0,000 mole%	00 00 00 00
5129	4	float IEEE 754	R/W	IK	16	Imp. GQ-Modb. Back	Neo-Pentane	0,000 mole%	00 00 00 00
5131	4	float IEEE 754	R/W	IK	17	Imp. GQ-Modb. Back	Hexane	0,000 mole%	00 00 00 00

5133	4	float IEEE 754	R/W	IK	18	Imp. GQ-Modb. Back	Heptane	0,000 mole%	00 00 00 00
5135	4	float IEEE 754	R/W	IK	19	Imp. GQ-Modb. Back	Octane	0,000 mole%	00 00 00 00
5137	4	float IEEE 754	R/W	IK	20	Imp. GQ-Modb. Back	Nonane	0,000 mole%	00 00 00 00
5139	4	float IEEE 754	R/W	IK	21	Imp. GQ-Modb. Back	Decane	0,000 mole%	00 00 00 00
5141	4	float IEEE 754	R/W	IK	22	Imp. GQ-Modb. Back	H2S	0,000 mole%	00 00 00 00
5143	4	float IEEE 754	R/W	IK	23	Imp. GQ-Modb. Back	H2O	0,000 mole%	00 00 00 00
5145	4	float IEEE 754	R/W	IK	24	Imp. GQ-Modb. Back	Helium	0,000 mole%	00 00 00 00
5147	4	float IEEE 754	R/W	IK	25	Imp. GQ-Modb. Back	O2	0,000 mole%	00 00 00 00
5149	4	float IEEE 754	R/W	IK	26	Imp. GQ-Modb. Back	CO	0,000 mole%	00 00 00 00
5151	4	float IEEE 754	R/W	IK	27	Imp. GQ-Modb. Back	Ethene	0,000 mole%	00 00 00 00
5153	4	float IEEE 754	R/W	IK	28	Imp. GQ-Modb. Back	Propene	0,000 mole%	00 00 00 00
5155	4	float IEEE 754	R/W	IK	29	Imp. GQ-Modb. Back	Argon	0,000 mole%	00 00 00 00
5157	4	unsigned integer 32-bit	R/W	IK	30	Imp. GQ-Modb. Back	Id. GQ-source	0	00 00 00 00
5159	2	unsigned integer 16-bit	R/W	IK	31	Imp. GQ-Modb. Back	main/backup	0	00 00
5160	2	unsigned integer 16-bit	R/W	IK	32	Imp. GQ-Modb. Back	GQ type	0	00 00
5161	4	unsigned integer 32-bit	R/W	IK	33	Imp. GQ-Modb. Back	Ord.No Analysis	0	00 00 00 00
5163	4	unsigned integer 32-bit	R/W	IK	34	Imp. GQ-Modb. Back	time stamp	01-01-1970 01:00:00	00 00 00 00
5165	2	unsigned integer 16-bit	R/W	IK	35	Imp. GQ-Modb. Back	CRC12 protection	0	00 00
5166	2	unsigned integer 16-bit	R/W	IJ	36	Imp. GQ-Modb. Main	roadway	0	00 00
5167	4	unsigned integer 32-bit	R/W	IJ	37	Imp. GQ-Modb. Main	protected list	0	00 00 00 00

Special ultrasonic registers

6000	4	signed integer 32-bit	R	FH	33	Ultrasonic diag.	Alarm LED	Uncertain	00 00 00 03
							Options:	OFF	= 0
								ON	= 1
								Flashes	= 2
								Uncertain	= 3
6002	4	signed integer 32-bit	R	FH	34	Ultrasonic diag.	Warning LED	Uncertain	00 00 00 03
							Options:	OFF	= 0
								ON	= 1
								Flashes	= 2
								Uncertain	= 3
6004	2	unsigned integer 16-bit	R	FH	35	Ultrasonic diag.	Message 0...15	0000 hex	00 00
6005	2	unsigned integer 16-bit	R	FH	36	Ultrasonic diag.	Message 16...31	0000 hex	00 00
6006	2	unsigned integer 16-bit	R	FH	37	Ultrasonic diag.	Message 32...47	0000 hex	00 00
6007	2	unsigned integer 16-bit	R	FH	38	Ultrasonic diag.	Message 48...65	0000 hex	00 00
6008	2	unsigned integer 16-bit	R	FH	39	Ultrasonic diag.	Message 64...79	0000 hex	00 00
6009	2	unsigned integer 16-bit	R	FH	40	Ultrasonic diag.	Message 80...95	0000 hex	00 00
6010	2	unsigned integer 16-bit	R	FH	41	Ultrasonic diag.	Message 96..111	0000 hex	00 00
6011	2	unsigned integer 16-bit	R	FH	42	Ultrasonic diag.	Message 112..127	0000 hex	00 00
6012	2	unsigned integer 16-bit	R	FH	43	Ultrasonic diag.	Message 128..143	0000 hex	00 00
6013	2	unsigned integer 16-bit	R	FH	44	Ultrasonic diag.	Message 144..159	0000 hex	00 00
6014	2	unsigned integer 16-bit	R	FH	45	Ultrasonic diag.	Message 160..175	0000 hex	00 00
6015	2	unsigned integer 16-bit	R	FH	46	Ultrasonic diag.	Message 176..191	0000 hex	00 00
6016	2	unsigned integer 16-bit	R	FH	47	Ultrasonic diag.	Message 192..207	0000 hex	00 00
6400	4	float IEEE 754	R	FH	3	Ultrasonic diag.	V gas 1	0 m/s	00 00 00 00
6402	4	float IEEE 754	R	FH	4	Ultrasonic diag.	V gas 2	0 m/s	00 00 00 00
6404	4	float IEEE 754	R	FH	5	Ultrasonic diag.	V gas 3	0 m/s	00 00 00 00

6406	4	float IEEE 754	R	FH	6	Ultrasonic diag.	V gas 4	0 m/s	00 00 00 00
6408	4	float IEEE 754	R	FH	7	Ultrasonic diag.	V gas 5	0 m/s	00 00 00 00
6410	4	float IEEE 754	R	FH	8	Ultrasonic diag.	V gas 6	0 m/s	00 00 00 00
6412	4	float IEEE 754	R	FH	9	Ultrasonic diag.	VOS 1	0 m/s	00 00 00 00
6414	4	float IEEE 754	R	FH	10	Ultrasonic diag.	VOS 2	0 m/s	00 00 00 00
6416	4	float IEEE 754	R	FH	11	Ultrasonic diag.	VOS 3	0 m/s	00 00 00 00
6418	4	float IEEE 754	R	FH	12	Ultrasonic diag.	VOS 4	0 m/s	00 00 00 00
6420	4	float IEEE 754	R	FH	13	Ultrasonic diag.	VOS 5	0 m/s	00 00 00 00
6422	4	float IEEE 754	R	FH	14	Ultrasonic diag.	VOS 6	0 m/s	00 00 00 00
6424	4	float IEEE 754	R	FH	15	Ultrasonic diag.	AGC up 1	0	00 00 00 00
6426	4	float IEEE 754	R	FH	16	Ultrasonic diag.	AGC down 1	0	00 00 00 00
6428	4	float IEEE 754	R	FH	17	Ultrasonic diag.	AGC up 2	0	00 00 00 00
6430	4	float IEEE 754	R	FH	18	Ultrasonic diag.	AGC down 2	0	00 00 00 00
6432	4	float IEEE 754	R	FH	19	Ultrasonic diag.	AGC up 3	0	00 00 00 00
6434	4	float IEEE 754	R	FH	20	Ultrasonic diag.	AGC down 3	0	00 00 00 00
6436	4	float IEEE 754	R	FH	21	Ultrasonic diag.	AGC up 4	0	00 00 00 00
6438	4	float IEEE 754	R	FH	22	Ultrasonic diag.	AGC down 4	0	00 00 00 00
6440	4	float IEEE 754	R	FH	23	Ultrasonic diag.	AGC up 5	0	00 00 00 00
6442	4	float IEEE 754	R	FH	24	Ultrasonic diag.	AGC down 5	0	00 00 00 00
6444	4	float IEEE 754	R	FH	25	Ultrasonic diag.	AGC up 6	0	00 00 00 00
6446	4	float IEEE 754	R	FH	26	Ultrasonic diag.	AGC down 6	0	00 00 00 00
6448	4	float IEEE 754	R	FH	27	Ultrasonic diag.	Meas.quality 1	0 %	00 00 00 00
6450	4	float IEEE 754	R	FH	28	Ultrasonic diag.	Meas.quality 2	0 %	00 00 00 00
6452	4	float IEEE 754	R	FH	29	Ultrasonic diag.	Meas.quality 3	0 %	00 00 00 00
6454	4	float IEEE 754	R	FH	30	Ultrasonic diag.	Meas.quality 4	0 %	00 00 00 00
6456	4	float IEEE 754	R	FH	31	Ultrasonic diag.	Meas.quality 5	0 %	00 00 00 00
6458	4	float IEEE 754	R	FH	32	Ultrasonic diag.	Meas.quality 6	0 %	00 00 00 00
6460	4	float IEEE 754	R	GQ	19	ID display IGM 1	Path 1 Axial len.	0,000 mm	00 00 00 00
6462	4	float IEEE 754	R	GQ	28	ID display IGM 1	Path 2 Axial len.	0,000 mm	00 00 00 00
6464	4	float IEEE 754	R	GR	19	ID display IGM 2	Path 3 Axial len.	0,000 mm	00 00 00 00
6466	4	float IEEE 754	R	GR	28	ID display IGM 2	Path 4 Axial len.	0,000 mm	00 00 00 00
6468	4	float IEEE 754	R	GS	19	ID display IGM 3	Path 5 Axial len.	0,000 mm	00 00 00 00
6470	4	float IEEE 754	R	GS	28	ID display IGM 3	Path 6 Axial len.	0,000 mm	00 00 00 00
6472	4	float IEEE 754	R/W	GB	55	Flow rate param.	Nominal diameter	200,00 mm	43 48 00 00
6474	4	float IEEE 754	R	GP	1	Effects of correct.	Velo. uncorr.	0,000 m/s	00 00 00 00
6476	4	float IEEE 754	R	GP	2	Effects of correct.	Velo, Re-corr.	0,000 m/s	00 00 00 00
6478	4	float IEEE 754	R	GP	3	Effects of correct.	Velo, basecorr.	0,000 m/s	00 00 00 00
6480	4	float IEEE 754	R	GP	4	Effects of correct.	Velo, errcrv.corr.	0,000 m/s	00 00 00 00
6482	4	float IEEE 754	R	GP	5	Effects of correct.	Flow, uncorr.	0,00000 m3/h	00 00 00 00
6484	4	float IEEE 754	R	GP	6	Effects of correct.	Flow, Re-corr.	0,00000 m3/h	00 00 00 00
6486	4	float IEEE 754	R	GP	7	Effects of correct.	Flow, basecorr.	0,00000 m3/h	00 00 00 00
6488	4	float IEEE 754	R	GP	8	Effects of correct.	Flow, errcrv.corr.	0,00000 m3/h	00 00 00 00
6490	4	signed integer 32-bit	R	OE	61	Miscellaneous	IGM function	0	00 00 00 00
6492	4	signed integer 32-bit	R	OE	33	Miscellaneous	DMT function	0	00 00 00 00
6494	4	signed integer 32-bit	R	OE	62	Miscellaneous	Magic number	47110815	02 CE DA 9F
6496	4	signed integer 32-bit	R	HN	10	Path 1	Path status	Okay	00 00 00 00
							Options:	Okay	= 0
								unused	= 1
								Measurem. quality	= 2
								Communic. quality	= 3

6498	4	signed integer 32-bit	R	HO	10	Path 2	Path status	Okay	00 00 00 00
							Options:	Okay	= 0
								unused	= 1
								Measurem. quality	= 2
								Communic. quality	= 3
6500	4	signed integer 32-bit	R	HP	10	Path 3	Path status	Okay	00 00 00 00
							Options:	Okay	= 0
								unused	= 1
								Measurem. quality	= 2
								Communic. quality	= 3
6502	4	signed integer 32-bit	R	HQ	10	Path 4	Path status	Okay	00 00 00 00
							Options:	Okay	= 0
								unused	= 1
								Measurem. quality	= 2
								Communic. quality	= 3
6504	4	signed integer 32-bit	R	HR	10	Path 5	Path status	Okay	00 00 00 00
							Options:	Okay	= 0
								unused	= 1
								Measurem. quality	= 2
								Communic. quality	= 3
6506	4	signed integer 32-bit	R	HS	10	Path 6	Path status	Okay	00 00 00 00
							Options:	Okay	= 0
								unused	= 1
								Measurem. quality	= 2
								Communic. quality	= 3
6508	4	signed integer 32-bit	R/W	EE	1	Display	Language	English	00 00 00 01
							Options:	German	= 0
								English	= 1
								Russian	= 2
6510	4	signed integer 32-bit	R	GI	12	Ultrasonic transm.	Direction	Direction 1	00 00 00 00
							Options:	Direction 1	= 0
								Direction 2	= 1
6512	4	signed integer 32-bit	R	LO	16	USZ data protocol	USZ direction	Direction 1	00 00 00 00
							Options:	Direction 1	= 0
								Direction 2	= 1

Send sequence
1st, 2nd, 3rd and 4th bytes from the left

Note! If an ultrasonic flowmeter is connected via a US9000, the most important data and fault messages can be mapped in the MODBUS of the ERZ 2000 for diagnostic purposes.

Example: Reading the fault messages transmitted via the link with the US9000.

Register 6000 (signed 32-bit integer type)
Alarm status information in low byte
0 = No alarm
1 = Stored alarm
2 = At least one alarm is still active
3 = Indefinite (no connection with the US9000)

Register 6002 (signed 32-bit integer type)
Warning status information in low byte

0 = No warning
1 = Stored warning
2 = At least one warning is still active
3 = Indefinite (no connection with the US9000)

Registers 6004 to 6016 (unsigned 16-bit integer type)

Message registers containing all fault messages in compliance with the US9000 description. ☜

Register 6004 Messages 0 to 15, every bit represents a fault message.
Bit 0 = Reserved
Bit 1 = Fault message 1
Bit 2 = Fault message 2
Bit 3 = Fault message 3
Bit 4 = Fault message 4
..
..
Bit 15 = Fault message 15

Register 6005 Messages 16 to 31, every bit represents a fault message.
Bit 0 = Fault message 16
Bit 1 = Fault message 17
..
..

Registers 6400 to 6458 Special registers for ultrasonic diagnosis

Fault messages of the device itself are shown from register 100 (please note the offset)
Register 918 (signed 32-bit integer type)
Warning status information in low byte

0	= No warning
1	= Stored warning
2	= At least one warning is still active

Register 920 (signed 32-bit integer type)
Alarm status information in low byte

0	= No alarm
1	= Stored alarm
2	= At least one alarm is still active

Registers 100 to 122 (unsigned 16-bit integer type)
Message registers representing all fault messages of the ERZ 2000 (registers 123 to 149 are reserved).

Register 100 Messages 0 to 15, every bit represents a message.
Bit 0 = Message A00-0
Bit 1 = Message A00-1
Bit 2 = Message A00-2
Bit 3 = Message A00-3
Bit 4 = Message W00-4
Bit 5 = Message W00-5
..
..
Bit 15 = Message A02-1

Register 101 Messages 16 to 31, every bit represents a message.
Bit 0 = Message A02-2
Bit 1 = Message A02-3
..
..

Addressing registers

All addresses refer to the user-specific offset. Therefore, the registers must be addressed directly using the indicated address plus offset (not with address -1 as indicated in the PI-MBUS 300 Reference Guide).

Floating point notation (MODBUS RTU):
Device address = 05, read register 200, energy flow rate = 548254.1 kW (49 05 D9 E1 Hex)
05 03 00 C8 00 02 CRC1 CRC2
Transmission:
05 03 04 49 05 D9 E1 CRC1 CRC2
Send sequence: First the exponent, then the mantissa high, then the mantissa, and then the mantissa low.

Annex options

3.2 Optional extension with a plug-in card

For the ERZ 2000 gas corrector family, there are several plug-in cards which can be inserted into the module slots 1 a/b, 2 a/b and 3 a/b.
There are the following modules:

- Interface card for COM 3 and COM 4, electrically isolated and with a power supply unit for DSfG applications; this card is also required for the RMG bus.
- HART master card, in its basic version for 3 transmitters, in its high-end version for up to 6 transmitters.
- Frequency card for applications with density, standard density and VOS (ERZ 2002 and 2102).
- Intrinsically safe (Ex-i) card for volume input, pressure and temperature measurements (0/4 to 20 mA or HART) and Vo original totalizer (encoder).

3.3 Allocation of functions to unoccupied outputs

Assignments of unoccupied outputs of the base card

Reserved