



Operating Manual

Flow Computer Series ERZ2000-DI

Issued: 2020, December 7th

Version: 13 Firmware version: 1.1.0



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Translation of the The manual ERZ2000DI_manual_en_13 of **original document** 2018, November 15th for the flow computer ERZ2000-DI is the document translated first from the German original version. Anyhow, this document may serve as reference for translations into other languages. Please use in case of any uncertainties the German version as main reference.

Note Unfortunately, paper is not updated automatically, whereas technical development continuously advances. Therefore, we reserve the right to make technical changes in regard to the representations and specifications of this operating manual. The latest version of this manual (and other devices) can be downloaded at your convenience from our Internet page:

www.rmg.com.

Created	Version	
	1.2	December 2017
1. Revision	13	2018, November 15th

Document version and language

Document	ERZ2000DI_manual_en_13
version	2018, November 15th
Language	EN

Manual ERZ2000-DI · EN13 · 2018, November 15th

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1 About this manual

1.1 Structure of the manual

The first chapter of this manual essentially comprises four parts. Safety-relevant general specifications are provided in the first part. They must be observed for safe operation. The symbols used in the manual and the structure of notices are presented, and a risk assessment are also provided. The second part describes the function before the basic overview of the configuration is presented in the third part. The fourth part describes different device types that are used for various applications. In general, the device comes pre-configured and sealed for the previously intended application. For this reason, the fourth part also includes the complete seal diagram. This fourth area also includes signed data that the ERZ2000-DI can be sent as a final sub-section.

The second chapter covers the operation of the ERZ2000-DI. Complete operation is possible via the touchscreen of the device; the various screens and their functions are presented. Operation of the ERZ2000-DI via a browser is convenient after connection to a PC.

The electrical connections and their configuration are presented in the third chapter. The chapter also outlines how inspections and corrections can be carried out, when applicable.

There is additional information in the fourth chapter about turbines and ultrasonic gas flow meters for the transmitters.

The ERZ2000-DI stores a wide range of information, such as supporting documentation for data and registries and the collective parameterization. It is provided in the fifth chapter.

The sixth chapter provides a list of errors and error annotations.

The appendix contains the description of a software update. It also provides further details about the archives. Connection and operation of the optional Ex input card are defined here.

The manual is concluded with a summary of the current approvals.

1.2 Purpose of the manual

This manual provides information that is necessary for fault-free and safe operation.

The ERZ2000-DI was designed and produced according to the state of the art and generally recognized safety standards and directives. However, its use can entail dangers that are avoidable by complying with this manual. The device must only be used as intended and in technically sound condition.



Caution

Unintended use voids all warranty claims and the flow computer ERZ2000-DI can also lose its approvals.

1.2.1 Abbreviations

The following abbreviations are used:

MessEG	Measurement and Calibration Act Law on the marketing and provision of measuring devices in the market, their use and calibration, valid since 1/1/2015
MessEV	Measurement and Calibration Regulation Regulation on the marketing and provision of measuring devices in the market and on their use and calibration; 12/11/2014
MID	Measurement Instruments Directive
РТВ	Physikalisch-Technische Bundesanstalt [German National Test Authority]
DSfG	Digitale Schnittstelle für Gasmessgeräte [digital interface for gas measuring devices]
TCP/IP	Transmission Control Protocol/Internet Protocol Family of network protocols (internet protocol family)
IP (address)	Devices are assigned an address based on the internet protocol (IP). This makes these devices addressable and reachable in the internet.
LAN	LAN (Local Area Network) is a local network, a computer network.



ETH1 / ETH 2	Ethernet interface 2 /2 Ethernet technology enables a data exchange between the connected devices in the local network.
SNTP	(Simple) Standard (NTP = Network Time Protocol) for synchronization of clocks in computer systems
SNR	Signal to Noise Ratio
SoS (VoS)	Speed (Velocity) of Sound
TD	Transducer (ultrasonic transmitter and receiver)
USM (USZ)	Ultrasonic gas meter
Vo	Digital interface, original meter of an encoder (ENCO)
HART	Highway Addressable Remote Transducer Protocol Standardized digital communication superimposes on the 420 mA analogue signal for data exchange with transmitting devices

The following registered trademarks are used in the text:

Windows, Windows®, Windows CE, Explorer (
), Firefox (
),

1.2.2 Structure of notices

The following notices are used:

A Danger

This warning notice informs you of imminently threatening dangers that can arise due to misuse/operator error. If these situations are not avoided, death or severe injuries can occur.

A warning

This warning notice informs you of potentially dangerous situations that can arise due to misuse/operator error. If these situations are not avoided, minor injuries can occur.

A Caution

This notice informs you of potentially dangerous situations that can arise due to misuse/operator error. If these situations are not avoided, damage to the device or nearby property can occur.

Note

This notice provides you with helpful tips to make your work easier. This notice also provides you with further information about the device or the work process in order to prevent operator error.



1.2.3 Working with the device

1.2.3.1 Safety instructions

A Danger

All of the following safety notices must be observed!

Disregard of the safety notices can result in danger to the life and limb or environmental and property damage.

Bear in mind that the safety warnings in this manual and on the device cannot cover all potential dangerous situations, because the interaction of various conditions can be impossible to foresee. Merely following the instructions may not suffice for correct operation. Always remain attentive and consider potential consequences.

- Read this operating manual and especially the following safety notices carefully before working with the device for the first time.
- The operating manual provides a warning of residual risks for users and third parties working in the area of influence of the device, as well as for damage to devices or possible costs due to the damage of other property. The safety instructions used in this manual do not refer to unavoidable residual risks.
- Only operate the device in fault-free condition and in observance of the operating manual.
- Compliance with local statutory accident prevention, installation and assembly regulations is also mandatory.

▲ Caution

All notices in the manual must be observed.

Use of the flow computer ERZ2000-DI is only permitted in accordance with the specifications in the operating manual.

RMG assumes no liability for damages arising due to disregard of the operating manual.

▲ Danger

Service and maintenance tasks or repairs that are not described in the operating manual must not be carried out without prior consultation with the manufacturer.

Note

The flow computer ERZ2000-DI is approved for officially certified operation. For this purpose, it is sealed before deliver and settings specified by the approval authority are locked.

These seals, software or hardware locks must not be damaged, destroyed or removed!

In this case, the ERZ2000-DI loses its official certification!

The ERZ2000-DI can only be approved for officially certified operation after a renewed inspection by an officially recognized inspection authority or calibration officials and an additional inspection of additional settings in the factory.

The calibration official must re-apply the seals after the renewed locking.

Observe the following, in particular:

- changes to the flow computer ERZ2000-DI, e.g. from ERZ2004-DI to ERZ2104-DI (see *chapter 1.5 Areas of application*) are not permitted.
- The technical specifications must be observed and followed for safe operation. Performance limits must not be exceeded (chapter 3 Electrical connections).
- For safe operation, the flow computer ERZ2000-DI must only be used in the scope of the intended use (*chapter1.5 Areas of application*)
- The flow computer ERZ2000-DI complies with current standards and regulations. However, danger can arise with misuse.

1.2.3.2 Dangers during commissioning

Initial commissioning

The initial commissioning must only be carried out by qualified personnel or RMG service personnel.

Note

In accordance with Article 15 of the German Ordinance on Industrial Safety and Health (BetrSichV), Article 5 of German Social Accident Insurance (DGUV) REGULATION 3 "Electrical systems and equipment" and generally recognized good engineering practices, particularly the VDE standards VDE 0100-100 "Construction of low-voltage systems" and VDE 0165 "Electrical explosion protection", an inspection of the measuring system must be carried out before the device is commissioned. Maybe that similar local laws and rules have to followed instead of the German ones.

An acceptance test certificate must be created during the commissioning. This, the operating manual and the CE Declaration of Conformity must be stored so that they are always readily available. In the process, the entire documentation, including the conformity declarations and certificates must be checked for completeness.

All sharp edges on the device were removed, insofar as possible. However, suitable personal protective equipment provided by the operator must be worn during all work.

The flow computer ERZ2000-DI is <u>not</u> approved or designed for use in explosion-prone areas. Installation must only take place in safe rooms. The ERZ2000-DI is intended for installation in a control cabinet in an electronics room.

If the device as specified in the operating manual, adequate explosion protection for other connected devices may not be provided.

Inadequately qualified persons working on the equipment are unable to correctly estimate dangers. Explosions can be triggered. Only work on the equipment if you have the appropriate qualifications.

Components can be damaged if you do not use suitable tools and materials. Only use tools that are recommended for the respective work in the operating manual.

Mechanical installation Mechanical installation must only be performed by appro-

priately qualified technicians.

Electrical installation Installation on electrical components must only be carried

out by qualified electricians.

Mechanical and/or electri-

cal installation

These qualified personnel require training specifically for work in explosion-prone areas. Qualified personnel are persons who have training / education in accordance with

DIN VDE 0105, IEC 364 or comparable standards.

Caution

In general, the replacement of a flow computer ERZ2000-DI must only be carried out by RMG Service.

1.2.3.3 Dangers during maintenance and repair

Operating personnel The operating personnel use and operate the device in

the scope of the intended use.

Maintenance personnel Work on the device must only be carried out by qualified

personnel who can carry out the respective tasks on the basis of their technical training, experience and familiarity with the applicable standards and requirements. These qualified personnel are familiar with the applicable statutory regulations for accident prevention and can independently recognize and avoid potential dangers.

Maintenance and clean-

ing

Maintenance and cleaning must only be performed by ap-

propriately qualified technicians.

Danger

Inadequately qualified persons working on the equipment are unable to correctly estimate dangers. Explosions can be triggered if impermissible current or voltage values are transferred in the explosion-protected area.

A

Caution

The device can be damaged if it is not cleaned as specified in the operating manual. Clean the device with a lightly moistened cloth only.

$oldsymbol{\Lambda}$

Danger

The flow computer ERZ2000-DI must only be used as intended! (*chapter 1.5 Areas of application*).



1.2.3.4 Qualification of personnel

Note

In general, the following is recommended for all persons working with or on the flow computer ERZ2000-DI:

- Training / education for work in explosion-prone areas.
- The capacity to be able to correctly estimate dangers and risks when working with the flow computer ERZ2000-DI and all connected devices.
- Training / education by RMG for work with gas measuring devices.
- Education / instruction in all national standards and directives to be complied with for the work to be carried out on the flow computer ERZ2000-DI.

1.2.4 Risk assessment and minimization

According to assessment by qualified employees of RMG, the flow computer ERZ2000-DI is subject to risks during its use. Risks can arise, for instance, during use outside of the permissible temperature range. Impermissible current and voltage values can trigger explosions in explosion-prone areas. Naturally, work must only be carried out by trained personnel (see *chapter 1.2.3.4 Qualification of personnel*), who are also trained to recognize suitable tools and use them exclusively. These risks were summarized alongside development and measures were taken to minimize these risks.

Measures for risk minimization:

- The maximum permissible temperature range is specified on the type plate of the flow computer ERZ2000-DI. Operation of the device is only permitted within these specified ranges.

Danger

- The wiring from and installation of the flow computer ERZ2000-DI in explosion-prone areas must only be carried out by trained personnel in accordance with EN60079-14 and in observance of national regulations.
- Qualified persons must satisfy the definitions in accordance with DIN EN 0105 or IEC 364 or directly comparable standards.
- Only trained and instructed personnel are permitted. Work on the measuring system must only be carried out from qualified persons and inspected by responsible qualified supervisors.
- Qualified persons have been authorized by the person responsible for safety of personnel to carrying out such work on the basis of their training, experience or instruction and familiarity with applicable standards, provisions, accident prevention regulations and system conditions. It is essential that these persons are able to recognize and avoid potential dangers in good time.

1.2.5 Applicability of the manual

This manual describes the flow computer ERZ2000-DI. The ERZ2000-DI is only part of a complete system. The manuals of the other components of the system must be observed. If you find contradictory instructions, contact RMG and/or the manufacturers of the other components.

A

Caution

Ensure that the power data of the current connection matches the specifications on the type plate. Observe any applicable national regulations in the country of use. Use cable that is appropriate for the cable fittings.

1.2.5.1 Danger during operation

Observe the specifications of the system manufacturer and/or system operator.



1.2.5.2 Dangers of operation in Ex areas

A Danger

- The flow computer ERZ2000-DI must be used exclusively in fault-free and complete, original condition. If you make technical changes to the device, safe operation can no longer be guaranteed.
- Ensure that the appropriate explosion protection is provided for the connection of all sensors or other devices that are used in explosionprone areas!
- If they are intrinsically safe devices, galvanic isolation must be provided with connection of these devices!

1.2.5.3 Responsibility of the operator

As the operator, you must ensure that only adequately qualified personnel work on the device. Ensure that all employees who work with the device have read and understood this manual. You are also obligated to train personnel regularly and inform them of the dangers. Ensure that all work on the device is carried out exclusively by qualified persons and inspected by responsible qualified supervisors. The responsibilities for installation, operation, fault rectification, maintenance and cleaning must be clearly regulated. Instruct your personnel with regard to the risks involved with working with the device.

1.2.6 Transport

The device is packaged specific to the transport requirements for each customer. Ensure safe packaging that absorbs light impact and vibrations is used for any further transport. Nevertheless, inform the transport company that all types of impact and vibrations should be avoided during transport.

1.2.7 Scope of delivery

The scope of delivery can differ depending on the optional orders. The following is "normally" included in the scope of delivery:

 Part
 Quantity

 ERZ2000-DI
 1

 Socket set 98800-15700
 1

 Manual
 1

1.2.8 Disposal of packaging material

Dispose of the material in an environmentally friendly manner in accordance with national standards and directives.

1.2.9 Storage

Avoid extended periods of storage. After storage, inspect the device for damage and test for correct function. Contact the RMG service department to arrange for inspection of the device after a storage period of longer than one year. For this purpose, send the device to RMG.

Note

Even if the ERZ2000-NG is stored for a short time only, it is important to ensure a clean and dry environment!

A Caution

Hazard due to damage during storage.

If the device is stored for a period of more than one year, deficient repacking or securing of the device can result in damage to the device from dirt or moisture.



1.3 Function

The flow computer ERZ2000-DI is designed to operate various sensors, particularly flow rate and gas analysis sensors, evaluate their signals or adopt and determine resulting operating and nominal volume flows. The resulting calculation variables can be represented in a graph and checked via alarm output, etc. The ERZ2000-DI corresponds to the standards, directives and specifications listed in *chapter 1.5 Areas of application. Figure* 1 explains the functional principle.

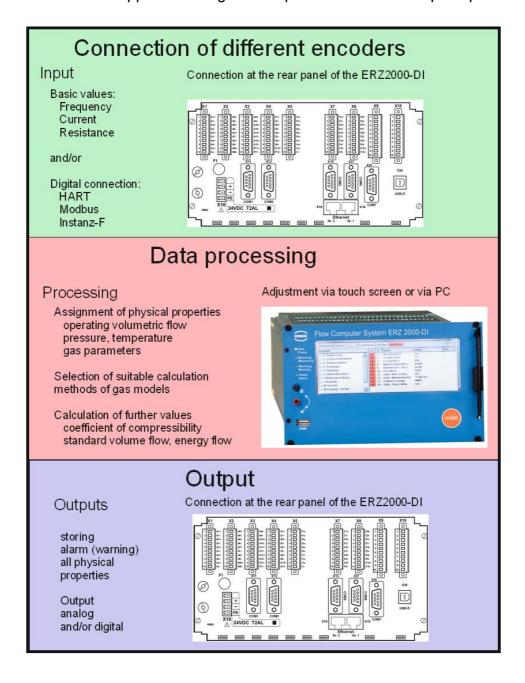


Figure 1: Functional principle

The ERZ2000-DI records analogue and digital values, such as frequencies, resistances, etc. Then these are assigned to physical variables, such as operating volume flow or temperature. Further processing of these values takes place in the ERZ2000-DI, where, for example, gas characteristics and standard volume flow are calculated from these basic values. At the same time, a continuous check guarantees that all necessary values are constantly available. An alarm or warning message is triggered of adjustable limit values are exceeded or undercut.

The third task of the ERZ2000-DI is data storage and output, which can take place in analogue and digital form. An alarm or a warning is also triggered if there is a fault in the data recording.

1.4 Overview

The ERZ2000-DI, therefore, is an advancement of the ERZ2000 as a half 19" slide-in module (half 19" width). Enhancements include a live browser (*chapter 2.3 Browser home page and coordinate system*) which enables permanent control of the measurement data recording and reimbursement. A further enhancement is the adjustment of the flow computer ERZ2000-DI and the parameterization of the connected transmitters via a wizard on a PC. This wizard is not a separate PC program, and is executed directly in the browser.

The ERZ2000-DI system has a configuration consisting of 2 function groups. The first function group provides the quick measurement recording, all inputs and outputs, all interfaces and manual operation via the front panel or via the wizard. The internal calculations and converter functions are processed by the second assembly, the computing unit.

The working memory contains the variables, fields, buffers, etc. necessary for the processing of the system software, as well as the (variable) device parameters of all function assemblies. The device parameters are saved with a checksum that is checked automatically each time the device is restarted.

The program memory contains the operating program of the device. A CRC check-sum is calculated via the source and stored as a reference value. The correctness of the checksum can be checked for the software ID in the coordinates of the menu **IE Software ID** with the specifications on the type plate (chapter "2.7.3 Details" and chapter "2.7.4 Functions" – type plate).



1.5 Areas of application

The essential area of application is the recording and metering of flow rates for custody transfer in natural gas flow measurement technology.

The device can be delivered in two different versions of the software, each with a separate approval as:

- Status flow computer for natural gas (ERZ2004-DI)
- Calorific value flow computer for natural gas (ERZ2104-DI)

Both variants can access the following for the K coefficient calculation:

k = constant, ideal gas, GERG88 S set A, GERG 88 S set B,

GERG 88 S set C, AGA NX 19 L, AGA NX 19 H, AGA 8 Gross Meth. 1,

AGA 8 Gross Meth. 2, GOST 30319.2, AGA 8 (1985),

AGA 8 92DC + AGA 10, AGA 8 (2017), GERG 2004, GERG 2008,

AGA 8 92DC + ISO20765-1, GOST 8.662-2009, GOST 30319.3

The ERZ2000-DI diction is superordinate and applies for both variables in the following text.

The special factory setting and sealing (see chapter 1.5.2 Seal diagram for devices with MID approval) is used for operation in custody transfer. In the process, the function of the device must conform to the approval identified on the type plate. Therefore, a subsequent modification of the device type is blocked.

Note

Modification of the device type is only possible under the supervision and control of an officially recognized inspection authority or calibration official. Then the necessary seals are also applied after the modification.

1.5.1 Use in gas measurement technology

The ERZ2000-DI is <u>not</u> intended for use in explosion-prone areas. However, it can operate sensors and other devices in explosion-prone areas.

Only operate the ERZ2000-DI in fault-free and complete condition.

If you make technical changes to the device, safe operation can no longer be guaranteed.

Danger

- Only use the ERZ2000-DI in its original condition.
- When connecting sensors and other devices in explosion-prone areas, ensure that the appropriate explosion protection is provided for these components. The specified maximum values in the certificates issued for these components must be observed.
- They are intrinsically safe devices for which galvanic isolation must be provided with connection of these devices.
- Life-threatening danger due to incorrect earthing. If the device is not earthed correctly, so that electrostatic charges can trigger the formation of sparks, there is a risk of explosion.

Note

The ERZ2000-DI system is approved in different variants for custodytransfer application for gas measurement technology in Germany and other countries.

The following EU type examination certificates are available for Germany (see *Appendix Approvals*:

ERZ2004-DI MID Approval / Status flow computer

ERZ2104-DI MessEV / Calorific value flow computer

ERZ2000-DI MessEV / Maximum load display and registering device

The respective applicable approval (approval symbol) is specified on the type plate (*chapter "2.7.4 Functions" – "Type plate"*). The corresponding seal diagrams can be found in this manual or the approval (*chapter 1.5.2 Seal diagram*).

If a pressure or temperature transmitter for the ERZ2004-DI or ERZ2104-DI types approved in accordance with MID, it must be secured as follows:

- The main plate is provided with a sealing label.
- Access to the calibration switch, which is set to "write protect" during normal operation, is secured by connecting the removable cover of the electronic housing with sealing marks with the stationary parts of the housing.



1.5.2 Seal diagram for devices with MID approval

The ERZ2000-DI leaves the company with a setting agreed upon with the customer, which is protected from "significant" modifications by seals and metrological sealing, or it leaves the factory without seals. In the latter case, a calibration official must provide the device with seals according to the desired settings in accordance with the seal diagram. The metrological seals must also be applied, as specified in the seal diagram. Figure 2: Seal diagram - front and Figure 4: Seal diagram - rear show the specified positions of the seals.

A Caution

The ERZ2000-DI must only be used for custody transfer with unbroken seal. Removal or damage to seals normally entails considerable expenses!

Re-application of seals must only be carried out by an officially recognized inspection authority or calibration officials!

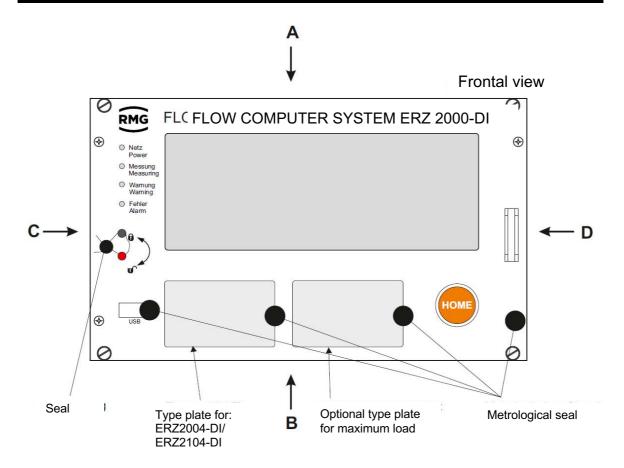


Figure 2: Seal diagram - front

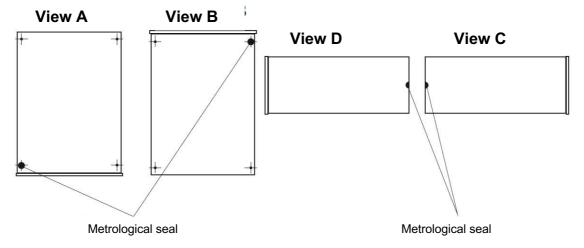


Figure 3: Seal diagram - sides A, B, C, D

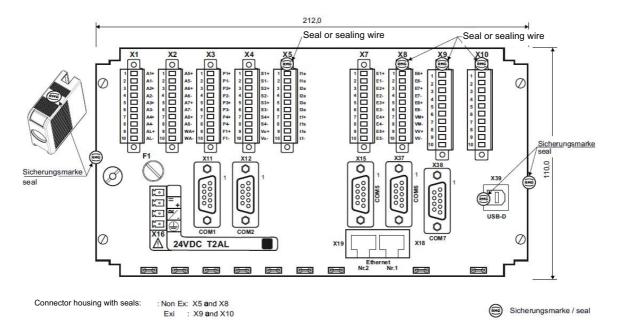


Figure 4: Seal diagram - rear

Note

The ERZ2000-DI is also supplied with a connector set (see above *chapter 1.2.7 Scope of delivery*).

In particular, terminals X5 and X8 (if necessary also X9 and X10) must be used to fasten the enclosed socket shells, which must be sealed by the calibration officer after adjustment and commissioning.



1.5.3 Signature, software and hardware data

The ERZ2000-DI offers the option of marking recorded data with an accompanying signature. In doing so, the recipient receives the message and signature. They can verify from the message and signature that the data is unchanged and originates from a "secure" source, i.e. from a trustworthy sender or whether this is not the case.

The signature is described in detail in the wizard (*chapter 2.2 Adjustment of the ERZ2000-DI via* wizard).

2 Introduction

2.1 Operation

2.1.1 Front panel

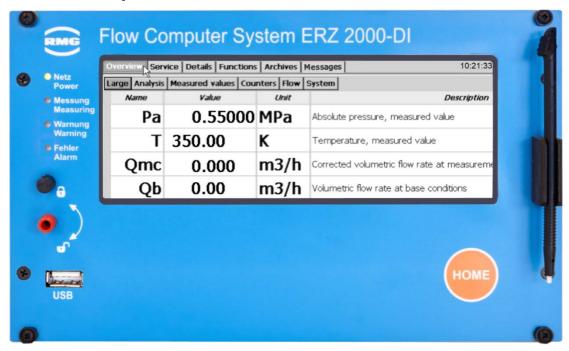


Figure 5: Front panel

The following display and operating elements are located on the front panel:

Green LED (Network)		Continuously illuminated: Blinking light:	Voltage indicator. User or calibration lock opened
Orange LED (measure- ment)		Continuously illuminated: Blinking light: Off:	Meter connected, delivers measurements. Flow rate outside of permissible limits. No flow.
Yellow LED (warning)		Blinking light: Continuously illuminated:	There is currently a fault (warning) in non-custody-transfer functions. A warning is pending
Red LED (error)		Blinking light: Continuously illuminated:	There is currently a fault (alarm) in custody-transfer functions An alarm is pending
Custody transfer switch	8	Sealable rotary switch	at limit stop in the clockwise direction the custody transfer lock is open, at limit stop in the counterclockwise direction the custody transfer lock is closed



USB interface For connection of USB components (e.g. a mouse), this inter-

face is sealed in custody transfer mode and cannot be used.

Home button To jump to the startup/message screen (alternating)

Touch screen Display and control panel.

2.1.2 Operation on the touch screen

The touch screen enables operation via a graphic and largely self-explanatory user interface. You jump back to the home screen from any place in the menu with the "home" button. Pressing the button again jumps to the "Message" screen/menu.

A Caution

Operate the touch screen directly with your finger or use the supplied plastic stylus.

Never use hard or sharp objects such as screwdrivers or pens (otherwise, there is a risk that the foil of the touch screen is scratched or torn).

2.1.3 Remote control / parameterization

In addition to operation via the front panel, the touchscreen provides an additional convenient option to operate or parameterize the device either **locally** or **remotely** with a PC or notebook.





Figure 6: Operation of the ERZ2000-DI

Very simple adjustment takes place with the browser available on the PC (e.g. Internet Explorer, Firefox, etc.), which essentially corresponds to operation of the touchscreen. In addition, display on the PC enables the startup of a wizard directly in the browser for convenient commissioning. The local connection is established via a standard network cable (LAN cable).

Operation of the ERZ2000-DI via the browser is the recommended adjustment and operation possibility and, therefore, is given priority below. Operation with the browser generally offers expanded display options. Furthermore, display on the touchscreen is identical to display on the browser; small differences are purely visual in nature and do not limit the adjustment options for the ERZ2000-DI via the web browser.

The LAN cable connects one of the 2 connection ports (Ethernet 1 or 2) on the rear side of the ERZ2000-DI (see Figure 7: Rear side of the ERZ2000-DI and Ethernet interfaces) with the local network of the PC.

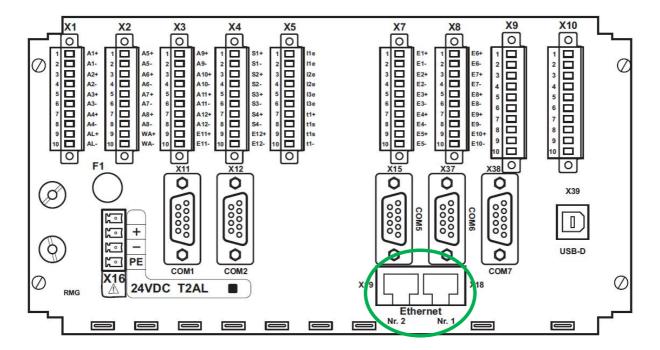


Figure 7: Rear side of the ERZ2000-DI and Ethernet interfaces



A

Caution

Then the ERZ2000-DI can only be integrated into an existing network if the network permits integration of third-party devices.

Protected company networks may prohibit this access.

Contact your IT department to discuss how you can integrate the ERZ2000-DI into your company network.

Note

The ERZ2000-D has – as shown in *Figure 7: Rear side of the ERZ2000-DI* and *Ethernet interfaces* – two Ethernet interfaces. Two separate accesses are also possible via these interfaces. With simultaneous use of the ERZ2000-DI by two users, <u>no</u> connection (bridge) is established between the (normally) two different networks.

In order to ensure that the network connections functions correctly, the correct TCP/IP address of the ERZ2000-DI must be entered in the browser. This TCP/IP address can be read on the ERZ2000-DI. For this purpose, proceed as follows after starting up the device:

Select the following with the stylus:

1. The ERZ2000-DI logs in after start-up with the following screen. Select the **"Functions"** tab in the upper part of the display.



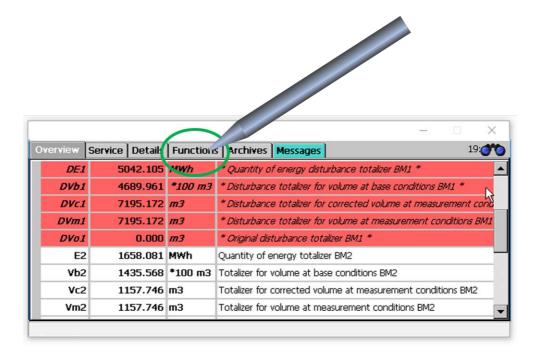


Figure 8: ERZ2000-DI Start page

2. Then select the TCP/IP tab.

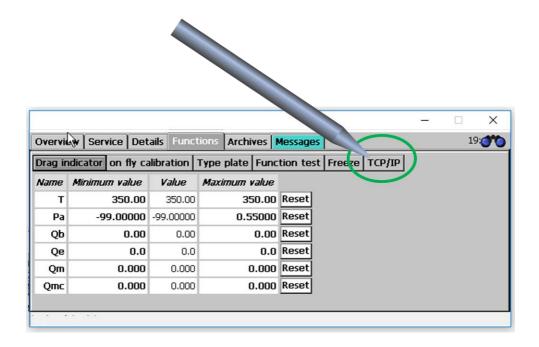


Figure 9: Functions menu

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3. After activation, the screen below appears.

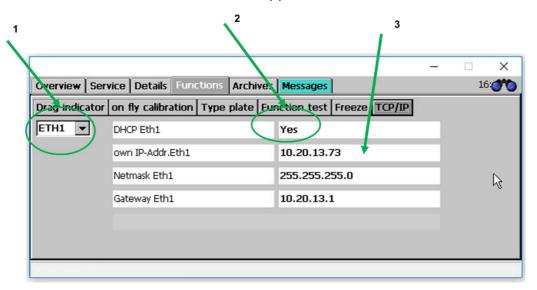


Figure 10: TCP/IP menu

- 1 Check whether you are working with interface 1 (ETH1) or 2 (ETH2) and adjust this setting in the selection menu (please activate) accordingly.
- 2 Check the DHCP setting of the interface.
 - If a DHCP server is available in the network, the IP address is assigned automatically when "yes" is activated. When the setting is "no", the IP address must be entered manually.
- 3 Normally, you should be able to see the IP address now.

If the TCP/IP address in the browser is entered, the following home page of the ERZ2000-DI appears.



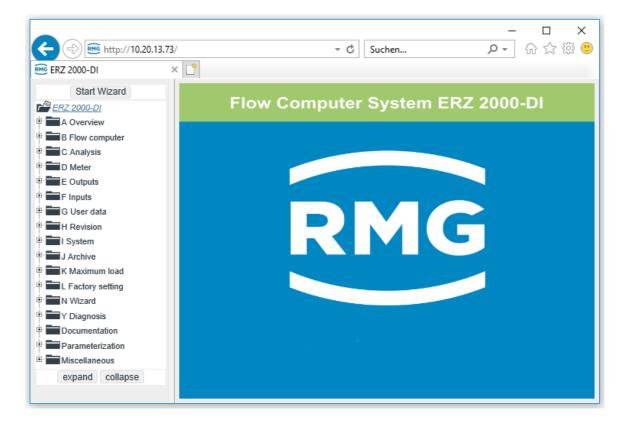


Figure 11: Home page after entry of the TCP/IP address

Note

If you work with Microsoft Internet Explorer – before the wizard can be started for simplified operation – the compatibility status of the web browser must be checked and adjusted as necessary.

If you are using Microsoft Internet Explorer, the compatibility view can be adjusted under "Extras" in the web browser. In this menu you may find the submenu "Adjustment of the compatibility view". The field "Show intranet sites in compatibility view" must be activated in this menu.



Note

In exceptions, it may be necessary to adjust the maximum packet size of the transmission protocol (MTU). This is possible for both Ethernet interfaces. Please make these settings only after consulting your IT department if there are connection problems (firewall, mobile radio, ...).

A short description can be found in *Appendix G*) Adjustment of the MTU size.







2.1.4 Operation on the home page

The home page can be operated with a mouse and keyboard in the accustomed manner. Operations are equivalent to those on the touchscreen of the ERZ2000-DI and are adopted accordingly. For instance, the TCP/IP addresses can be queried here. The IP address is displayed in the "Details" menus in Figure 14: IF TCP/IP network menu.

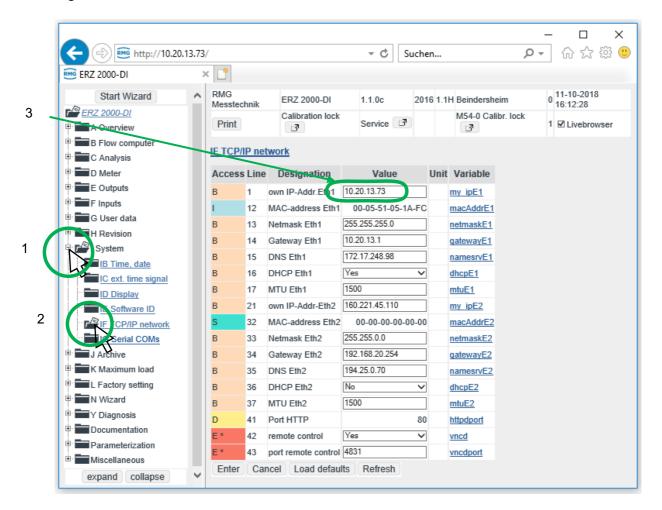


Figure 14: IF TCP/IP network menu

- 1. Activate the menu I System on the home page with the mouse
- 2. Activate the menu IF TCP/IP network with the mouse
- 3. The TCP/IP address can be read in the field with the green frame



2.2 Adjustment of the ERZ2000-DI via wizard

Adjustment of the ERZ2000-DI preferably takes place using a wizard. For this purpose, it must be activated on the home page:

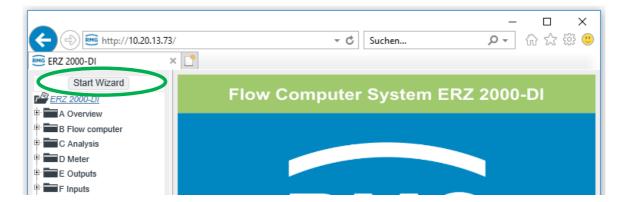


Figure 15: Starting the wizard

After activation of the "Start wizard" field circled in green, the settings tool of the ERZ2000-DI appears.



Figure 16: Wizard home page



The wizard is a component of the ERZ2000-DI and stored internally. This also applies for all documents and images integrated in the wizard. They are not listed here again. The wizard and all integrated documents and images, therefore, are an essential part of the documentation.

The document: <u>Preface_ERZ2000DI.pdf</u> is integrated on the first wizard screen and can be opened by clicking on the left part of this home page.

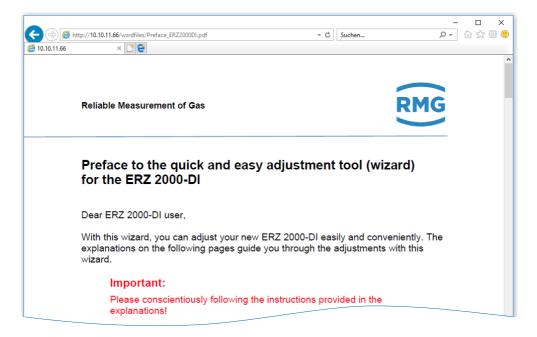


Figure 17: Preface to the wizard

This preface provides general information for use of the wizard and should absolutely be read prior to making any further settings in the wizard, which is why it is marked with an Attention symbol. This information is also helpful for a better understanding and use of the remainder of the manual.

The home page requires 2 essential settings. Firstly, access authorization must be specified (see *chapter 2.4 Access protection for data and* settings).



Simplified adjustment with the wizard is basically only possible with an open calibration switch of the ERZ2000-DI.

However, the notice on removal of seals (*chapter 1.5.2 Seal diagram for devices with MID approval*) must be observed!

If the calibration switch is closed - for legal custody-transfer purposes - almost no settings are possible on the wizard screens.

Secondly, the user profile must be specified. "User" should be selected for as an "ordinary" user of the flow computer; "Service" can also be selected for internal settings.

All settings options that are necessary for parameterization are available to a "**User**". Then the simplified adjustment of the ERZ2000-DI with the help of the wizard is also enabled.

Note

Recommendation:

Please choose User as a user profile!

The wizard (and the ERZ2000-DI) displays only the parameters that are relevant according to the intended use for the selected device type. Complete settings menus and/or individual parameters are hidden (in the wizard and coordinate system of the ERZ2000-DI).

The wizard should be used in the specified sequence. In this case, unnecessary additional settings options are hidden on the subsequent pages after settings have been changed. If, for instance, the GERG 88 S is selected for state equation of the gas composition, only the relevant input values for this calculation are required as entries. Portions of gas components such as methane or other types are no longer displayed or queried.

Scrolling past, forwards or backwards can result in unnecessary entries or corrections if these settings have not been carried out (yet).

The settings that are initiated with the recommendation button are also made on the basis of entries which were already made – then they are only permitted/logical if the sequence has been observed.

The **"Service"** setting always shows **all** settings menus and settings possibilities, regardless of settings already made by the user. These settings options can be edited on the following wizard screens in the **"Service"** setting, although they are entirely unnecessary for the overall settings of the ERZ2000-DI.

Refer to the wizard for all additional settings here. The selection of all permissible transmitters that can normally be integrated easily with a pre-assignment of all relevant parameters by clicking the mouse.



2.3 Browser home page and coordinate system

Links in the home page there is a tree structure that is comparable to Windows Explorer. The relevant menu is opened by clicking on one of the discrements, components, ... In the process, a symbol change from to discrement to line or discrements, or discrements of the discrement to discrement to line also takes place and various sub-menus can be selected by clicking on such as overviews, reassessment, gas properties, etc. A symbol change from discrement to line also takes place here. Then you see the content of the selected menu, see Figure 18: "Overviews."

Click on the first, top $\dot{\exists}$; then the menu "A Overview" in which various sub-items are listed in the menu tree appears.

2.3.1 Large representation in the display

The first sub-item "AB Large" ("Click" on the top) permits the selection of 4 parameters, which are displayed in a large font on the display of the ERZ2000-DI for better reading at some distance (see *Figure 19: Display view*)

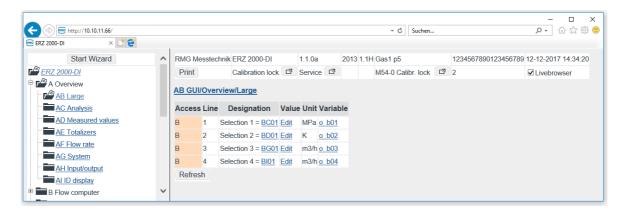


Figure 18: "Overviews " menu

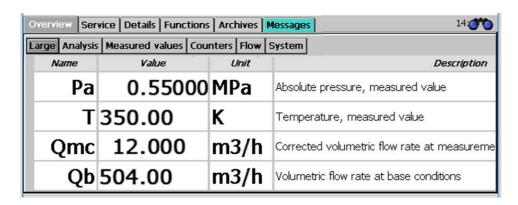


Figure 19: Display view

This representation can be activated in the display of the ERZ2000-DI on the touchscreen:

- 1. Activation of the "Overview" tab
- 2. Activation of the "Large" tab

The displayed parameters can be changed by activating <u>edit</u> after the relevant selection. Then you have an additional selection with which the value can be changed if you click on the \vee arrow.

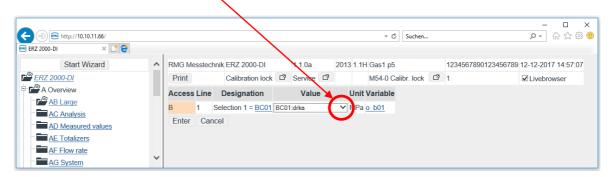


Figure 20: Selection of the large representation of parameters

Then a selection appears as shown in Figure 21: Selection of parameters.

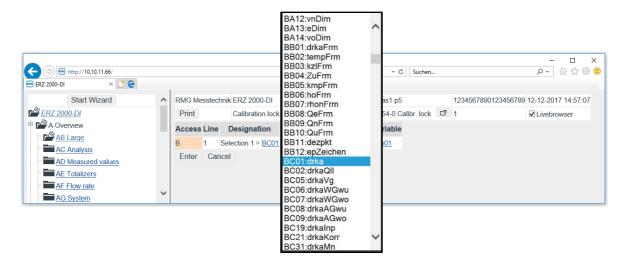


Figure 21: Selection of parameters

16

Any other parameters can be selected here, "entered" and then confirmed with "continue".



For assignment of the parameter to the selected value can be accessed by clicking on the term after the selection (<u>BC01</u> in this case). The coordinate BC01 Absolute pressure is recognizable. This menu can also be reached with selection of the menu **B Reassessment** and then **BC Absolute pressure** is activated on the start screen. The coordinate BC01 Absolute pressure is in the 1st line.

2.3.2 Further specifications in the home page

In the right-hand window, the following can also be seen in the upper lines (*Figure 22: Top lines in the menu*):



Figure 22: Top lines in the menu

Top line:

- 1. RMG Messtechnik
- 2. ERZ2000-DI

3. 1.1.0 Firmware version

4. 2017 Year of manufacture of the ERZ2000-DI

5. 1.1H Rail name EL 2

6. Gas1 p5 Measurement point EL 3

7. 1234567890123456789

8. 12-12-2017 Current date

9. 15:08:20 Current time

Note

If the live browser is activated (see below);

For field 9: Time

The time must change in the seconds!

A live connection is only provided thereafter.

<u>All</u> values, not only the values shown in *Figure 18: "Overviews " menu* are updated "online" (continuously - live).

If the time does not change in seconds, there is no or only a poor connection between the ERZ2000-DI and the PC. It may also be due to an "old" browser or the settings above have not been carried out.

A poor connection can impede or completely block data transmission (e.g. the reading of archives).

Second line:

1. Print The framed area shows an operable field; the displayed page is printed.

2. Calibration lock / locked Shows the current access here: "Calibration lock open"

The menu GA Access rights can be opened by clicking in the adjacent field . The code values are visible and can be changed with the calibration switch open

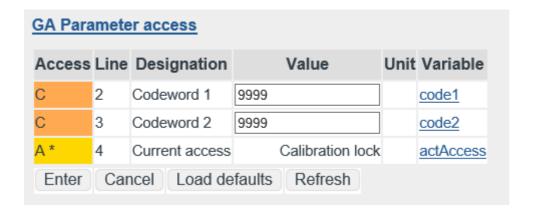


Figure 23: Access to the device

(For more information, see Chapter 2.4 Access protection for data and settings)

3. Service



Figure 24: User profile

(For more information, see wizard)

4. " "

5. " "

6. Error display Pending errors are continuously displayed here.

Here: "M54 Calibration lock" (= Calibration lock is open)

All available messages can be displayed by

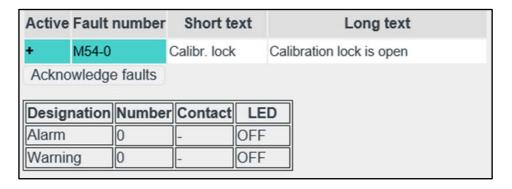


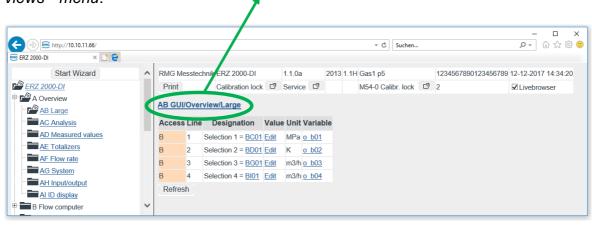
Figure 25: Error messages

- 7. 1 Debug value (internal use)
- 8. " "
- 9. ✓ Live browser

 The live browser is activated and all data (such as time) is updated continuously.

 Clicking on ✓ deactivates the live browser ().

Furthermore, a heading AB GUI/Overview/Large is shown in Figure 18: "Overviews " menu:



The selected measurements or parameters are displayed there. Click on this **Heading**, then a menu with further explanations for the values on the previous screen appears. Windows in which additional, in-depth information of the selected parameter is shown are opened by clicking on the <u>underlined text</u>. Clicking on the **Heading** again will bring you back to the initial menu (*Figure 18: "Overviews*).



The representation of measurements and parameters is shown in other menus. For example, various analytical values are specified in the next menu **AC Analysis Overview**.

Designation	Value	Unit	Description	Jump target
	GERG 88 S		Calculation method for K coefficient	K coefficient
С	4.2493		Current conversion factor	
К	0.99693		K coefficient	
z	0.994348		Compressibility factor at measurement conditions	
Zb	0.997407		Compressibility factor at base conditions	
sd	0.75651	kg/m3	Standard density, measured value	Current gas quality
Hs	11.250	kWh/m3	Superior calorific value, measured value	
CO2	0.9960	mole%	Carbon dioxide, normalized molar fraction	
H2	0.0000	mole%	Hydrogen, normalized molar fraction	
Refresh	0.0000	mole%	nydrogen, normalized molar fraction	

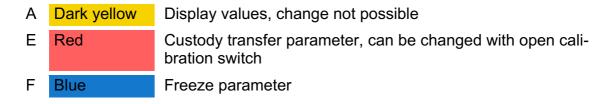
Figure 26: "AC Analysis Overview " menu

The parameters contain the corresponding live values with a unit (if available) and the jump target that describes the determination and specification of the respective value in a menu. By clicking on the parameter under the jump target, the corresponding menu appears; e.g. clicking on the K coefficient opens the sub-menu "BH Calculation of K (compressibility) coefficient".

BH Calculation of K coefficient					
Access	Line	Designation	Value	Unit	Variable
A *	1	Conversion factor	4.2493		<u>Zu</u>
A *	2	K coefficient	0.99693		<u>kzl</u>
A *	3	Compr.factor(M)	0.994348		<u>ZBetr</u>
A *	4	Compr.factor(B)	0.997407		ZNorm
E*	5	Calc. method	GERG 88 S ✓		kMod
E *	6	Default	1		<u>kVg</u>
E*	30	Pbase selection	1.01325 bars		<u>PnWahl</u>
E*	31	Tb selection	0 °C		t norm
E*	32	Tm selection	25 °C ✓		<u>tb</u>
E*	51	Limit mode	Default if LV		gergErrMod
E*	52	Limits	Sensor limits		gergRange
F	61	Frz. Conversion factor	0.0000		<u>fZu</u>
F	62	Frz. K coefficient	0.00000		fkzl
F	63	Frz. Compr.factor(M)	0.000000		<u>fZBetr</u>
F	64	Frz. Compr.factor(B)	0.000000		fZNorm
Enter	Car	cel Load defaults	Refresh		

Figure 27: "BH Calculation of K coefficient"

The parameters on the right side belong to different categories, which is indicated with different colors, identification letters and other symbols in the left part on the right screen in the relevant line. The most important include:

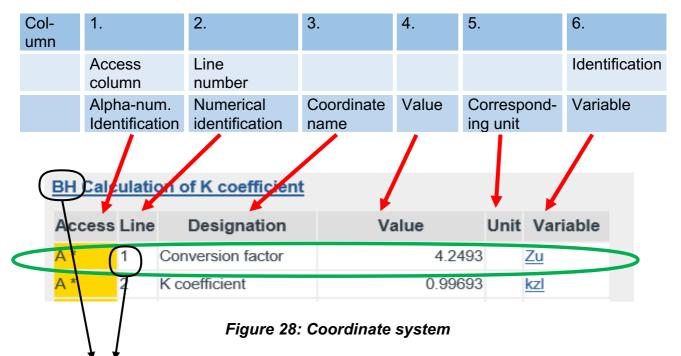


This identification and the color assignment are shown in detail in *Chapter 2.3.3 Display*.

All measurements, calculation values, parameters and functions are arranged in a coordinate system. There are several tables with columns and lines in this coordinate system. Each table as a (umbrella) term, or a heading, under which all various



points which have a logical connection with the term are summarized line by line; for example, points such as **BH05 Calc. method**, **BH06 Default**, etc. are summarized under the term **BH Calculation of K coefficient**. These "points" are referred to as "coordinates" below. These individual coordinates are assigned additional meanings column-by-column:



With **BH01** Conversion factor, the coordinate is uniquely identified in the green frame. The "Variable" column is only visible in Developer mode (see *Chapter 2.4 Access protection for data and settings*), for which the highest access level is required. The variable identification <u>Zu</u> establishes a unique identification for the physical variable; this physical identification is assigned to the coordinate **BH01** Conversion factor.

If applicable, a coordinate can also be a function, then these designations can also appear simultaneously.

The coordinates are arranged in a table, a coordinate system in the form of a matrix, in which each column (also identified with menu) is identified with two letters and each line is identified with a number. Furthermore, columns that belong together are summarized in groups and each group has the same first letters, e.g. "A" for the measurement columns. Each table as a (umbrella) term, or a heading, under which all various points which have a logical connection with the term are summarized line by line; for example, points such as "status coefficient", "calculation type", etc. are summarized under the term "calculation of the compressibility number". Chapters belonging together are summarized under the first letters: AA, AB, AC, AD... / BA, BB, BC, ... / CA, CB, CC, CD.....

Note

The method of counting takes place with letter / number combinations beginning with

AA = first column

01 = first line

Chapters belonging together are summarized under the first letters: AA, AB, AC, AD... / BA, BB, BC, ... / CA, CB, CC, CD ...

Only the values that are relevant for the selected device type are displayed. Therefore, complete columns and/or individual coordinates are hidden in the coordinate system – depending on the device type and operating mode setting.

In addition, there are coordinates (functions) that are intended for service purposes and for review, only. Depending on the user profile and the device type, therefore, all parameters and data are not always visible.

The columns displayed to the left and the parameters and measurements displayed to the right depend on the selected user profile. All data is displayed in "Service" mode only; the device is delivered in "User" mode.

2.3.3 Display

The visibility of coordinates and columns depends on the user profile setting. All coordinates are only visible in the service setting. Example display:

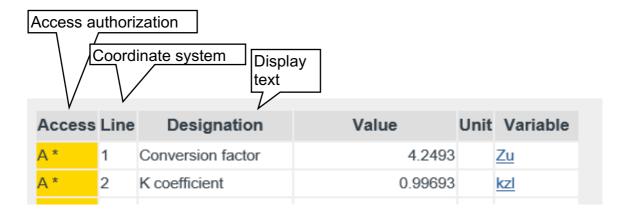


Figure 29: Parameter display



Explanation of symbols in the Access column:

Α	Display values, custody transfer, change not possible
В	Parameter under single code word protection
С	Special case: Code word entry/check
D	General displays, display values, non-custody-transfer
Е	Parameters protected by official calibration
F	Freeze value, not editable
I	Interface variable – measurement, not editable
J	Interface variable – imported type plate (e.g. hard), not editable
K	Constant, not editable
M	Imported measurement via Modbus, not editable
N	Non-custody-transfer meters, CO2, all disturbance meters, meters with an undefined billing mode, customer meters
Р	Automatically changing input value with simple code word protection
Q	Automatically changing input value without protection
S	Parameter under super user protection
Т	Parameter under double code word protection
W	Factory parameter, can only be changed in the factory
X	Automatically changing input value under calibration switch
Y	Automatically changing input value under super user protection
Z	Custody transfer meters Vo, Vm, Vb, E, M

The coordinate system runs horizontally from AA to QX (columns) and vertically from 1 to 99 (lines) (*Table 1: Coordinate system*)



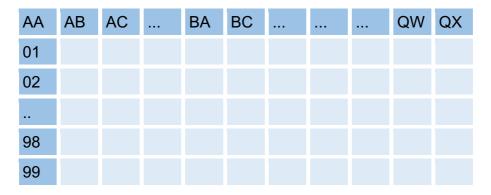


Table 1: Coordinate system

Displayed parameters

Parameters

These behave like constants. Editing changes the value of this constant.

Automatically changing values that can be edited

These values behave like changing values. Editing will change the initial value of these changing values, e.g. an offset. Example: Remaining time / trigger (IC06) for viewing the PTB telephone time service. IC06 contains the number of seconds until the next call of the telephone time service of the PTB. This call normally takes place once per day. The time can be shortened for testing and the call-up can be triggered prematurely.

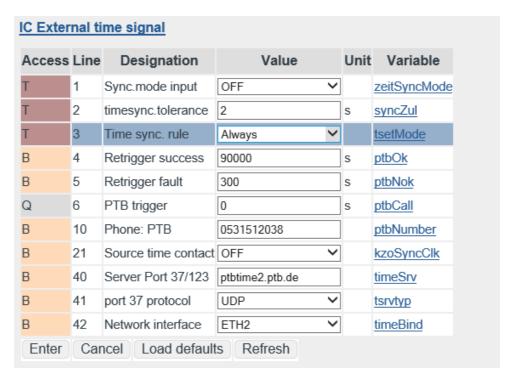


Figure 30: Automatically changing value "IC06 PTB trigger"

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Trigger

These values basically have no function in the basic state. A task is assigned and initiated with the editing. After completion of the task, the initiator returns to its basic state.

Click on the white field to change the value and then write the desired value.

Note

Please observe the unit after these fields (e.g. IC06: unit = s [seconds]) and choose suitable entries.

Parameter change:

There are different ways to change parameters:

1. Fields with an arrow (e.g. specification of the parameter shown in "large")



Figure 31: "AB Large"

Clicking on the arrow (in the red circle) opens a selection menu (see above). The desired value can be selected from these specification parameters.

Entries can be made directly in other fields, e.g. **IC04 Retrigger success** (see *Figure 30: Automatically changing value "IC06 PTB trigger"*):



Figure 32: Entry in fields (numbers)

The desired time after which a re-login takes place is entered directly in the field (with the example $90000 \text{ s} \approx 1 \text{ day}$), the assigned unit ([s]) was already assigned. Other fields contain additional information that can also be entered directly (in *Figure 33: Entry in fields (text)* the manufacturer "Rosemount" is entered).



Figure 33: Entry in fields (text)

A final possibility is fields that can be activated (*Figure 34: Activation of value fields*).



Figure 34: Activation of value fields

By clicking on the value: "edit", a sub-menu appears in which the variable **BC01 Absolute pressure** can be changed.

With the back arrow of Explorer

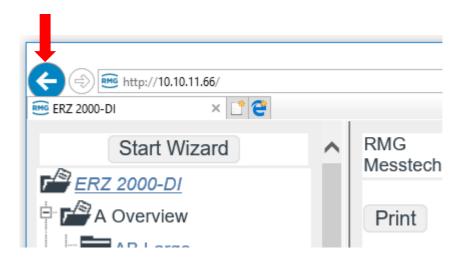


Figure 35: Back to the main menu

you return to the previous menu.

In order to familiarize yourself with the settings options and the type of setting, we recommend testing the settings options in the various "menus" in this display with the mouse. In order to avoid unnecessary "resetting", only save new settings if you actually need them.

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2.4 Access protection for data and settings

The ERZ2000-DI permits the entry and adjustment of all editable values. A description is provided in *chapter 2.3.3 Display*. All editable values are access-protected, which prevents arbitrary changes. This access protection has different hierarchies that are illustrated in the following figure:

Operater Access protection Without protection, can be used when closed. Calibration switch and closed closed code word must be activated. User Lowest protection Single code Double code Official accepted Calibration lock certifying body certifyer Highest protection Factory setting

Figure 36: Hierarchy of access protection

The lowest protection level applies with a closed calibration switch and without entry of a protection code. With entry of the first protection code, you reach the next protection level and entry of the second protection enables access to the third protection level.

These levels must be activated or deactivated by the user in order to make changes.

The next protection level is subject to calibration protection and must only be opened by authorized persons. The factory settings are also made in this level. There is also a super user protection for the highest level. With higher protection level, all lower protection levels are open. The following *Table 2: Access rights* explains the access rights for the different protection levels.

Closed	Without influence on measurement and measurement accuracy, e.g. operating point testing resolution
Single code	Without influence on measurement and measurement accuracy, e.g. specification values, warning limits, plausibility, comparisons, user protocols
Double code	Adaptation of gas property tables, has influence on measurement, but is then permitted and desired. Permission takes place with enabling of an operating mode protected by calibration lock.
Calibration lock	With influence on measurement and measurement accuracy. e.g. alarm limits, coefficients, operating modes (especially also operating modes allowing permission),
Super user	With considerable influence on measurement and measurement accuracy. e.g. calibration values, equipment, enabling of functions,

Table 2: Access rights

Access rights can be changed in the menu "GA Access" (Figure 23: Access to the device).

You can click on the fields after Codeword 1 and Codeword 2 and change the value of the code words with keyboard entry. If the rotating calibration lock is already open, the currently set code word can be read under the code words. The factory setting for both is "9999". This value must be entered (with calibration turned back and closed) and activated with "enter". The field **GA04 Current access** displays "single code". If Code word 2 is activated with the same code = "9999" with the same procedure, then **GA04 Current access** displays "double code". Separation between supplier and purchaser is possible with 2 different code words.

The calibration lock on the front panel is opened by turning it clockwise and **GA04 Current access** displays "super user".

Without prior activation of Code words 1 and 2, **GA04 Current access** is "calibration lock".

Change of the code word

In "super user" access protection, the code word can also be changed. In the menu "GA Access", the code words are read as encrypted numbers. If a new word is entered for the code word (series of numbers), it is activated with "enter" (adopt) for further activation of the access protection.



Deactivation of the access protection

The access protection can be deactivated with the touchscreen of the ERZ2000-DI (see *Figure 37: Deactivation of the access protection*) and with the browser (see *Figure 25: Error messages*). The button "Forget code word" becomes visible in the touchscreen display after clicking on the "Message" tab to the right (*Figure 37: Deactivation of the access protection*). By clicking on the button, "single code" and "double code" are closed. The text on *Figure 25: Error messages* describes how to activate the error message. The "single code" and "double code" access are also closed here by clicking on the "Acknowledge faults" button. The calibration lock is closed by turning it counterclockwise.

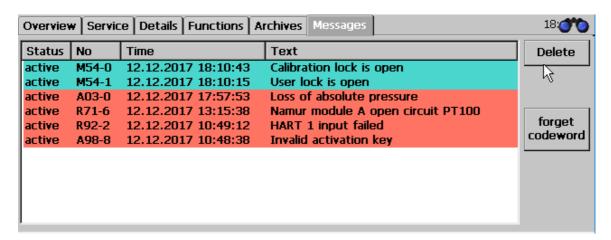


Figure 37: Deactivation of the access protection

Note

Normally, the calibration is now sealed by a calibration official.

In order to finish the adjustment of the access authorization and the user profile, the user profile must be entered in the menu **NA Wizard**. This is carried out most easily by opening the wizard (see above).

2.5 Language setting

The ERZ2000-DI is normally pre-configured, and the ordered language is set. The wizard also starts automatically in the pre-configured language.

However, it may be necessary to change the language. This takes place in the menu **ID Display**, see *Figure 38: ID Display menu*.



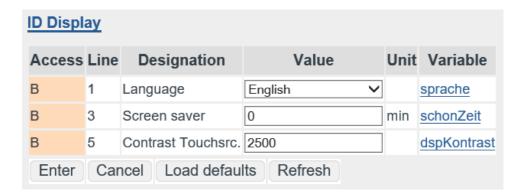


Figure 38: ID Display menu

First, select the language in the coordinate **ID01 Language**; "German" and "English" are available selections. After a change of the language and an update, all texts and instructions of the ERZ2000-DI and the wizard language are changed.

2.6 Screen saver

The time after which the screen switches off following a period of inactivity is entered in the coordinate **ID03 Screen saver**. The coordinate **ID05 EE05 Contrast Touchscr.** control the resolution of the display; the brightness of the screen can be adjusted from 1000 to 4000 with a presetting of 2500.

2.7 Display screen

Representations of the touch screen of the ERZ2000-DI are shown below. For this purpose, supplementary explanations of the figures on the browser are provided, if applicable. After the power is connected to the ERZ2000-DI, it displays the home screen, which is visible in *Figure 39: Start screen*.

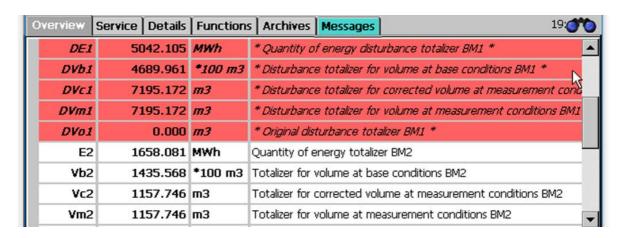


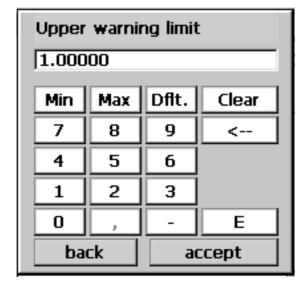
Figure 39: Start screen

The home screen appears after each restart of the device or after pressing the "HOME" key. This home screen shows the active meters, which are framed in italics with " * " according to calibration authority specifications. The other meters become visible with vertical scrolling (right).

Pressing the right tab in the upper area of the screen takes you to further display screens. The display screens are arranged like tabs. They represent the top level of the operating menu and are accessible via the buttons on the upper bar. The following display pages, "menus" are available, where the following sections are displayed.

Overview	Home screen with the meters (and important measurements)
Service	Service functions
Details	List of all measurements and parameters of the ERZ2000-DI
Functions	Displays and functions for test and calibration
Archives	Archive entries
Messages	Color event and error messages (alarms, warnings and notices)

Changes/settings can be made in some of the display screens. To change this parameter, go to the appropriate field or the appropriate line and the input fields appear, as shown in the example in *Figure 40: Input field*:



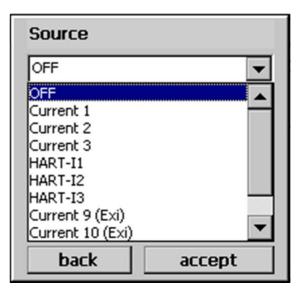


Figure 40: Input field

The left field is provided for entry of the numerical values; the right field is provided to select a mode. The new numerical value and/or the new mode is adopted with "accept".

2.7.1 Overview

Scroll to the top in the overview or tap on the "Overview" menu item again; six selection fields which can be used to switch to other tables, e.g. display screens, appear in the upper line.

2.7.1.1 Large

The "Large" display was already described above. This can be used to display 4 specific parameters in an extra-large font in order to enable a reading from a greater distance.



2.7.1.2 Analysis

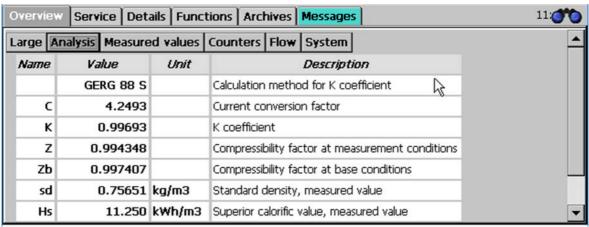
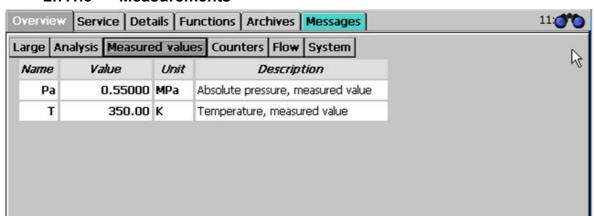


Figure 41: Overview -> Analysis sub-menu

The calculation process and corresponding input and result values are displayed in this menu. The calculation process of the compressibility number is specified in the first line – GERG 88S in this case.

In addition to further gas-specific parameters, the data for the gas composition that varies depending on the selected calculation process is provided here.

The calculation process can be changed on the **BH Calculation of K coefficient** wizard screen. This is equally possible in the corresponding menu.



2.7.1.3 Measurements

Figure 42: Overview -> Measurements sub-menu

The pressure and temperature measurements are shown in this display.

2.7.1.4 Counters

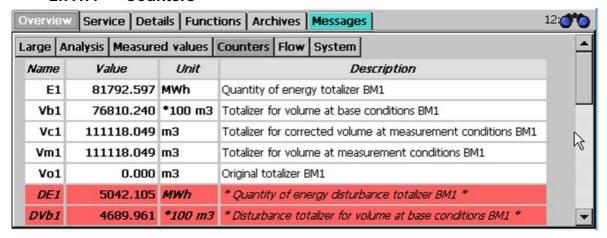


Figure 43: Overview -> Meters sub-menu

This menu shows the various meters for the two calculation modes, a color underline assigns different times or other classifications to the meters.

The appendix B) Totalizer in the browser view shows how the meters are handled in the browser display.

2.7.1.5 Flow rate

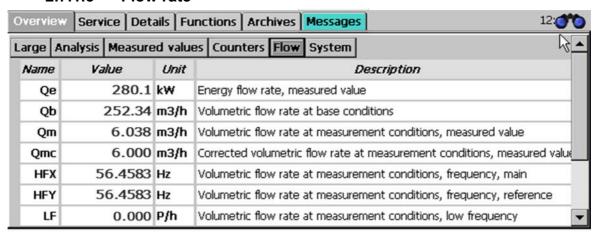


Figure 44: Overview -> Flow rate sub-menu

This menu shows different flow rates, such as energy flow, nominal volume flow and operating volume flow or the measurement current.



2.7.1.6 System

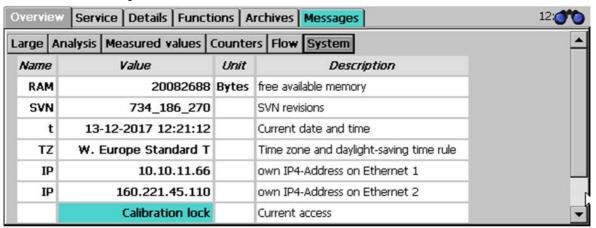


Figure 45: Overview -> System sub-menu

Various general values are displayed here, including the IP addresses with which you can actuate the device if it is connected to the PC, a PLC, etc. via Ethernet.

2.7.2 Service

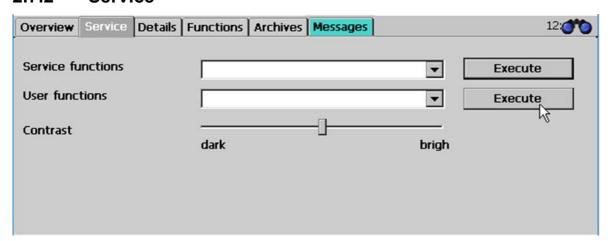


Figure 46: Service menu

The available settings in "Service functions" are reserved for the service department and a calibration official and/or an officially recognized inspection authority. These functions are described in the *appendix F*) Service functions.

If a blur occurs on contact of the stylus with the touchscreen, calibration can take place in the "Calibrate stylus" menu item under "User functions". Then this is initiated after selection of "Execute".

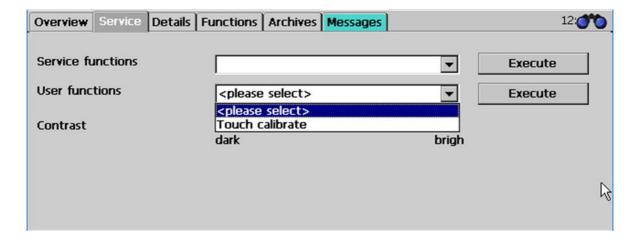


Figure 47: "Calibrate stylus" service menu / sub-program

After the function starts a series of crosses that must be touched in the center is displayed. After this takes place touching the touchscreen again returns to the previous screen.

This calibration can take place at any time. The **contrast** can also be changed in the service menu at any time. The stylus calibration can also be activated by pressing the home button on the overview page and drawing a line covering about 1/3 of the screen width. Then the stylus calibration opens automatically.

2.7.3 Details

A list of all measurements, computed values, calculated variables, parameters, functions and operating modes is provided here. The data is shown in a structure like in the display with an internet browser; as viewed from the left, you see the superordinate menu **tree**, which can be opened by "clicking" with the stylus on the touchscreen or by clicking with the right mouse pointer in the PC display for the sub-menus. *Figure 48: Details menu* shows the screen.

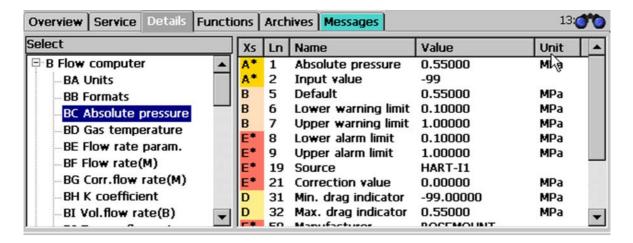


Figure 48: Details menu

Chapter 2.1.3 Remote control / parameterization explains how parameters can be changed.

2.7.4 Functions

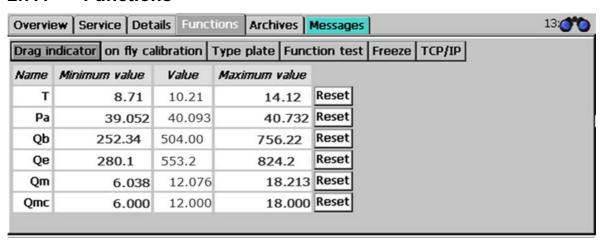


Figure 49: "Drag pointer" sub-menu under "Functions"

The "Functions" menu opens 6 additional display views, which are presented below. The drag pointer function is displayed first.

2.7.4.1 Drag pointer

The absolute minimum and maximum values for the measurements since the last restart or since the last resetting of the drag pointer are shown here. The function can be used for different measurement variables and is specified, for example, with the **BC Absolute pressure** in the coordinates **BC31 Min. drag pointer.** and **BC32 Max. drag pointer.** With other measurement variables, where this function can also be used, the settings are also in lines 31 and 32. These values specified for the "drag pointer" are deleted with "Reset" and then the set to the current measurement. The display is shown in *Figure 49: "Drag pointer" sub-menu under "Functions"*. The drag pointers can also be reset globally in the **LE Erasing procedure** menu.

2.7.4.2 On-the-fly calibration

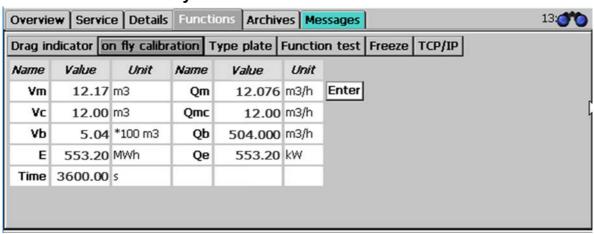


Figure 50: "On-the-fly calibration" sub-menu under "Functions"

Meters that can be started like a stopwatch at 0 are shown in this screen. It is started with "Enter" – to the right of the values. The meters then run until "Enter" is pressed again. Pressing "Enter" again resets the meters to 0 and initiates a restart.

Note

Tip:

When the time marks: 36 s, 360 s and 3600 s are reached, the meter values of meter and flow can be compares most easily *1 .

^{*1} Frequency conversion (unit Hz = 1/s) to volume flow (unit $V = m^3/h$) the factor is set to 3600; rounding, which occurs with other time marks is omitted here.

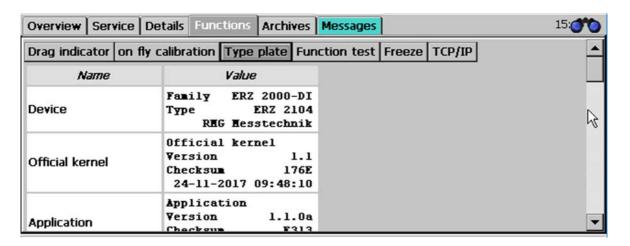


Figure 51: "Type plate" sub-menu under "Functions"

The type plate of the device is displayed in the "Type plate" submenu. This included further data, e.g. about the electronics (calibration kernel, Bios, WinCE kernel), about the meters and their settings (dimensions, pulse value), about the type of gas (composition, velocity of sound) and the environmental and standard conditions (pressure, temperature).

Only the type plate data is displayed here; there is no input possibility in the type plate display. Entry of the values takes place by entering the parameters of the relevant transmitter devices (*chapter "4 Transmitters*")

The type plate can also be viewed in the browser under the menu **Al ID display**.

Al ID display						
Access	Line	Designation	Value	Unit	Variable	
A *	1	Device	Family ERZ 2000-DI Type ERZ 2104 RMG Messtechnik		gerTyps	
A *	2	Official kernel	Official kernel Version 1.1 Checksum 176E 24-11-2017 09:48:10		<u>ekTyps</u>	
A *	3	Application	Application Version 1.1.0a Checksum E313 24-11-2017 09:48:10		<u>apTyps</u>	
A *	4	Flow computer BIOS	Flow computer BIOS Version 2.008 Checksum 5AB5 21-10-2014 15:03:38		<u>fcbTyps</u>	

٠..



Figure 52: Al Type plate menu

2.7.4.4 Functional test



Figure 53: "Functional test" sub-menu under "Functions"

The quantities and measurements are recorded and displayed for a defined length of time in the functional test. The functional test is divided into a run-up, the actual test and an after-run.



Functional test process:

- 1. Enter four times for the three sections of the functional test.
- 2. Click on the "Start Time1" button. Then the functional test is run according to the four times. Times that have already elapsed are highlighted green. Blinking green times indicate the functional test progress.
- 3. Alternatively, you can press the "Start now" button. Time 1 is set to the current time and the test starts immediately with the run-up time. Run-up, after-run and test times proceed according to the specifications. The time progress is also displayed here in green and blinking green.
- 4. If the testing is finished, the 4 time fields are highlighted yellow.
- 5. The result can be read in the green highlighted table to the right. You can switch back and forth between the tables for run-up, test and after-run with "Change".

Alternatively, the times for test time, run-up and after-run, as well as a delay time can be entered. The results of the functional test are also saved in archive groups 17 to 20.

Access	Line	Designation	Value	Unit	Variable
D	1	Revision status	At rest		<u>revStat</u>
Q	2	Time stamp 1	01-01-1970 01:00:00		revStamp1
Q	3	Time stamp 2	01-01-1970 01:00:00		revStamp2
Q	4	Time stamp 3	01-01-1970 01:00:00		revStamp3
Q	5	Time stamp 4	01-01-1970 01:00:00		revStamp4
Q	6	Revision run	1200	s	<u>revPrf</u>
Q	7	Pre/post run	60	s	revVorNach
Q	8	Delay	1	s	<u>revDelay</u>
Enter Cancel schedule Refresh					

Figure 54: HC Function test menu

In order to receive logical values with appropriate resolution, an adequate test time must be provided. A few minutes are sufficient for the volume detection via the HF inputs, because synchronization of the test function with the recording of the volume frequency takes place. For "slow" inputs, such as interfaces with ENCO or ultrasonic gas meters, the test time must be sufficiently long to minimize resolution



error (e.g. 1200 seconds = 20 minutes). This also applies for the "On-the-fly calibration" function.

The coordinates of the menu in detail:

HC01 Revision Status	Shows the current status of the function (stationary / running)
HC02 Time stamp 1	Parameter for starting the test process (run-up start)
HC03 Time stamp 2	Parameter for stopping the run-up and starting the actual test
HC04 Time stamp 3	Parameter for stopping the test and starting the after- run
HC05 Time stamp 4	Parameter for stopping the after-run and the function
HC06 Revision run	Parameter for a relative specification of the test time, corresponding to the time between Time stamp 3 and 4
HC07 Pre/post run	Parameter for a relative specification of the run-up and after-run time, corresponding to the time between Time stamp 1 and 2 or 3 and 4
HC08 Delay	Parameter for a wait time before the start with Time stamp 1

There are multiple processes for using the Functional testing function.

Use of the time stamp with manual entry.

If the 4 time stamps are entered, activate the "Start Time1" button. Then the function starts automatically when the times are reached and stops after the 4th time stamp has elapsed. The test time, the time for run-up/after-run and the delay are calculated and adopted from these times.

There is also a very simple option for activating a functional test directly by clicking on the "Start now" button. For this purpose, the test time and run-up/after-run must be specified beforehand.

Parameterization of the time stamp with entry by means of remote operation via the browser.

For this purpose, click on the "**schedule**" button under the table. The 4 time stamps are calculated from the PC time (not the flow computer time!) and the values for test time, run-up/after-run and delay. The function starts automatically when the times are reached and stops after the 4th time stamp has elapsed.

The result of an elapsed function test can be viewed in the browser. For this purpose, click on the "Result of function test" button under the table in the menu **HC Functional test under running conditions** (*Figure 54: HC Function test menu*)



Functional test under running conditions

Г	Time stamp 1		Time stamp	2	Time stam	р 3	Time s	stamp 4	
	\supset					\Ζ'		$\overline{}$	
	Pre ru	n	V Ex	camination		Po	ost run	~	
Desig- nation	13-12-2017 15:57:41	-	13-12-2017 15:58:41	-	13-12-2017 15:59:57	-	13-12-2017 16:00:57	Unit	Trend
Time	22459.647093	59.996115	22519.643209	75.995960	22595.639168	59.996881	22655.636049	s	
Vo1	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	m3	
Vm1	111118.048975	0.326637	43045.224940	1.959824	111118.048975	0.326637	111118.048975	m3	
Vc1	111118.048975	0.326637	43045.224940	1.959824	111118.048975	0.326637	111118.048975	m3	
Vb1	76810.239998	12.228196	1354422.625786	73.369174	76810.239998	12.228196	76810.239998	*100 m3	
E1	81792.596735	0.122184	24540.661667	0.733105	81792.596735	0.122184	81792.596735	MWh	
Vo2	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	m3	
Vm2	1157.746350	0.000000	1157.746350	0.000000	1157.746350	0.000000	1157.746350	m3	
Vc2	1157.746350	0.000000	1157.746350	0.000000	1157.746350	0.000000	1157.746350	m3	
Vb2	1435.567757	0.000000	1435.567757	0.000000	1435.567757	0.000000	1435.567757	*100 m3	
E2	1658.080787	0.000000	1658.080787	0.000000	1658.080787	0.000000	1658.080787	MWh	
Qm		117.589		117.589		117.589		m3/h	↑
Qmc		117.589		117.589		117.589		m3/h	↑
Qb		4402.15		4402.15		4402.15		m3/h	↑
Qe		43986.2		43986.3		43986.3		kW	1
Pa		0.55000		0.55000		0.55000		MPa	
Т		293.15		293.15		293.15		K	↓
Hs		11.250		11.250		11.250		kWh/m3	
sd		0.75651		0.75651		0.75651		kg/m3	↑
С		5.0577		5.0577		5.0577			↑
K		1.00000		1.00000		1.00000			↓ l
CO2		0.0000		0.0000		0.0000		mole%	
H2		0.0000		0.0000		0.0000		mole%	
N2		0.0000		0.0000		0.0000		mole%	
CH4		100.0000		100.0000		100.0000		mole%	
C2H6		0.0000		0.0000		0.0000		mole%	
C3H8		0.0000		0.0000		0.0000		mole%	
N-C4		0.0000		0.0000		0.0000		mole%	
I-C4		0.0000		0.0000		0.0000		mole%	
N-C5		0.0000		0.0000		0.0000		mole%	
I-C5		0.0000		0.0000		0.0000		mole%	
NeoC5		0.0000		0.0000		0.0000		mole%	
C6		0.0000		0.0000		0.0000		mole%	
C7		0.0000		0.0000		0.0000		mole%	
C8		0.0000		0.0000		0.0000		mole%	
C9		0.0000		0.0000		0.0000		mole%	
C10		0.0000		0.0000		0.0000		mole%	
H2S		0.0000				0.0000		mole%	
H2O He		0.0000		0.0000		0.0000		mole% mole%	
Пе 02		0.0000		0.0000		0.0000		mole%	
CO		0.0000		0.0000		0.0000		mole%	
Ar		0.0000		0.0000		0.0000		mole%	
		0.0000		0.0000		0.0000		mole /0	

Table 3: Explanation of terms Transfer of the volume transmitter

The center row with 3 columns and the test heading (bold) is the result of the function test. The first column displays the initial values, the center column the differences and averages and the third column the stop values. Run-up and after-run are relevant data depending on the logical test times.

The function test then delivers usable data if the flow computer runs error-free and does not change during the test of the totalizer status (running / stopped). If this is not the case, the starting and stopping values are not displayed and the lines with the totalizer statuses are hidden. If, for instance, only the disturbance totalizer are running, the stationary main totalizer are stored with the difference = 0. For interface protocols that only send the data in second-long intervals, the test time must be given more attention (ENCO, DZU). The same also applies for LF inputs.

2.7.4.5 Freeze

The ERZ2000-DI offers the option of temporarily storing current data for later use. This is referred to as a freeze. The last quantities and measurements are "frozen" with the freeze function. First, the ERZ2000-DI reports the recording of all data and the configuration of the table. This can take several seconds, then the data that was recorded on the specified date and time.

A freeze is most easily activated by pressing the "Freeze now" button.

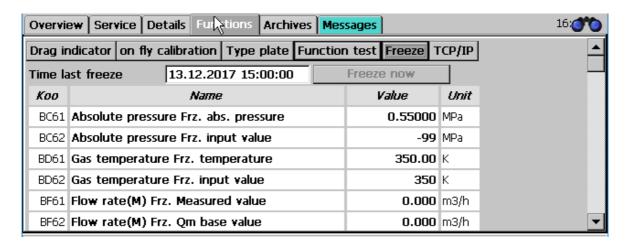


Figure 55: "Freeze" sub-menu under "Functions"



Figure 56: HA Freeze menu shows the menu HA Freeze under "H Revision". HA01 shows the time of the last archiving, coordinates HA03 to HA05 can be used to adjust when and how the freeze function is activated. HA04 defines the time interval over which the data is recorded and archived. In coordinate HA05 Source freeze cont. the corresponding contact input 1 to 8 must be set if a "Freeze" should be initiated by a contact pulse.

HA Freeze					
Access	Line	Designation	Value	Unit	Variable
D	1	Time last freeze	13-12-2017 15:00:00		<u>frzTime</u>
D	2	Freeze contact	Freeze		ktkFreeze
В	3	Freeze mode	Gas day 💙		<u>frzMode</u>
В	4	Freeze interval	30	S	frzInterval
В	5	Source freeze cont.	Contact input 2		kzoFreeze
Enter Cancel Load defaults Refresh					
Frozen v Freeze r		hen show results			

Figure 56: HA Freeze menu

The selection of how frequently the freeze process is initiated (**HA03 Freeze mode**) is:

Off	No freeze processes are initiated and the freeze dialog is deactivated.
Every second	Freeze in second intervals
Every minute	Freeze in minute intervals at the start of a minute
Every hour	Hourly freezing at the start of an hour
Every day	Daily freeze at the start of the day
Gas day	Freeze is initiated on the specified gas day ("YA27 Gas day") at the beginning of the specified billing hour. The billing hour must be specified; day, month and year are specified automatically.



Cyclical	Cyclical freeze in the specified interval (coordinate "HA04 Freeze interval")
Contact	Initiate freeze via a selectable contact input; e.g. if freeze is initiated with buttons via Contact input 2
Manual	The "Freeze now" button is activated in the freeze dialog.
Every month	Monthly freeze on the 1st day of every month
Gas month	The freeze is initiated in the specified month (coordinate "YA28 Gas month") at the beginning of the specified billing hour and specified day (coordinate "YA27 Gas day").
	The billing hour and day must be specified; month and year are specified automatically.

The freeze results can be displayed in the browser (function under the menu **HZ Freeze**). They are stored in the blue fields.

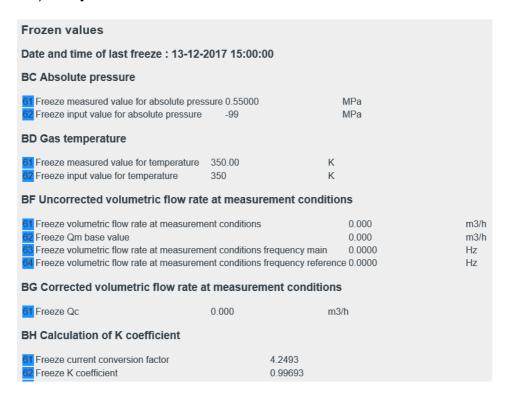


Figure 57: Display of the last freeze values



2.7.5 Archive

The archive entries of all archive groups can be viewed in this screen. The entries are numbered from "Start" to "End", where the initial value is set to 1. If the index has reached the maximum buffer depth, the oldest entry is overwritten when a new data record is generated starting at this point. Then the start index increases by 1 each time.

Note

Only display is possible on the device; the archive content can also be exported in the Excel-compatible tsv format with the internet browser.

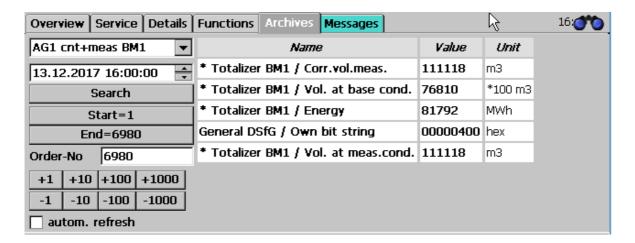


Figure 58: "Archive"

Call-up of archive data

The desired archive group (AG) is selected at the top left. A search time can be entered in the field below it. After pressing "Search", the entry is displayed to the right with this date and time.

Note

If no entry exists with this time, the next newest data record is displayed.

Two fields for jumping to the oldest or newest entry are included. The indenture number indicates the current position, i.e. the index of the displayed entry. Jumps of ± 1 , ± 10 , ± 100 and ± 1000 positions can be made with the fields below.

The display can be automated so that the last stored value is always displayed. For this purpose, the last data record (end) must be selected first, then the function "Autom. refresh" must be activated. If the newest data record is not displayed, the check box is deactivated and meaningless. "End" must be actuated before the automation is reactivated. The actualization process is displayed with a blinking of the background color of the check box. In the process, color-coding differentiates between updating and updating and display of a new data record.

The values in the table can have different background colors:



Error-free measurement Meter/measurement has stopped Substitute value Fixed value

It is possible to freely define a special archive. The content and recording cycle can be selected arbitrarily by the user. The complete scope of all measurements and values are available via a selection menu for the storage of data, comparable to the selection for the current outputs (*Figure 59: Free programmable archive menu*).

Parameterization of the archive content takes place under JN Free programmable archive. For selection of content, the appropriate coordinate to be archived must be selected under "Name" under JN10 Assign. Channel 1. Any other arbitrary value can be assigned via a selection menu. Up to 20 coordinates can be assigned in this manner. Entry for the user code is suitable for access.

The ERZ2000-DI writes the result-controlled (e.g. with incoming and outgoing errors or with full hours or ..) meter statuses, measurements and messages in its archive. For this purpose, there are different archives, e.g. for main meters, disturbance meters or special measurements. It also determines the highest values from the measurements, which are displayed and written to the appropriate archive groups.

The time grids are adjustable with the coordinate "JN01 Record cycle": Off, every minute, every 2nd minute, every 3rd minute, every 4th minute, every 5th minute, every 6th minute, every 10th minute, every 12th minute, every 15th minute, every 20th minute, on minute 30, every hour, every day, gas day, every month, gas month, on ever freeze cycle and on every change of the gas composition.

The archive depth is 8192 entries.

Figure 59: Free programmable archive menu

Deletion of archives, log books, change buffer, etc.

Cancel Load defaults Refresh

Enter

In the menu L Factory setting, sub-menu LE Erasing procedures (Figure 60: Menu LE Erasing procedures), archives, log books, etc. can be deleted. As a Super user (see chapter 2.4 Access protection for data and settings) the coordinates LE10 Clear log, LE11 Clear changes, LE12 Clear archive (DSfG archive of the flow computer and registry entry, as well as the DSfG log book), LE13 Hour/day reset (DSfG Archive for the highest load), LE14 Drag indic. reset (max and min values of all drag pointers, values are set to the current values) and LE16 Clear exceptions are activated.

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Figure 60: Menu LE Erasing procedures

Further details about the archive are provided in the appendix C) Archive assignment, depth and identification.

2.7.6 Alarm, warning message

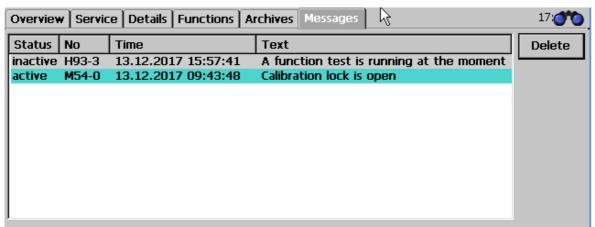


Figure 61: "Messages"

All messages that have taken place since the last deletion are displayed in different colors in this field:

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Red Pending alarms, i.e. faults of the custody transfer functions that result in counting in the disturbance meters. General alarms are identified with "A"; internal computer errors are identified with "R". Yellow Current warnings, identified with "W", that refer to an error of a non-custody-transfer function. The main meters continue to run. Notices ("H") of implausible parameterization or potentially faulty Light blue operating statuses. Tur-Messages ("M") normal operating statuses, e.g. "User lock is quoise open". Alarms or warnings that are temporary, have not been acknowl-Gray edged, but are no longer present.

LED status: blinking / continuously illuminated Warning and alarm messages are displayed by a yellow (warning) and a red (alarm) LED on the front side of the device. The blinking LED indicates an active message. If a continuous light is present, the warning (alarm) is no longer present, but the message has not been deleted yet. If multiple messages are pending simultaneously, the blinking status has priority.

Relay closes

The warning relay and/or alarm relay closes in parallel.

If single-value and double-value messages are differentiated between; a single-value message appears and then is pending permanently, the two-value message is always present, but with interruptions. There is only one status for single-value messages: "Message is active"; the active status for these messages remains in effect until acknowledgment. The warning or alarm relay is energized if a (or multiple) message(s) occurs (occur) and reset if no messages are present. The relays remain active for single-value messages until acknowledgment.

All messages that have not been acknowledged are shown in the display. With "Delete", the no longer pending alarms and warnings and all other messages are deleted from this display. With "Delete", the relevant LEDs are also deactivated, if no alarm or warning is pending. However, the deleted messages are stored in the log book (archive group 21). If no events are pending, the following text appears: "no errors".

The "Message" tab is displayed in the color of the message having the highest value if you are in other menus / screens.

Warning and alarm messages can be acknowledged in the Miscellaneous menu, Error display sub-menu with the button under the error list.

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2.7.7 Highest load display

The highest load displays and archives have a dedicated approval and are described in a separate manual.

2.8 Time system

General displays and parameters and all displays and parameters that are required for receiving the time signal are located in the menus **IB Time**, **date** and **IC External time signal**. The time system consists of a battery-buffered, quartz-controlled real-time clock module (RTC). This provides the basic time for the ERZ2000-DI.

2.8.1 IB Time, date

The settings for the time and date specifications are made in the wizard and are described there.

2.8.2 IC External time signal

The settings for the time synchronization are made in the wizard and are described there.



2.8.3 IF TCP/IP network

IF TCP/IP network					
Access	Line	Designation	Value	Unit	Variable
В	1	own IP-Addr.Eth1	10.20.13.73		my ipE1
l .	12	MAC-address Eth1	00-05-51-05-1A-FC		macAddrE1
В	13	Netmask Eth1	255.255.255.0		netmaskE1
В	14	Gateway Eth1	10.20.13.1		qatewayE1
В	15	DNS Eth1	172.17.248.98		namesrvE1
В	16	DHCP Eth1	Yes 🗸		dhcpE1
В	17	MTU Eth1	1500		mtuE1
В	21	own IP-Addr-Eth2	160.221.45.110		my ipE2
S	32	MAC-address Eth2	00-00-00-00-00		macAddrE2
В	33	Netmask Eth2	255.255.0.0		netmaskE2
В	34	Gateway Eth2	192.168.20.254		gatewayE2
В	35	DNS Eth2	194.25.0.70		namesrvE2
В	36	DHCP Eth2	No 🗸		dhcpE2
В	37	MTU Eth2	1500		mtuE2
D	41	Port HTTP	80		httpdport
E*	42	remote control	Yes 🗸		vncd
E*	43	port remote control	4831		vncdport
Enter Cancel Load defaults Refresh					

Figure 62: Menu: IF TCP/IP network

Usually the basic settings in the **IF TCP/IP Network** menu work, but it is still possible that the ERZ2000-DI cannot be reached via TCP/IP. A message appears that DHCP (communication protocol; enables the assignment of the network configuration to the client / ERZ2000-DI via server) has been changed at runtime (not at startup) and that no DHCP server is available. In this case, the settings should be checked and adjusted if necessary.

If "yes" is activated in coordinate **IF16 DHCP Eth1**, the network configuration is assigned automatically; if "no" is activated, this has to be done manually, which should be tried if the ERZ2000-DI cannot be reached via TCP/IP.

For example, the IP4 address for the ERZ2000-DI must be entered manually in coordinate **IF01 own IP-Addr. Eth1** for network 1, e.g. "10.20.13.73". Under this address (or the automatically assigned address), the ERZ2000-DI operates as an



HTTP server and can be activated with a standard browser (Internet Explorer, Firefox) (see also *chapter 2.1.3 Remote control / parameterization*). In **IF32 MAC-address Eth2**, the MAC address Ethernet 2 can be entered by a super user.

Coordinate **IF15 DNS Eth1** (DNS = Domain Name Service) contains the IP address of the service for the name resolution. The setting is connected to the time service via network function.

The analog assignments for the Ethernet interface 2 are made with coordinates **IF21**, **IF33**, **IF34**, **IF35** and **IF36**.

The value of coordinate **IA41 Port HTTP** is typically Port 80. It cannot be changed.

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3 Electrical connections

3.1.1 Equipment variants

The assignment of the connection terminals of the ERZ2000-DI is essentially specified by the compact configuration. However, there are reserves, because a different definition of the terminal assignment is necessary depending on additionally installed extension modules. The positions of the extension cards and assignments for the plug strips are specified in the additional data sheet for the device. The unoccupied slots can be optionally equipped with the following extension cards:

1. Ex isolation card for volume (measurement and comparison), Vo, p and T

with 4..20mA or HART

2. HART card for 3 transmitters

The modules that are used are recognized automatically by the ERZ2000-DI. The menu **LB Module assembly** shows the modules recognized by the system and inserted. Therefore, the menu is provided as information for automatic recognition or troubleshooting. This information is important for the assembly of device combinations in the factory or for equipping modules at a later time. *Figure 63: Menu LB Module assembly* shows the equipment for the ERZ2000-DI that is in use. (This includes a COM 6 / COM 7 card for additional interfaces and a Hard card for digital communication with pressure and temperature sensors.)

Figure 63: Menu LB Module assembly

Device rear wall

Since the ERZ2000-DI has a universal configuration, there are more connection terminals that required by the typical device (e.g. a status flow computer). There is a standard assignment of terminals that always use the first pins in consideration of numbering. Additional pins are reserves and/or can be assigned by means of software. Therefore, it is also possible to connect the pressure transducer to one of the free reserve inputs and select it by means of software.



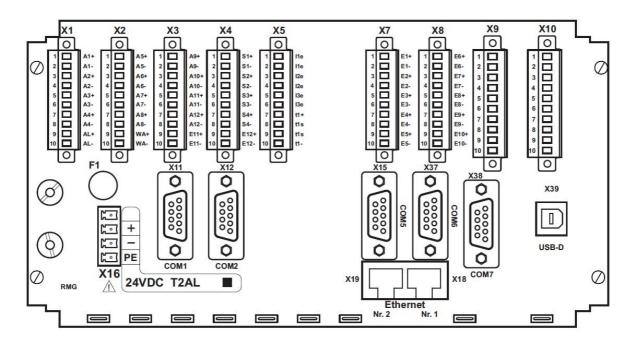


Figure 64: Rear wall of the ERZ2000-DI



3.1.2 Terminal assignment

Connection of supply voltage:

Figure 64: Rear wall of the ERZ2000-DI (bottom left)

X 16 24 V DC __10% / +15%

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Fuse F1 = 2 A

1.0 A

24 W

-10% / +15%

Typical power con-

Max. output

sumption

(depending on equip-

ment)

ERZ2000-DI without external Ex- separator stage Ex1-NAMUR-2 / V1 or V2

X 1 Terminal 1 Transistor output 1 +

Terminal 2 Transistor output 1 -

Terminal 3 Transistor output 2 +

Terminal 4 Transistor output 2 -

Terminal 5 Transistor output 3 +

Terminal 6 Transistor output 3 -

Terminal 7 Transistor output 4 +

Terminal 8 Transistor output 4 -

Terminal 9 Alarm contact + semiconductor rel. poled, NC

Terminal 10 Alarm contact – semiconductor rel. poled, NC

X 2 Terminal 1 Transistor output 5 +

Terminal 2 Transistor output 5 -

Terminal 3 Transistor output 6 +

Terminal 4 Transistor output 6 -

Terminal 5 Transistor output 7 +

Terminal 6 Transistor output 7 -

Terminal 7 Frequency output + (higher prio) or transistor output 8 +

Terminal 8 Frequency output - (higher prio) or transistor output 8 -

Terminal 9 Transistor output Warning message +

Terminal 10 Transistor output Warning message -

X 3 Terminal 1 Pulse output 1 + Dispatcher or meter pulse

Terminal 2 Pulse output 1 - Dispatcher or meter pulse

Terminal 3 Pulse output 2 + Dispatcher or meter pulse

Terminal 4 Pulse output 2 - Dispatcher or meter pulse

Terminal 5 Pulse output 3 + Dispatcher or meter pulse

Terminal 6 Pulse output 3 - Dispatcher or meter pulse

Terminal 7 Pulse output 4 + Dispatcher or meter pulse

Terminal 8 Pulse output 4 - Dispatcher or meter pulse

Terminal 9 Reserve 2nd input for Vo with external separator stage +

Terminal 10 Reserve 2nd input for Vo with external separator stage -



Terminal 1 **X4** Current output 1 + Terminal 2 Current output 1 -Terminal 3 Current output 2 + Terminal 4 Current output 2 -Terminal 5 Current output 3 + Terminal 6 Current output 3 -Terminal 7 Current output 4 + Terminal 8 Current output 4 -Terminal 9 Input for Vo with external separator stage + Terminal 10 Input for Vo with external separator stage -X 5 Terminal 1 Current input 1 active or passive Terminal 2 Current input 1, active or passive Terminal 3 Current input 2, active or passive Terminal 4 Current input 2, active or passive 5 Current input 3, active or passive Terminal Terminal 6 Current input 3, active or passive Terminal 7 PT 100 # 1 supply ++ standard connection Terminal 8 PT 100 # 1 sense + standard connection Terminal 9 PT 100 # 1 sense - standard connection Terminal 10 PT 100 # 1 supply - - standard connection Terminal 1 **X** 7 Signal input 1 + , assignment takes place with software Terminal 2 Signal input 1 - , assignment takes place with software Terminal 3 Signal input 2 + , assignment takes place with software Terminal 4 Signal input 2 - , assignment takes place with software Terminal 5 Signal input 3 + , assignment takes place with software Terminal 6 Signal input 3 - , assignment takes place with software Terminal 7 Signal input 4 + , assignment takes place with software Terminal 8 Signal input 4 - , assignment takes place with software Terminal 9 Signal input 5 + , assignment takes place with software Terminal 10 Signal input 5 - , assignment takes place with software X 8 Terminal 1 Signal input 6 + , assignment takes place with software Terminal 2 Signal input 6 - assignment takes place with software 3 Signal input. 7 + reserve for 2nd vol. input measuring channel Terminal Signal input 7 - reserve for 2nd vol. input measuring channel Terminal 4 Terminal 5 Signal input 8 + reserve for 2nd vol. input comparison channel Terminal 6 Signal input 8 - reserve for 2nd vol. input comparison channel Volume input measuring channel (HFX) + (external isolation) Terminal 7 Terminal 8 Volume input measuring channel (HFX) - (external isolation) Volume input comparison channel (HFY) + (ext. isolation) Terminal 9 Terminal 10 Volume input comparison channel (HFY) - (ext. isolation)



ERZ2004/2104-DI; X 9 and X 10 are optionally assigned

X 9 Terminal 1 Ex-option enco + (Vo)
Terminal 2 Ex-option enco - (Vo)
Terminal 3 Ex-option Vm measuring channel (HFX) +
Terminal 4 Ex-option Vm measuring channel (HFX) Terminal 5 Ex-option Vm comparison channel (HFY) +

Terminal 6 Ex-option Vm comparison channel (HFX) -

Terminal 7 Ex-option pressure measurement - transmitter (opt. HART)
Terminal 8 Ex-option pressure measurement + transmitter (opt. HART)
Terminal 9 Ex-option temp. - transmitter (opt. HART) for PT 100 s. X 10
Terminal 10 Ex-option temp. + transmitter (opt. HART) for PT 100 s. X 10

X 10 Terminal 1 reserve / free

Terminal 2 reserve / free Terminal 3 reserve / free

Terminal 4 reserve / free

Terminal 5 reserve / free

Terminal 6 reserve / free

Terminal 7 Ex-option PT 100 supply ++

Terminal 8 Ex-option PT 100 sense +

Terminal 9 Ex-option PT 100 sense -

Terminal 10 Ex-option PT 100 supply - -

Note

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With use of the internal Ex isolation stage:

A mixture of inputs is possible with respect to Ex protection, which means an individual signal can also be used with an external isolation stage or with a <u>pressure-proof encapsulated</u> ignition protection type, in combination with <u>Ex intrinsically safe</u> protection type.

Example:

The volume inputs for measuring and comparison channels and the original ENCO meter are operated on **X 9** via the internal Ex card, the pressure transducer is operated as a 4..20 mA transmitter and the temperature probe is operated as PT 100 4-wire connection with pressure-proof encapsulation ignition pressure type and connected to **X 5**.

Other possible mixtures are feasible.

The number of connection possibilities increases if the optional Ex input card is used. This input card enables galvanic isolation of MSR signals, such as 20 mA



current loops or the adjustment and/or standardization of signals. Intrinsically safe field devices can be operated within explosion-prone areas with the isolation.

For further information, refer to appendix E) Optional Ex input card.

3.1.3 Data interfaces

The **digital data interfaces** are also provided on the basic assembly. These interfaces can be used as:

- Service interface
- Modbus for external data transmission
- Ethernet TCP/IP network connections
- Connection for an external modem (DSfG-B)
- Serial data interfaces

Interface characteristics

			Recommendation / possible use
X 11	COM 1	Interface	Modbus RTU / ASCII
X 12	COM 2	Interface	
X 15	COM 5	Interface	External modem, PTB time call-up
X 37	COM 6	Interface	Modbus master for reading the gas
X 38	COM 7	Interface	composition and volume (F-instance)
X 18	Ethernet 1	Network connection	Multi-session capability: Modbus IP,
X 19	Ethernet 2	Network connection	http Single-Session (selectable interface): Remote operation, DSfG-B-IP, SNTP, TIME



3.1.4 Pin assignment and usage recommendation of the interfaces

COM 1: Pin assignment

Pin	Mode: RS 232	Mode: RS 422	Mode: RS 485
1	+U (+5V DC)	+U (+5V DC)	+U (+5V DC)
2	RxD	TxD-A	
3	TxD		R/TA A Data
4		RxD-A	
5	GND	GND	SGND Signal Ground
6		TxD-B	
7			
8		RxD-B	R/TN B Data
9			

Use

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Switchable from **RS 232** to **RS 422** or **RS 485**, can be optionally assigned with **different protocols**, **MODBUS protocol** and **IGM** (for ultrasonic meters) available. Optionally, **MODBUS ASCII / RTU** can be offered as **Modbus standard** driver for RS 232 or RS 485 interfaces.

The operating mode for the COM 1 interface is adjusted in the wizard in the menu **IG Serial interfaces** with the coordinate **IG03 COM 1 operating mode**.

COM 2: Pin assignment

Pin	Mode RS 232
1	
2	RxD
3	TxD
4	
5	GND
6	
7	
8	
9	

The operating mode for the COM 2 interface is adjusted in the wizard.



COM 5 (modem): Pin assignment

Pin	Mode: RS 232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Use

RS 232 with handshake plus DCD (data carrier detect) plus RI (ring indicator). Usable for MODEM (DFÜ).

With connection of a modem, the COM 5 operating mode "Modem" must be selected in the wizard.

3.1.5 External modem connection

The COM 5 interface is used for connection.

Example for a setting

The following setup must be made in the menu **GD DSFG instance remote data transmission**:

GD13 Modem init. string ate0s0=1
GD14 Dial prefix atx3dt

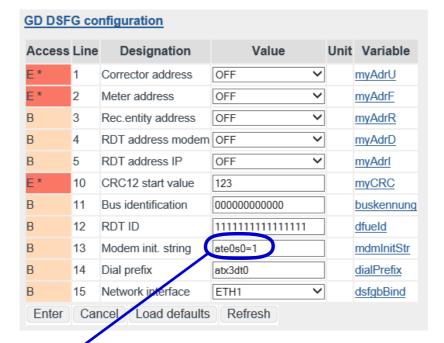


Figure 65: DSfG setting

Meaning:

- at Prefix of a command line
- e0 Echo function deactivated
- s0=1 Set register 0 to 1, which means the number of alert characters after which the modem answers and establishes the connection, should be 1.
- x3 Response setting:
 - Hayes Smartmode 300 compatible answers / blind dialing (extension) plus all CONNECT answers
 - plus recognition of busy symbols
- dt sound selection process (dp = pulse selection process)

Depending on the modem, there may be other commands, which are covered in the manufacturer's manual.

Additional settings in the menu IG Serial interfaces:



Figure 66: Menu: IG Serial interfaces

The parameters for operation of the serial interfaces (also DSfG-B and Modbus) are adjusted in this menu **IG Serial interfaces**.

The coordinate **IG23** is an internal interface that can be used for the original Vo totalizer of an encoder (ENCO).

The register offset for the Modbus register is adjusted in **IG60**. The Modbus address for COM 1 can be entered with **IG04** (**IG14** for COM 2).

With **IG33**, COM 5 can be configured for modem connection for "Modem" or "Dedicated line" (with external modem), e.g. DFÜ for DSfG-B.

3.1.6 Connections

3.1.6.1 Input characteristics

2-channel HF volume flow input with pulse metering and frequency measurement

The appropriate frequency input must be selected in this menu; Inputs 5, 6, 7 and 8 offer higher resolution.

Channel 1: Volume measuring channel HF input

Measuring range	0.10 Hz to 6.0 kHz
Accuracy	0.01 Hz
U hys	1.0 V
U trg	3.0 V
Overvoltage protec-	6.8 V with external module
tion	18.0 V with internal module (galvanically isolated)

Channel 2: Volume comparison channel HF input

Same data as for Channel 1

2-channel LF volume flow input with pulse metering and frequency measurement

Channel 1: Volume measuring channel LF input

Measuring range	0.00 Hz to 6.0 kHz
Accuracy	0.01 Hz
U hys	1.0 V
U trg	3.0 V
Overvoltage protec-	6.8 V with external module
tion	18.0 V with internal module (galvanically isolated)

Channel 2: Volume comparison channel LF input

Same data as for Channel 1

Volume input for digitally operating Vo totalizer

Data transmission between the gas volume meter and flow computer take place unidirectionally and reactionless via a shielded, twisted pair of wires from the meter to the flow computer. The electrical characteristic data conforms to DIN 19234 (NAMUR).



Up to 5 analogue inputs, including a pressure measurement input for analog signals and for HARD protocol

Current measurement

Range	0/4 to 25 mA
Resolution	20 bit
U max	2.5 V
Ri	250 Ω
Tk	< 15 ppm
Measuring time	50 ms
Overvoltage protection	6.8 V

Calibration of current inputs takes place at the factory, but correction can take place with the adjustment of the input variables pressure, temperature, etc.

HART protocol connection SMART transmitter (optional)

	Two-wire system
Communication	Simultaneously analog and digital
Protocol	HART master
Inputs	3 (optionally 6)
With EX isolation card (optional)	+ 2 inputs
Distribution of inputs	1 x pressure (reserved) 1 x temperature (reserved) Remainder -> Free availability

Up to 2 resistor inputs, a temperature measuring input for resistance measurement

Resistance measurement

Type	PT 100 four-wire
Range	-20°C to +60°C
Resolution	0.01°C
Accuracy	0.05°C
Measuring time	50 ms

8 signal inputs for H/L gas switching, travel direction reversal and external freeze

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Digital status inputs

All inputs are galvanically isolated from the computer, but not from each other. The following can be used as signal transmitters: contact, open collector / drain, active push / pull

-U max	5 V	
-I max	13 mA	
f max	10 Hz	
Overvoltage protection	6.8 V	

3.1.6.2 Output characteristics

Current outputs

Quantity	4
Range	0-20 mA or 4-20 mA
Resolution	12 bit
Ohmic resistance	700 Ω
Overvoltage protection	from 33 V, galvanically isolated

Signal outputs

Quantity	8
U max	24 V DC
P max	150 mW
Ic max	100 mA
U _{CE} sat	1.2V or Ron = 50 Ohm
F max	400 Hz
Overvoltage protection	33 V, galvanically isolated

Pulse outputs

Quantity	4
tmin off	16 ms
tmax off	230 ms
tmin on	16 ms
tmax on	230 ms
Ic	100 mA
U _{CE} sat	1.2V
F max	400 Hz
Overvoltage protection	33 V, galvanically isolated



Alarm and warning status outputs

U max	24 V DC
I max	100 mA
P max	100 mW
R _{DS} on	<= 50 Ohm
Photomos relay	
Ic	100 mA
Ron	50 Ohm
Overvoltage protection	33 V, galvanically isolated

3.1.7 Assignment of "physical values"

The assignment of inputs and outputs to "physical values" takes place in the wizard.



3.1.8 Software and hardware identification

IE Ident	IE Identification of software							
Access	Line	Designation	Value	Unit	Variable			
A *	1	Vers.offic.kernel	1.1		versionEK			
A *	2	Checks.offic.kernel	176E	hex	chksEK			
A *	3	Time offic.kernel	24-11-2017 09:48:10		<u>lchgEK</u>			
D	4	Version application	1.1.0a		<u>versionAP</u>			
D	5	Checks. application	E313	hex	<u>chksAP</u>			
D	6	Time stamp appl.	24-11-2017 09:48:10		<u>lchgAP</u>			
J	7	Version FC BIOS	2.008		versionFCB			
J	8	Checks. FC BIOS	5AB5	hex	<u>chksFCB</u>			
J	9	Time stamp FC BIOS	21-10-2014 15:03:38		<u>lchgFCB</u>			
E *	10	Activation key	348669738		schluessel			
D	16	SVN revisions	734_186_270		svnRevisions			
J	18	FC-BIOS bootloader	1.05		versionBTL			
J	19	kernel	PicoMOD6 V1.11		<u>versWinKern</u>			
J	20	kernel Built	Jun 18 2012		<u>dateWinKern</u>			
J	21	kernel CRC	81455247	hex	<u>chksWinKern</u>			
E*	22	approval kernel	81455247	hex	inputWinKern			
J	23	kernel bootloader	1.10		<u>versWinBL</u>			
J	24	version FPGA	3.000		versionFPGA			
J	25	date FPGA	21-10-14		<u>IchgFPGA</u>			
J	26	checksum FPGA	6FC2	hex	chksFPGA			
Enter	Car	cel Load defaults	Refresh					

Figure 67: Menu IE Software identification

There is an additional microcontroller on the base circuit board for control of the FPGA and basic measuring functions whose program is monitored with a check number.

Note

This check number is a component of the custody transfer approval.



The check number must be entered in coordinate **IE10 Activation key**. The Activation key can be found in the approval documents under "Identification".

The kernel has a **Target check**, which can also be found in the approval documentation and must be entered. This appropriate actual check number is calculated by the ERZ2000-DI with the WinCE operating system and displayed in **IE 21**. These check numbers are compared with each other continuously. If there is a deviation, the ERZ2000-DI issues an alarm with the message "A57-7 WinCE kernel CRC false".

LD Identification of hardware								
Access	Line	Designation	Value	Unit	Variable			
S	2	Year of construct.	2013		<u>baujahr</u>			
S	3	Factory number	1234567890123456789		<u>fabrikNr</u>			
S	4	Hardware ID	10		rfnummer			
S	5	Comment	keine		<u>bemerk</u>			
D	14	OBIS Id.	7061 1301 2345 6789		obisId			
Refres	h							

Figure 68: Menu LD Identification of hardware

Manufacturer-independent identification numbers for measuring devices (Object Identification System) are provided in coordinate **LD14 OBIS-ID**. The OBIS-ID consists of 4 groups of 4 numbers each. The groups are separated by a blank space for easier legibility.

SHHH BBFF FFFF

S: Column (7 = gas)

HHH: Manufacturer (061 = RMG)

BB: Year of manufacture (2-digit, e.g. 13=2013)

FFFFFFFFF: Serial number (10-digit, only numbers)

The OBIS-ID cannot be edited directly and is generated automatically from the existing coordinates **LD02 Year of construct.** and **LD03 Factory number**. Since the serial number in the ERZ2000-DI is a 20-character-long text field that is already used, there is generally a combination of numbers and letters in the field. The number may also be structured, e.g. "RMG-123/456/789". The software ignores all non-numerical characters when generating the number and the numbers are left in order. If the remainder number has less than 10 digits, leading zeros are shown. If the number has more than 10 digits, the highest-order are truncated.

4 Transmitters

Various transmitters with various connections and communications can be connected to the ERZ2000-DI and bus connections. This normally takes place via the wizard and supports pre-settings that often only have to be acknowledged.

4.1 Flow meters

Basically, the ERZ2000-DI can work with all flow measuring devices that are used in the flow measurement of gas.

4.1.1 Turbine wheel gas meters

The operating method of turbine wheel gas meters is based on the measurement of gas speed with a turbine wheel. In the process, the speed of the turbine (approximately) within the measuring range (Q_{min} - Q_{max}) is proportional to the mean gas speed and thus the flow rate. The number of rotations, therefore, is a measurement for the gas volume flowing through.



Figure 69: RMG turbine wheel gas meter TERZ94

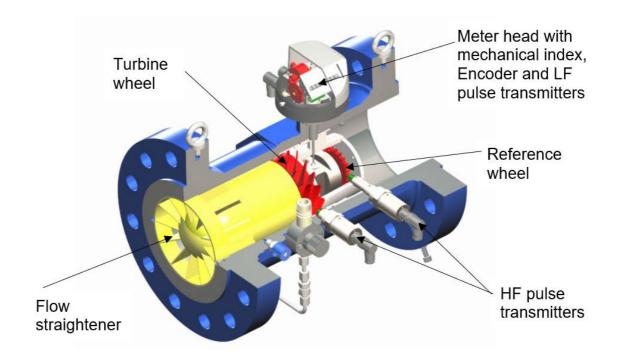


Figure 70: RMG turbine gas wheel meter sectional drawing

The rotational movement of the turbine wheel is transferred after reduction to the meter head in which the frequency is normally scanned redundantly with two sensors and transmitted as a LF signal. The meter can be optionally equipped with an encoder that can also transmit flow information.

In principle, the further processing of low-frequency pulses independently of the measuring principle, can also be handled in a comparable manner by rotary piston gas meters, vortex meters or other flow measuring devices with a frequency output.



4.1.2 Ultrasonic gas meters

Ultrasonic gas meters use the physical principle for volume flow detection that an ultrasonic pulse in the flow direction (with the flow) spreads faster than the opposite. With run-time measurement of ultrasonic pulses between appropriately arranged ultrasonic transducers, a flow speed and thus the flow rate can be determined. To achieve greater accuracy, multiple ultrasonic transducer pairs are normally used over multiple measuring paths. Figure 71: RMG ultrasonic gas meter USM-GT400 shows an ultrasonic gas meter from RMG and Figure 72: Measuring path arrangement USM-GT400 shows the basic arrangement of ultrasonic transducers with the measuring path.



Figure 71: RMG ultrasonic gas meter USM-GT400

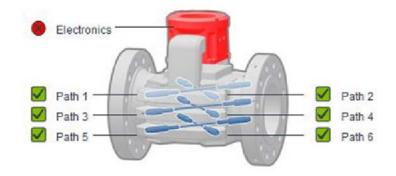


Figure 72: Measuring path arrangement USM-GT400



5 Special coordinates

Interim results of the highest load determination are shown in the hourly and daily amount menus. In case of faults, they behave as defined by the approval authorities. For a user who intends to base billing on these figures, the values cannot be used in case of a malfunction or are at least misleading.

Additional menus shown here include Documentation, Parameterization, Parameter aids, and Miscellaneous.

5.1.1 KI Hourly quantities

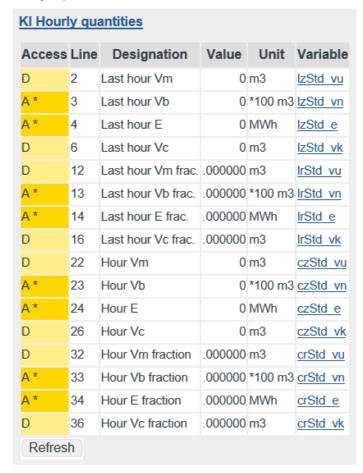


Figure 73: Menu KI Hourly amounts

Menus **KI Hourly quantities** and **KJ Daily quantities** are purely visualization menus. The amounts of the last hour KI02...KI16 are represented in the **Documentation / Documentation / Modbus Register 1400...1428**.

1400 4 unsigned integer 32-bit	R	ΚI	2	Hourly quantities	Last hour Vm	222 m3
1402 4 unsigned integer 32-bit	R	ΚI	3	Hourly quantities	Last hour Vb	2864 m3
1404 4 unsigned integer 32-bit						34 MWh
1408 4 unsigned integer 32-bit	R	ΚI	6	Hourly quantities	Last hour Vc	222 m3
1420 4 float IEEE 754	R	ΚI	12	Hourly quantities	Last hour Vm frac.	.345000 m3
1422 4 float IEEE 754	R	ΚI	13	Hourly quantities	Last hour Vb frac.	.842821 m3
1424 4 float IEEE 754	R	ΚI	14	Hourly quantities	Last hour E frac.	.378114 MWh
1428 4 float IEEE 754	R	ΚI	16	Hourly quantities	Last hour Vc frac.	.345000 m3

Figure 74: Modbus register for hourly amounts



5.2 Documentation

The documentation comprises 4 sub-chapters. Additional explanatory information is also provided here along with additional documents that can be opened by double-clicking on the <u>underlined</u> links.

5.2.1 Check numbers

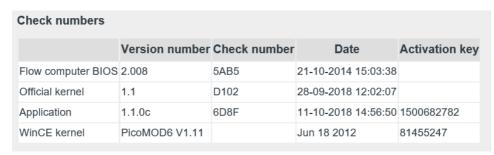


Figure 75: Documentation / Check numbers

The check numbers shown here are used by the calibration authority for identification purposes.

5.2.2 Matrix

	AA AB	AC	AD	<u>AE</u>	AF	AG	<u>AH</u>	Al	AJ	AK	AL	\Box
1	o b01	o y01	o m01	o z01	o f01	o s01	o e01	<u>qerTyps</u>				1
2	o_b02	o_y02	o_m02	o_z02	o_f02	o_s02	o_e02	<u>ekTyps</u>				2
3	o b03	o y03	o m03	o z03	o f03	o s03	o e03	<u>apTyps</u>				3
4	o b04	o y04	o m04	o z04	o f04	o s04	o e04	fcbTyps				4
5		o_y05	o_m05	o_z05	o_f05	o_s05	o_e05	kernelTyps				5
<u>5</u>		o_y06	o_m06	o_z06	o_f06	o_s06	o_e06	inleTyps		i	Ī	<u>5</u>
7		o y07	o m07	o z07	o f07	o s07	o e07	<u>refTyps</u>				7
8		o_y08	o_m08	o_z08	o_f08	o_s08	o_e08	zwkTyps				8
9		o_y09	o_m09	o_z09	o_f09	o_s09	o_e09	<u>applTyps</u>				9
10		o y10	o m10	o z10	o f10		o e10	<u>zmTyps</u>				10
11		o y11	o m11	o z11	o f11		o e11	<u>kvTyps</u>				11
12		o_y12	o_m12	o_z12	o_f12		o_e12	<u>voTyps</u>				12
13		o y13	o m13	o z13	o f13		o e13					13
14		o y14	o m14	o z14	o f14		o e14					14
15		o_y15	o_m15	o_z15	o_f15		o_e15					15
16		o_y16	o_m16	o_z16	o_f16		o_e16	drkaTyps				16
17		o y17	o m17	o z17			o e17	tempTyps				17
18		o_y18	o_m18	o_z18		İ	o_e18					18
19		o_y19	o_m19	o_z19		Ì	o_e19					19
20		o y20	o m20	o z20			o e20	<u>kmpTyps</u>		i		20
21		o y21	o m21	o z21		Ì	o e21			i		21
22		o_y22	o_m22	o_z22		Ì	o_e22			i		22
23		o y23	o m23	o z23			o e23					23
24		o y24	o m24	o z24		Ì	o e24			i	i	24
25		o_y25	o_m25	o_z25		Ì	o_e25			i		25
26		o_y26	o_m26	o_z26		Ì	o_e26			i	i	26
27		o y27	o m27	o z27			o e27				i	27
28		o_y28	o_m28	o_z28		Ì	o_e28					28
29		o_y29	o_m29	o_z29		Ì	o_e29					29
30		o y30	o m30	o z30			o e30					30
31		o y31	o m31	o z31		į	o e31					31
32		o_y32	o_m32	o_z32		Ì	o_e32					32
33		o y33	o m33	o z33			o e33	tcpTypsEth1		Ĭ		33
34		o y34	o m34	o z34			o e34	tcpTypsEth2				<u>34</u>
35		o_y35	o_m35	o_z35			o_e35	dsfgTyps				35
36		o_y36		o_z36			o_e36	ortTyps				36
37		o y37		o z37			o e37					37
38		o_y38		o_z38			o_e38					38
39		o_y39		o_z39			o_e39					39
40		o y40		o z40								40
41		o y41		o z41								41
42		o_y42		o_z42								42
43		o y43		o z43		İ						43
44		o y44		o z44								44
45				o_z45								45
46				o z46								46

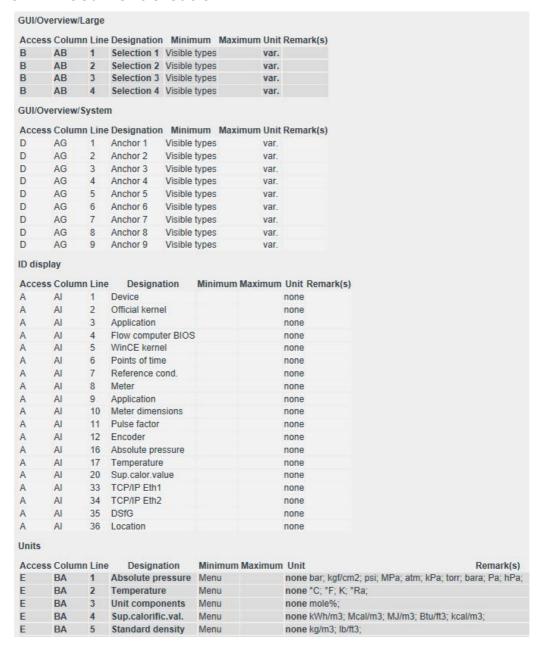
... (up to 99)

Figure 77: Menu Documentation / Matrix

An assignment of variables to the menus and the corresponding lines of the coordinate system is shown in this matrix.



5.2.3 Document creation



. . .

Figure 78: Menu Documentation / Document creation

All menus (columns), including the content are listed again here. Automatic adoption of this data to the documentation took place earlier, wherein the user saved or printed and stapled the pages. Now the user can decide which parts are added to the documentation.

Normally, this data is used for internal purposes.



5.2.4 Documentation

Documentation

- I. DSfG
 - Data Elements
 - a. Flow computer
 - b. Registration
 - c. Remote data transmission
 - d. Flow meter
 - Events
- II. MODBUS
 - Registers
 - 2. Coils
- III. Error table

Please have patience with longer loading times.

Figure 79: Menu Documentation / Documentation

Documents that offer additional explanations for the specified points beyond the manual.

For instance, DSfG parameter lists and Modbus register lists required for the programming if these buses are used are provided here. Examples are provided in the wizard.

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5.3 Parameterization

5.3.1 Parameterizing data

List of paramet	ters			
Identification				
	2.008 5AB5 1.05 PicoMOD6 V1.11 81455247 1.10 734_186_270 r 50790 2013 123456789012345678	39		
AB GUI/Overview	v/Large			
1 Selection 1 2 Selection 2 3 Selection 3 4 Selection 4		BC01 (drka) BD01 (temp) BG01 (Qk) BI01 (Qn)	MPa K m3/h m3/h	
BA Units				
1 Absolute pressure 2 Temperature, sele 3 Components, sele 4 Superior calorific 5 Standard density, 7 Energy flow rate,	ection of unit ection of unit value, selection of unit selection of unit		MPa K mole% kWh/m3 kg/m3 kW	* * * * * * *
	ate at hace conditions	selection of unit	m3/h	*

Figure 80: Menu Parameterization / Parameterizing data

A list of the relevant parameterizations is provided here.

5.3.2 Official parameters

A Units				
Absolute pressure, selection of unit		MPa		*
Temperature, selection of unit		K		*
Components, selection of unit		mole%		*
Superior calorific value, selection of ur	nit	kWh/m		*
Standard density, selection of unit	III.	kg/m3		*
Energy flow rate, selection of unit		kW		*
Volumetric flow rate at base conditions	selection of unit			*
Volumetric flow rate at measurement of	•			*
0 kv factor, selection of unit	Jonations, sciecti	P/m3		*
1 Totalizer for volume at measurement of	conditions salacti			*
2 Totalizer for volume at heast remember to	•		13	*
3 Quantity of energy, selection of unit	s, selection of unit	MWh	i.	*
4 Original totalizer for volume at measur	ement conditions			*
	cincin conditions	, solocion of anicins		
B Formats				
Absolute pressure, selection of format		%.5f		*
Temperature, selection of format		%.2f		*
K coefficient, selection of format		%.5f		*
Conversion factor, selection of format		%.4f		*
Components, selection of format		%.4f		*
Superior calorific value, selection of fo	rmat	%.3f		*
Standard density, selection of format		%.5f		*
Energy flow rate, selection of format		%.1f		*
Volumetric flow rate at base conditions	s, selection of forr	nat %.2f		*
Volumetric flow rate at measurement of	conditions, selecti	on of format %.3f		*
1 Decimal delimiter		Point		*
2 Custody transfer identification mark		Asterisk		*
C Absolute pressure				
Absolute pressure, lower alarm limit	0.10000	MPa	a *	
Absolute pressure, upper alarm limit	1.00000	MPa	*	
Absolute pressure, selection of input v	alue OFF		*	
1 Absolute pressure, correction value	0.00000	MPa	*	
Manufacturer of absolute pressure tra	nsmitter ROSEM	OUNT	*	
1 Device type, absolute pressure transm	itter 3051S10	CA2	*	
2 Serial number of absolute pressure tra	insmitter 0		*	
D Gas temperature				
Tomporature laurer eleme limit	253.15	К	*	
Temperature, lower alarm limit	200.10	IV.		

Figure 81: Menu Parameterization / Official parameters

The custody transfer parameters from all parameters are displayed here.



5.3.3 Changes

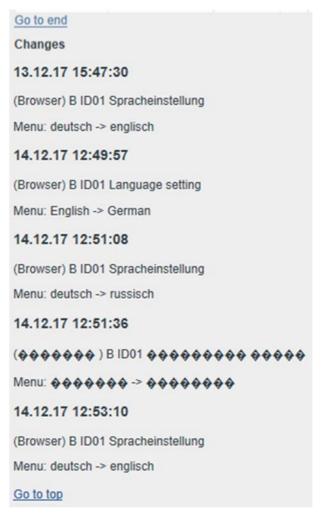


Figure 82: Menu Parameterization / Changes

This menu lists all parameter changes that have been made, sorted by time.

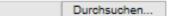
5.3.4 Save and load

Saving

The saving of all ERZ 2000 parameters on your PC can take place by reading back the here lodged file and save it under a significant name.

Loading

Downloading of all parameters from your PC into the ERZ2000 can take place by filling out the complete path of the saved file (ERZ2000 has to be in Superuser-Mode)



here and than send off

hereby

Uploading takes a few seconds (download-speed is faster). After uploading appears a table with all changed parameters. Please notice the marked lines and carry out the instructions.

Warning

Avoid to alter the saved file, changig data can cause damage of the system. If necessary use an editor with terminal-font and follow exactly the given syntax. Always use as an example an original saved file. Do not change the order of parameters. Do not change the notation of parameter names. Parameters in menus must have the exact value.

Do not send any files to engage ERZ2000 useless. The device will not accept these data. The device will not accept files with more than 50000 characters and will stop uploading immediately. In such a case the ERZ 2000 does not take any care of your browser or your PC.

Figure 83: Menu Parameterization / Save and load

This menu is provided for saving, reading and adjusting the settings of the ERZ2000-DI.

Note

In particular, backup copies of parameter settings of the ERZ2000-DI can and should be made with this menu, if the device is tested, updated or changed for other reasons.



5.4 Miscellaneous

5.4.1 Fault display

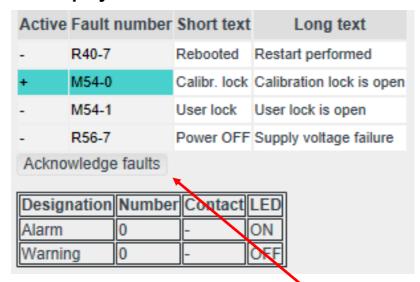


Figure 84: Menu Miscellaneous / Fault display

Pending faults with fault numbers are listed in this menu. Acknowledgment corresponding to that of the touch screen is possible.

5.4.2 Freeze values

Frozen values							
Date and time of last freeze : DD-MM	M-YYYY hh:n	nm:ss					
BC Absolute pressure							
61 Freeze measured value for absolute pressure 0.00000 MPa 62 Freeze input value for absolute pressure 0 MPa							
BD Gas temperature							
61 Freeze measured value for temperature 62 Freeze input value for temperature	0.00 0	K K					
BF Uncorrected volumetric flow rate	e at measure	ement conditio	ns				
61 Freeze volumetric flow rate at measurem 62 Freeze Qm base value 63 Freeze volumetric flow rate at measurem 64 Freeze volumetric flow rate at measurem	ent conditions f		0.000 0.000 0.0000 ce 0.0000	m3/h m3/h Hz Hz			
BG Corrected volumetric flow rate a	at measurem	ent conditions	5				
61 Freeze Qc	0.000	m3	3/h				
BH Calculation of K coefficient							
 61 Freeze current conversion factor 62 Freeze K coefficient 63 Freeze compressibility factor at measure 64 Freeze compressibility factor at base con 		0.0000 0.00000 0.000000 0.000000					
BI Volumetric flow rate at base cond	ditions						
61 Freeze volumetric flow rate at base cond	itions 0.00		m3/h				
BJ Energy flow rate							
61 Freeze energy flow rate	0.0	kW	1				
BL Totalizer, billing mode 1							
61 Freeze totalizer for volume at base conditions freeze fraction of volume at base conditions Freeze quantity of energy totalizer BM1 Freeze quantity of energy fraction BM1 Freeze totalizer for corrected volume at n	ons BM1	0	0000	*100 m3 *100 m3 MWh MWh m3			

Figure 85: Menu Miscellaneous / Freeze values

Values of the last freeze process are listed here.



5.4.3 Interface variables

interface variables from/to outside device										
CH Modbus Slave										
1 Superior calorific value Modbus Slave 2 Standard density Modbus Slave 3 Carbon dioxide Modbus Slave 4 Hydrogen Modbus Slave 5 Nitrogen Modbus Slave 6 Methane Modbus Slave 7 Ethane Modbus Slave 8 Propane Modbus Slave 9 N-butane Modbus Slave 10 I-butane Modbus Slave 11 N-pentane Modbus Slave 12 I-pentane Modbus Slave 13 Neo-pentane Modbus Slave 14 Hexane Modbus Slave 15 Heptan Modbus Slave 16 Octane Modbus Slave 17 Nonan Modbus Slave 18 Decane Modbus Slave 19 Hydrogen sulphide Modbus Slave 20 Water Modbus Slave 21 Helium Modbus Slave 22 Oxygen Modbus Slave	11.250 0.75651 0.9960 0.0000 0.2988 96.1155 1.7928 0.4482 0.0996 0.0996 0.0299 0.0498 0.0000 0.0697 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	kWh/m3 kg/m3 mole%								
23 Carbon monoxide Modbus Slave 24 Argon Modbus Slave	0.0000 0.0000	mole%								
DA Current velocity of gas 11 Rate of gas feed, path 1 12 Rate of gas feed, path 2	0.000 0.000 0.000	m/s m/s								
3	-									

Figure 86: Menu Miscellaneous / Interface variables

Interface variables are variables that transmit custody transfer information or effect the representation of custody transfer information but are not (permanently) subject to custody transfer requirements.

Example

ERZ2000-DI is connected to Stream 1. If the measurements of Stream 2, 3, 4 or the test gas are available these data are irrelevant. These values only transport custody transfer data if Stream 1 is displayed and the status = "okay".

5.4.4 Log book



Figure 87: Menu Miscellaneous / Log book

Entries that are helpful for documentation can be made in the log book.

5.4.5 Binary code check

Binary code control						
Module	Start of Code	End of Code	e Initial Checksum	Current Checksum	No. of checks okay	No. of checks error
ERZ3000App	00011000	00011E74	001e	001e	96	0
erzmain	00014FDC	00017500	b1f9	b1f9	96	0
aga10	00017524	0001DF88	fe14	fe14	96	0
aga8	0001DFAC	000209C4	eda0	eda0	96	0
aganx	000209E8	000232BC	ab18	ab18	96	0
components	000232E0	00023A68	d762	d762	96	0
dimens	00023A8C	000278B0	aa34	aa34	96	0
finstanz	000278D4	0002AA84	d4a9	d4a9	96	0
fliegeich	0002AAA8	0002AD78	03b2	03b2	96	0
flowwarning	0002AD9C	0002B09C	38c3	38c3	96	0
freeze	0002B0C0	0002BAC8	f4af	f4af	96	0
gaskonst	0002BAEC	0002BF4C	5f65	5f65	96	0
gerg	0002BF70	000300D8	3665	3665	96	0
iso6976	000300FC	000319EC	f973	f973	96	0
kelipoly	00031A50	00031E80	dbb2	dbb2	96	0
kelistzp	00031EA4	00032480	1cf3	1cf3	96	0
kmpbusctrl	000324A4	000329F8	3223	3223	96	0
mathedanach	00032A1C	000350B8	dfef	dfef	96	0
mothogunor	00025000	00035530	s24d	c24d	ne	0

This menu is reserved exclusively for internal service purposes.

Figure 88: Menu Miscellaneous / Binary code check



5.4.6 TSV export

TSV export

Archive group 1: counters and measured values billing mode 1

Ordinal No.	Number	state	from	to
6501 6987	487	grows	03-06-2017 20:00:00	14-12-2017 14:00:00
6001 6500	500	complete	12-05-2017 12:00:00	03-06-2017 19:00:00
5501 6000	500	complete	22-04-2017 14:00:00	12-05-2017 11:00:00
5001 5500	500	complete	01-04-2017 23:00:00	22-04-2017 13:00:00
4501 5000	500	complete	12-03-2017 02:00:00	01-04-2017 22:00:00
4001 4500	500	complete	19-02-2017 09:00:00	12-03-2017 01:00:00
3501 4000	500	complete	31-03-2016 12:00:00	19-02-2017 08:25:44
3001 3500	500	complete	17-02-2015 12:00:00	31-03-2016 11:00:00
2501 3000	500	complete	30-09-2014 10:17:58	17-02-2015 11:00:00
2001 2500	500	complete	17-06-2014 07:19:38	30-09-2014 09:50:14
1501 2000	500	complete	21-03-2014 16:00:00	16-06-2014 15:53:18
1001 1500	500	complete	16-12-2013 14:15:46	21-03-2014 15:00:00
<u>501 1000</u>	500	complete	20-09-2013 13:00:00	16-12-2013 14:15:43
1 500	500	complete	18-01-2023 16:04:49	20-09-2013 12:00:00

Archive group 2: disturbance counters billing mode 1

Ordinal No.	Number	state	from	to
5001 5291	291	grows	11-06-2017 18:00:00	14-12-2017 10:53:26
4501 5000	500	complete	20-05-2017 03:00:00	11-06-2017 17:00:00
4001 4500	500	complete	10-04-2017 20:00:00	20-05-2017 02:00:00
3501 4000	500	complete	21-03-2017 04:00:00	10-04-2017 19:00:00
3001 3500	500	complete	28-02-2017 08:00:00	21-03-2017 03:00:00
2501 3000	500	complete	25-01-2017 15:00:00	28-02-2017 07:00:00
2001 2500	500	complete	26-02-2016 12:18:04	25-01-2017 14:00:00
1501 2000	500	complete	24-10-2014 11:00:00	26-02-2016 12:17:06
1001 1500	500	complete	16-05-2014 13:00:00	24-10-2014 10:00:00
<u>501 1000</u>	500	complete	08-01-2014 10:46:37	16-05-2014 12:00:00
<u>1 500</u>	500	complete	18-01-2023 16:04:49	08-01-2014 10:46:32

Archive group 3: counters and measured values billing mode 2

Ordinal No.	Number	state	from	to
6501 6987	487	grows	03-06-2017 20:00:00	14-12-2017 14:00:00

Figure 89: Menu Miscellaneous / TSV export

All saved archive groups are listed here. They can be opened or saved by double-clicking on the <u>indenture numbers</u>. The "**complete**" groups no longer change and can be saved. The other groups ("growing") are still growing and thus not complete.

5.4.7 Exceptions

```
1 0.00-11 10.10-17 [PD-5-marcel | Parameter | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description | Description
```

Figure 90: Menu Miscellaneous / Exceptions

This menu is reserved for internal service purposes. This data can provide information about the cause of error.



6 Errors

6.1 Error settings

6.1.1 YL error messages

YL Fault messages											
Access	Line	Designation	Value	Unit	Variable						
D	1	Current messages	M54-0 Calibr. lock		actErr						
D	2	Accumulated msgs	M54-1 User lock		cumErr						
D	3	No. of alarms	0		alarmAnz						
D	4	No. of warnings	0		warnAnz						
D	5	No. of notes	1		hinweisAnz						
Q	8	Fault ackn. flag	0		errorQuit						
D	14	AG21 clear text M54-1 User lock			<u>errKlar</u>						
D	15	Message counter	9		errChgCnt						
A *	29	Vm-Alarm	0		midVBErr						
D	31	Last event	-801		<u>IEvt</u>						
D	32	Time of last event	14-12-2017 13:17:36		TIEvt						
D	33	Msgs. at issue	1		actErrors						
D	34	cummulated Msgs.	4		cumErrors						
Enter	Can	cel Load defaults	Refresh								

Figure 91: Menu YL error messages

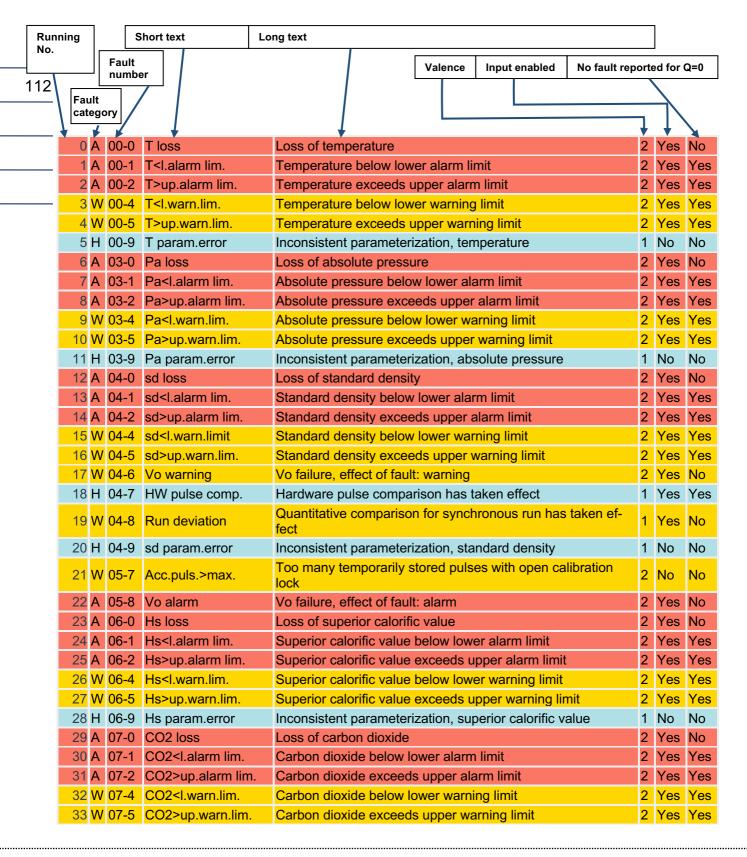
The coordinate **YL01 Current messages** shows all pending (active) messages in 2-second intervals. **YL02 Accumulated msgse** shows all messages since the last acknowledgment.

This menu is normally intended for service purposes.

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6.2 Error list





34	Н	07-9	CO2 param.error	Inconsistent parameterization, carbon dioxide	1	No	No
		09-4	H2 <i.warn.lim.< td=""><td>·</td><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.<>	·	2	Yes	Yes
36	W	09-5	H2>up.warn.lim.		2	Yes	Yes
37	W	10-8	Def. channel 1	Channel 1 failed	1	No	No
38	W	10-9	Def. channel 2	Channel 2 failed	1	No	No
39	W	11-0	Start-up>max.	Meter start-up time too long	2	Yes	No
40	W	11-1	Slow-down>max.	Meter slow-down time too long	2	Yes	No
41	W	19-4	N2 <i.warn.lim.< td=""><td>Nitrogen below lower warning limit</td><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.<>	Nitrogen below lower warning limit	2	Yes	Yes
42	W	19-5	N2>up.warn.lim.	Nitrogen exceeds upper warning limit	2	Yes	Yes
43	Н	30-0	Malloc error	Dynamic memory allocation error	1	No	No
44	Н	31-9	CAN fault	CAN bus malfunction	2	No	No
45	Α	32-1	BM failure	Failure of the billing-mode signal	2	Yes	Yes
46	M	33-0	Bill.Mod undef.	Undefined billing mode	1	No	No
47	M	33-1	Billing mode 1	Billing mode 1	1	No	No
48	M	33-2	Billing mode 2	Billing mode 2	1	No	No
49	M	33-5	DSfG-freeze	archive entry because attention f (freeze) on DSfG	1	No	No
50	Н	40-1	old totalizer	Totalizer directly before setting of new value	1	No	No
51	Н	40-2	new totalizer	Totalizer directly after setting of new value	1	No	No
52	R	40-7	Rebooted	Restart performed	1	No	No
53	Н	42-1	RTC defective	Real time clock is defective	2	No	No
54	Α	43-2	Def.tot.	Totalizer is defective	1	No	No
55	Н	45-0	I1 inp.param.	Current input 1 parameterization error	2	No	No
56	Н	45-1	I2 inp.param.	Current input 2 parameterization error	2	No	No
57	Н	45-2	I3 inp.param.	Current input 3 parameterization error	2	No	No
58	Н	45-8	PT1 inp.param.	Resistance input 1 parameterization error	2	No	No
59	Н	46-0	Cont.param.error	Parameterization of contact input, double seizing	1	No	No
60	Н	46-1	Vo defective	Vo transmitter shows unexpected behavior	2	No	No
61	Н	46-2	Vo timeout	No more signal from Vo transmitter	2	No	No
62	Н	46-3	Vo protocol	Vo protocol error	2	No	No
63	Н	46-4	Deleted pulses	Stored pulses were deleted	1	No	No
64	Н	46-5	19 inp.param.	Current input 9 parameterization error	2	No	No
65	Н	46-6	I10 inp.param.	Current input 10 parameterization error	2	No	No
66	W	47-0	Qm <l.warn.lim.< td=""><td>Flow rate at base conditions below lower warning limit</td><td>2</td><td>Yes</td><td>No</td></l.warn.lim.<>	Flow rate at base conditions below lower warning limit	2	Yes	No
67	W	47-1	Qm>up.warn.lim.	Flow rate at measurement conditions exceeds upper warning limit	2	Yes	No
68	W	47-2	Qmc <l.warn.lim.< td=""><td>Corrected flow rate at measurement conditions below lower warning limit</td><td>2</td><td>Yes</td><td>No</td></l.warn.lim.<>	Corrected flow rate at measurement conditions below lower warning limit	2	Yes	No
69	W	47-3	Qmc>up.warn.lim.	per warning limit	2	Yes	No
70	W	47-4	Qb <l.warn.lim.< td=""><td>limit</td><td>2</td><td>Yes</td><td>No</td></l.warn.lim.<>	limit	2	Yes	No
		47-5	Qb>up.warn.lim.	Volumetric flow rate at base conditions exceeds upper warning limit	2	Yes	
		47-6	Qe <i.warn.lim.< td=""><td><u> </u></td><td>2</td><td>Yes</td><td>No</td></i.warn.lim.<>	<u> </u>	2	Yes	No
73	W	47-7	Qe>up.warn.lim.	Energy flow rate exceeds upper warning limit	2	Yes	No



	74	Α	48-0	CAN timeout	CAN bus timeout	2	No	No
	75	Н	48-1	Def.modem	Modem is defective or switched off	1	No	No
	76	M	48-2	Factory state	I am a device which has not been tested.	1	No	No
	77	Н	48-3	PT1 open circ.	Resistance measurement 1 shows open circuit	2	No	No
	78	Н	48-6	PT3 inp.param.	Resistance input 3 parameterization error	2	No	No
114	79	Α	50-0	T<>GERG lim.	Temperature exceeds GERG limits	2	Yes	Yes
	80	Α	50-1	P<>GERG lim.	Pressure exceeds GERG limits	2	Yes	Yes
	81	Α	50-2	rd<>GERG lim.	Relative density exceeds GERG limits	2	Yes	Yes
	82	Α	50-3	CO2<>GERG lim.	Carbon dioxide exceeds GERG limits	2	Yes	Yes
	83	Α	50-4	N2<>GERG lim.	Nitrogen exceeds GERG limits	2	Yes	Yes
	84	Α	50-5	Hs<>GERG lim.	Superior calorific value exceeds GERG limits	2	Yes	Yes
	85	Α	50-6	H2<>GERG lim.	Hydrogen exceeds GERG limits	2	Yes	Yes
	86	Α	50-8	GERG iter.max	Maximum permissible GERG iterations exceeded	2	Yes	Yes
	87	Α	51-0	T<>AGA limit	Temperature exceeds AGA limits	2	Yes	Yes
	88	Α	51-1	P<>AGA limit	Pressure exceeds AGA limits	2	Yes	Yes
	89	Α	51-2	rd<>AGA limit	Relative density exceeds AGA limits	2	Yes	Yes
	90	Α	51-3	CO2<>AGA limit	Carbon dioxide exceeds AGA limits	2	Yes	Yes
	91	Α	51-4	N2<>AGA limit	Nitrogen exceeds AGA limits	2	Yes	Yes
	92	Α	51-5	Hs<>AGA limit	Superior calorific value exceeds AGA limits	2	Yes	Yes
	93	Α	51-7	AGA oth.errors	Other AGA errors	2	Yes	Yes
	94	Α	51-8	AGA-pi,tau	AGA interim result, pi,tau exceed limits	2	Yes	Yes
	95	Α	51-9	Interp.pt.probl.	Error during calculation of interpolation point	2	Yes	Yes
	96	Α	52-0	Q <qmin< td=""><td>Flow rate at measurement conditions below minimum</td><td>2</td><td>Yes</td><td>No</td></qmin<>	Flow rate at measurement conditions below minimum	2	Yes	No
	97	Α	52-1	Q>Qmax	Flow rate at measurement conditions exceeds maximum	2	Yes	No
	98	W	52-4	Bus-ID<>12	Bus identification for remote data transmission has not exactly 12 characters	1	No	No
	99	W		RDT ID<>16	Remote data transmission identification has not exactly 16 characters	1		No
	100						NI.	No
	.00	IVI	54-0	Calibr. lock	Calibration lock is open	-	_	
	101	M	54-1	User lock	User lock is open	2	No	No
	101 102	M M	54-1 54-2	User lock Revision	·	2	No	-
	101 102 103	M M R	54-1 54-2 56-0	User lock Revision Chan. 1 fault	User lock is open Revision switch is open Pulse counting channel 1 implausible	2 2 1	No No No	No No No
	101 102 103 104	M M R R	54-1 54-2 56-0 56-1	User lock Revision Chan. 1 fault Chan. 2 fault	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible	2 2 1	No No No	No No No
	101 102 103 104 105	M M R R	54-1 54-2 56-0 56-1 56-2	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb.	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted	2 2 1 1	No No No No	No No No No
	101 102 103 104 105 106	M M R R A H	54-1 54-2 56-0 56-1 56-2 56-3	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization	2 2 1 1 1 1	No No No No No	No No No No No
	101 102 103 104 105 106 107	M M R R A H	54-1 54-2 56-0 56-1 56-2 56-3 56-5	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment	2 1 1 1 1	No No No No No No	No No No No No No
	101 102 103 104 105 106 107 108	M M R A H H	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment	2 1 1 1 1 1 1	No No No No No No No	No No No No No No No
	101 102 103 104 105 106 107 108	M M R A H H H	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6 56-7	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time Power OFF	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure	2 2 1 1 1 1 1 1	No No No No No No No No	No No No No No No No
	101 102 103 104 105 106 107 108 109	M M R A H H H R	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6 56-7 60-0	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time Power OFF Ethane <i.warn.lim.< td=""><td>User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit</td><td>2 2 1 1 1 1 1 1 2</td><td>No No No No No No No No No Vo</td><td>No No No No No No No No No No Yes</td></i.warn.lim.<>	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit	2 2 1 1 1 1 1 1 2	No No No No No No No No No Vo	No No No No No No No No No No Yes
	101 102 103 104 105 106 107 108 109 110	M M R A H H H W	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6 56-7 60-0 60-1	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time Power OFF Ethane <i.warn.lim. ethane="">up.warn.lim.</i.warn.lim.>	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit	2 2 1 1 1 1 1 1 2 2	No No No No No No No No Yes Yes	No No No No No No No No No Yes
	101 102 103 104 105 106 107 108 109 110 111	M M R A H H H W W	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6 56-7 60-0 60-1 60-2	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time Power OFF Ethane <i.warn.lim. ethane="">up.warn.lim. C3H8<i.warn.lim.< td=""><td>User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit Propane below lower warning limit</td><td>2 2 1 1 1 1 1 1 2 2</td><td>No No No No No No No No Yes Yes</td><td>No No No No No No No No No Yes Yes</td></i.warn.lim.<></i.warn.lim.>	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit Propane below lower warning limit	2 2 1 1 1 1 1 1 2 2	No No No No No No No No Yes Yes	No No No No No No No No No Yes Yes
	101 102 103 104 105 106 107 108 109 110 111 112	M M R A H H H W W	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6 56-7 60-0 60-1 60-2 60-3	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time Power OFF Ethane <i.warn.lim. ethane="">up.warn.lim. C3H8<i.warn.lim. c3h8="">up.war.lim.</i.warn.lim.></i.warn.lim.>	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit Propane below lower warning limit Propane exceeds upper warning limit	2 2 1 1 1 1 1 1 2 2 2 2	No No No No No No No No Yes Yes Yes	No No No No No No No No Yes Yes Yes
	101 102 103 104 105 106 107 108 109 110 111 112 113	M M R R A H H H W W W W	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6 56-7 60-0 60-1 60-2 60-3 60-4	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time Power OFF Ethane <i.warn.lim. ethane="">up.warn.lim. C3H8>up.war.lim. N-C4<i.warn.lim.< td=""><td>User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit Propane below lower warning limit N-butane below lower warning limit</td><td>2 2 1 1 1 1 1 1 2 2 2 2</td><td>No No No No No No No No Yes Yes</td><td>No No No No No No No No Yes Yes Yes</td></i.warn.lim.<></i.warn.lim.>	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit Propane below lower warning limit N-butane below lower warning limit	2 2 1 1 1 1 1 1 2 2 2 2	No No No No No No No No Yes Yes	No No No No No No No No Yes Yes Yes
	101 102 103 104 105 106 107 108 109 110 111 112 113 114	M M R A H H H R W W W W W	54-1 54-2 56-0 56-1 56-2 56-3 56-5 56-6 60-0 60-1 60-2 60-3 60-4 60-5	User lock Revision Chan. 1 fault Chan. 2 fault Tc/Tb comb. CAN check Old time New time Power OFF Ethane <i.warn.lim. ethane="">up.warn.lim. C3H8<i.warn.lim. n-c4<i.warn.lim.<="" td=""><td>User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit Propane below lower warning limit Propane exceeds upper warning limit</td><td>2 2 1 1 1 1 1 2 2 2 2 2 2</td><td>No No No No No No No No Yes Yes Yes</td><td>No No No No No No No No Yes Yes Yes Yes Yes Yes</td></i.warn.lim.></i.warn.lim.>	User lock is open Revision switch is open Pulse counting channel 1 implausible Pulse counting channel 2 implausible Tc/Tb combination not permitted CAN bus plausibilization Time immediately before time adjustment Time immediately after time adjustment Supply voltage failure Ethane below lower warning limit Ethane exceeds upper warning limit Propane below lower warning limit Propane exceeds upper warning limit	2 2 1 1 1 1 1 2 2 2 2 2 2	No No No No No No No No Yes Yes Yes	No No No No No No No No Yes Yes Yes Yes Yes Yes



117 W 60-7 I-C4>up.warn.lim. I-butane exceeds upper warning limit			Yes
118 W 60-8 N-C5 <i.warn.lim. below="" limit<="" lower="" n-pentane="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
	2	Yes	Yes
	2	Yes	Yes
121 W 61-1 I-C5>up.warn.lim. I-pentane exceeds upper warning limit	2	Yes	Yes
122 W 61-2 NeoC5 <i.warn.lim. below="" limit<="" lower="" neo-pentane="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
123 W 61-3 NeoC5>up.warn.lim. Neo-pentane exceeds upper warning limit	2	Yes	Yes
124 W 61-4 Hexane <i.warn.lim. below="" hexane="" limit<="" lower="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
125 W 61-5 Hexane>up.warn.lim. Hexane exceeds upper warning limit	2	Yes	Yes
126 W 61-6 Heptane <i.warn.lim. below="" heptane="" limit<="" lower="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
127 W 61-7 Heptane>up.war.lim. Heptane exceeds upper warning limit	2	Yes	Yes
128 W 61-8 Octane <i.warn.lim. below="" limit<="" lower="" octane="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
129 W 61-9 Octane>up.warn.lim. Octane exceeds upper warning limit	2	Yes	Yes
130 W 62-0 Nonane <i.warn.lim. below="" limit<="" lower="" nonane="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
131 W 62-1 Nonane>up.warn.lim. Nonane exceeds upper warning limit	2	Yes	Yes
132 W 62-2 Decane <i.warn.lim. below="" decane="" limit<="" lower="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
133 W 62-3 Decane>up.warn.lim. Decane exceeds upper warning limit	2	Yes	Yes
134 W 62-4 H2S <i.warn.lim. below="" hydrogen="" limit<="" lower="" sulphide="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
135 W 62-5 H2S>up.warn.lim. Hydrogen sulphide exceeds upper warning limit	2	Yes	Yes
136 W 62-6 H2O <i.warn.lim. below="" limit<="" lower="" td="" warning="" water=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
137 W 62-7 H2O>up.warn.lim. Water exceeds upper warning limit	2	Yes	Yes
138 W 62-8 He <i.warn.lim. below="" helium="" limit<="" lower="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
139 W 62-9 He>up.warn.lim. Helium exceeds upper warning limit	2	Yes	Yes
140 W 63-0 O2 <i.warn.lim. below="" limit<="" lower="" oxygen="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
141 W 63-1 O2>up.warn.lim. Oxygen exceeds upper warning limit	2	Yes	Yes
142 W 63-2 CO <i.warn.lim. below="" carbon="" limit<="" lower="" monoxide="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
143 W 63-3 CO>up.warn.lim. Carbon monoxide exceeds upper warning limit	2	Yes	Yes
144 W 63-8 Ar <i.warn.lim. argon="" below="" limit<="" lower="" td="" warning=""><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.>	2	Yes	Yes
145 W 63-9 Ar>up.warn.lim. Argon exceeds upper warning limit	2	Yes	Yes
146 H 64-3 TCP/IP fault can't initialize TCP/IP sockets	1	No	No
147 H 64-5 file system file system unexpected behavior	1	No	No
148 H 65-2 Restart archive Restart archive after cleaning	1	No	No
149 W 70-0 Pulse 1 >max Pulse output 1 overflow	2	Yes	No
150 W 70-1 Pulse 2 >max Pulse output 2 overflow	2	Yes	No
151 W 70-2 Pulse 3 >max Pulse output 3 overflow	2	Yes	No
152 W 70-3 Pulse 4 >max Pulse output 4 overflow	2	Yes	No
153 W 70-6 I1 outp. <min 1="" below="" current="" minimum<="" output="" td=""><td>2</td><td>Yes</td><td>No</td></min>	2	Yes	No
154 W 70-7 I2 outp. <min 2="" below="" current="" minimum<="" output="" td=""><td>2</td><td>Yes</td><td>No</td></min>	2	Yes	No
155 W 70-8 I3 outp. <min 3="" below="" current="" minimum<="" output="" td=""><td>2</td><td>Yes</td><td>No</td></min>	2	Yes	No
156 W 70-9 I4 outp. <min 4="" below="" current="" minimum<="" output="" td=""><td>2</td><td>Yes</td><td>No</td></min>	2	Yes	No
157 W 71-0 I1 outp.>max Current output 1 exceeds maximum	2	Yes	No
158 W 71-1 I2 outp.>max Current output 2 exceeds maximum	2	Yes	No
159 W 71-2 I3 outp.>max Current output 3 exceeds maximum	2	Yes	No
160 W 71-3 I4 outp.>max Current output 4 exceeds maximum	2	Yes	No



	161 R	71-4	NMA ADC	Namur module A analog/digital-converter	1	No	No
	162 R	71-5	NMA overload	Namur module A overload	1	No	No
	163 R	71-6	NMA OC PT100	Namur module A open circuit PT100	1	No	No
	164 R	71-7	NMA OC mainch.	Namur module A open circuit main channel	1	No	No
	165 R	71-8	NMA OC ref.ch.	Namur module A open circuit reference channel	1	No	No
116	166 R	71-9	NMA OC ENCO	Namur module A open circuit ENCO	1	No	No
	167 R	72-0	NMB ADC	Namur module B analog/digital-converter	1	No	No
	168 R	72-1	NMB overload	Namur module B overload	1	No	No
	169 R	72-2	NMB OC PT100	Namur module B open circuit PT100	1	No	No
	170 R			Namur module B open circuit main channel	1	No	No
				Namur module B open circuit reference channel			No
	172 R			Namur module B open circuit ENCO			No
				Current output 1 parameterization error		No	No
			I2 outp.param.	Current output 2 parameterization error		No	No
			· · ·	Current output 3 parameterization error		No	No
				Current output 4 parameterization error		No	No
			K1 outp.param.	Contact output 1 parameterization error		No	No
			K2 outp.param.	Contact output 2 parameterization error		No	No
			K3 outp.param.	Contact output 3 parameterization error		No	No
			K4 outp.param.	Contact output 4 parameterization error		No	No
			K5 outp.param.	Contact output 5 parameterization error		No	No
			K6 outp.param.	Contact output 6 parameterization error		No	No
			K7 outp.param.	Contact output 7 parameterization error		No	No
			K8 outp.param.	Contact output 8 parameterization error		No	No
				Module 1A assembly implausible		No	No
				Module 1B assembly implausible		No	No
				Module 2A assembly implausible		No	No
				Module 2B assembly implausible		No	No
				Module 3A assembly implausible		No	No
			Mod. 3B false	Module 3B assembly implausible		No	No
			FC-BIOS old	Flow computer bios version is to old		No	No No
				HART 1 status reports trouble		No No	No
				HART 2 status reports trouble			No
			HART9 status	HART 3 status reports trouble HART 9 status reports trouble		No No	No No
			HART10 status	HART 10 status reports trouble		No	No
				Maximum deviation at operating point exceeded		Yes	
			HFX miss.pulses	Counter main channel (HFX) malfunction			No
			HFY miss.pulses	Counter reference channel (HFY) malfunction			No
	200 H		·	Extra hint 1 with changeable short text		No	No
	201 H			Extra hint 2 with changeable short text		No	No
	202 H			Extra hint 3 with changeable short text		No	No
	203 H			Extra hint 4 with changeable short text		No	No
	204 H			Extra hint 5 with changeable short text			No
			-3-				



205 H 85-5	mea6	Extra hint 6 with changeable short text	2	No	No
206 H 85-6	 	Extra hint 7 with changeable short text		No	No
200 H 85-7		Extra hint 8 with changeable short text	2		No
208 W 86-0	msg1	Extra warning 1 with changeable short text	2	No	No
					-
209 W 86-1	msg2	Extra warning 2 with changeable short text	2	No	No
210 W 86-2	msg3	Extra warning 3 with changeable short text	2	No	No
211 W 86-3	msg4	Extra warning 4 with changeable short text	2	No	No
212 W 86-4	msg5	Extra warning 5 with changeable short text	2	No	No
213 W 86-5	msg6	Extra warning 6 with changeable short text	2	No	No
214 W 86-6	msg7	Extra warning 7 with changeable short text	2	No	No
215 W 86-7	msg8	Extra warning 8 with changeable short text	2	No	No
216 A 87-0	msg1	Extra alarm 1 with changeable short text	2	No	No
217 A 87-1	msg2	Extra alarm 2 with changeable short text	2	No	No
218 A 87-2	msg3	Extra alarm 3 with changeable short text	2	No	No
219 A 87-3	msg4	Extra alarm 4 with changeable short text	2	No	No
220 A 87-4	msg5	Extra alarm 5 with changeable short text	2	No	No
221 A 87-5	msg6	Extra alarm 6 with changeable short text	2	No	No
222 A 87-6	msg7	Extra alarm 7 with changeable short text	2	No	No
223 A 87-7	msg8	Extra alarm 8 with changeable short text	2	No	No
224 H 88-0	param.ignored	Parameterization ignored	1	No	No
225 H 89-8	HART-Ver. old	Software version HART-card is to old	1	No	No
226 H 89-9	EXI-Ver. old	Software version EXI-card is to old	1	No	No
227 R 90-0	F1 failure	Frequency measurement 1 failed	2	No	No
228 R 90-1	F2 failure	Frequency measurement 2 failed	2	No	No
229 R 91-0	I1 failure	Current measurement 1 failed	2	No	No
230 R 91-1	I2 failure	Current measurement 2 failed	2	No	No
231 R 91-2	I3 failure	Current measurement 3 failed	2	No	No
232 R 92-0	PT1 failure	Resistance measurement 1 failed	2	No	No
	HART1 failure	HART 1 input failed	2	No	No
234 R 92-3	HART2 failure	HART 2 input failed	2	No	No
	HART3 failure	HART 3 input failed		No	No
236 R 92-8	Corrupt param.	corrupted parameter detected	1	No	No
	Def.cont.inp.	Contact input failed	2	No	No
	Function test	A function test is running at the moment	2		No
	USM implaus.	USM transmitter, implausible protocol data	2		No
240 A 93-5		USM transmitter signalizes an alarm	2	No	No
241 A 93-6	USM timeout	No more signal from USM transmitter	2	No	No
	Vo1 implaus.	USM totalizer for Vo1 shows implausible behavior	1	No	No
	Vo2 implaus.		1	No	No
	 	USM totalizer for Vo2 shows implausible behavior			
	Vo1D implaus.	USM totalizer for Vo1D shows implausible behavior	1	No	No
	Vo2D implaus.	USM totalizer for Vo2D shows implausible behavior	1	No	No
246 H 94-1	Time sync.para.	Parameterization of time synchronization implausible	2	No	No
247 R 94-2	19 failure	Current measurement 9 failed	2	No	No
248 R 94-3	110 fallure	Current measurement 10 failed	2	No	No



	249	R	94-6	PT3 failure	Resistance measurement 3 failed	2	No	No
	250	R	95-0	Math.problem	Mathematical error	1	Yes	No
	251	Α	95-1	Corrupt code	corrupt code detected	1	No	No
	252	Α	95-2	Alarm volume	hard-wired contact of volume transmitter shows alarm	2	No	No
	253	W	95-4	Time sync fail	Time synchronization failed	1	No	No
	254	Н	95-5	Net time error	Net time error	1	No	No
4	255	R	95-6	HART9 failure	HART 9 input failed	2	No	No
	256	R	95-7	HART10 failure	HART 10 input failed	2	No	No
-	257	Α	96-7	Hs GC timeout	No more signal from the superior calorific value transmitter	2	Yes	No
	258	Α	96-8	sd GC timeout	No more signal from standard density transmitter	2	Yes	No
1	259	Α	97-0	CO2 GC timeout	No more signal from CO2 transmitter	2	Yes	No
	260	Н	97-3	Hs GC alarm	GC reports loss of superior calorific value	2	Yes	No
	261	Н	97-4	sd GC alarm	GC reports loss of standard density	2	Yes	No
	262	Н	97-6	CO2 GC alarm	GC reports loss of carbon dioxide	2	Yes	No
ı	263	W	98-4	CH4 <i.warn.lim.< td=""><td>Methane below lower warning limit</td><td>2</td><td>Yes</td><td>Yes</td></i.warn.lim.<>	Methane below lower warning limit	2	Yes	Yes
ı	264	W	98-5	CH4>up.warn.lim.	Methane exceeds upper warning limit	2	Yes	Yes
	265	Α	98-7	Comp.normaliz.	Error occurred during normalization of gas components	2	Yes	Yes
	266	Α	98-8	Inval.act.key	Invalid activation key	2	No	No
	267	Н	99-4	Adjusted float	Floating point parameter adjusted to floating-point notation	1	No	No
				AGA8 alarm	AGA 8 algorithmic error	2		Yes
ı				AGA892DC alarm	AGA 8 92DC algorithmic error	2		Yes
ı				Signature error	Problems with signature	1	No	No
ı			57-1	Qu param.	Parameter inconsistent flow	2		No
				Memory RAM	less RAM	2	No	No
ı				Memory SDCard	less memory on SD-Card	2	No	No
ı				MAC ETH2	Reboot required, Eth2 MAC has changed	_	No	No
ı				Custody commis.	custody commissioning triggered	2		No
ŀ				CRC WinCE	WinCE-Kernel wrong CRC	2		No
ŀ				Param.Attack	Parameter file was attacked	1		No
ı				FilesysWarn	noncritical WinCE file system error	1	No	No
ı				FilesysAlarm	critical WinCE file system error	1		No
				Service mode	Service mode is active			No
				C6 conflict	Serial interface C6 protocol in conflict			No
ı				C7 conflict	Serial interface C7 protocol in conflict			No
ŀ				Pulse cmp. 1:1	Pulse comparision error 1:1	1	Yes	
ŀ				Pulse cmp. X:Y	Pulse comparision error X:Y	1		
				GERG2008 alarm	GERG2008 algorithmic error	1		Yes
					GERG2004 algorithmic error	1		Yes
				AGA8(2017) alarm	AGA8(2017) algorithmic error	1		Yes
				GOST 30319 alarm	GOST 30319 algorithmic error	1		Yes
				ETHI DHCP server	DHCP server for ETH1 is not available			No
				ETH2 DHCP server	DHCP server for ETH2 is not available	_		No
	291	W	40-5	counter modified	counter was manually modified	1	No	No

Manual ERZ2000-DI $\,\cdot\,\,$ EN13 $\,\cdot\,\,$ 2020, December 7th



Appendix

A) Updating software

A

Caution

A change or update of the software should not be carried out without consulting with the RMG service department!

Please have this change or update carried out by the RMG service department.

A change to the software breaks the seal. Please refer to the comments in chapter 1.5.2 Seal diagram for devices with MID approval.

A.1 Advance information

The main components of the device software are:

- The Flow Computer BIOS.
- The **application** with a special part, the calibration core.

Each part is identified by:

- Version number
- Checksum
- **Time stamp** (date and time of creation)

An SD memory card that is inserted at the bottom left behind the front panel contains files in the subdirectory \Bin for the Flow Computer BIOS and the application, e.g.:

\Bin**ERZ2000DI.exe** (application) \Bin**F2 008.mot** (Flow Computer BIOS)

When the device is switched off, the SD card can be removed in order to inspect and edit it on an external PC with a card reader. When switching on the device, the application file is read by the SD card and executed under Windows CE (operating system kernel). A new flow computer BIOS must be installed from the SD card to the internal flash memory with a special procedure. Then the BIOS is active!



A.2 Software identification

There are various options for determining version number, checksum and time stamp of the software parts:

- When switching on the device
 A few seconds after the device is switched on, the version numbers of BIOS and the application appear on the bottom right of the display under the green area.
 The calibration core is determined from the two first positions of the application e.g. application = V1.0.0, then the calibration core is 1.0
- In the **coordinate system**, in the menu **IE Software identification**, see *Figure 67:*Menu IE Software identification.

The option can be used on the touch screen under the menu "Functions", sub-menu "Type plate" (*chapter 2.7.4.3 Type* plate) or using the web browser.

A.3 Updating software

The update takes place by copying the new software to the SD card in the device.

A Caution

- Consult with the RMG service department to discuss how and in which form you can obtain new software!
- In doing so, you can ensure that archive content and device parameters are not lost!

Required tools

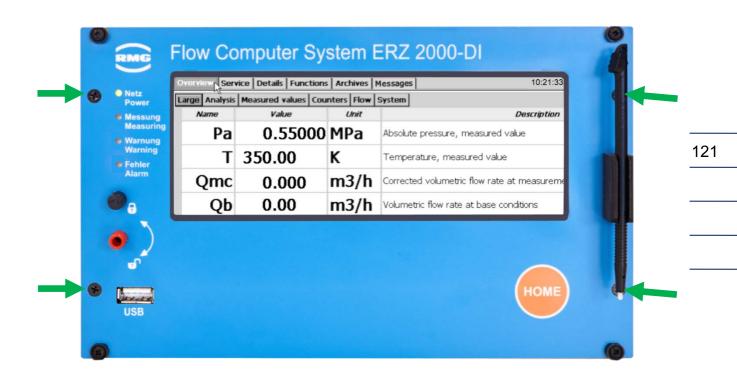
- Phillips screwdriver
- SD card reader

SD card removal

- Switch your measuring system to a safe state. If possible, discontinue the flow through the flow computer, because there is no computing during the software update and accumulating amounts are not measured.
- Switch off the ERZ2000-DI.
- Remove the four screws on the front panel and carefully pull it off.

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· Remove the inserted SD card from the holder.



SD card backup

• Backing of the entire SD card is highly recommended so that it is possible to reactivate the old software. This can be necessary, for instance, if an error occurs during the subsequent steps.



- Insert the SD card in a card reader.
- Copy the entire contents of the SD card to a separate backup directory on your PC.

You should have received the software from the RMG service department. Load the following files to the SD card to update the software:

md5.txt version.txt

and the subdirectories

\Bin \ERZ2000NG \HTMLS \tools

The subdirectory \ERZ2000NG does not contain any files for archive content and parameters. Therefore, an existing file can be overwritten without loss of parameters or archives.

- Insert the SD card (push it in the slot until it engages).
- Re-install the front panel (= reverse order of removal of the front panel).
- Switch on the ERZ2000-DI.

Enter activation key

Enter the activation key for the new software, which is provided under coordinate **IE10 Enable**. The activation key and the target CRC of the WinCe kernel can be found in the approval documentation under "Identification".

Checking BIOS

After the update, a new BIOS on the SD card is not automatically active. Therefore, check the device BIOS to determine whether it should be updated and re-installed if applicable; contact RMG customer service for information about the latest BIOS version.

A.4 Installing BIOS

Open the calibration switch



Note

Prevent automatic resetting!

Activate coordinate LC40 Service mode ("yes") in order to prevent an automatic device, reset (watchdog) during subsequent steps.

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Close the application

- · Click on the "Service" tab on the touch screen
- Select and execute the "Close program" function.

Start Windows Explorer

- Click on the "Start" button.
- · Click on "Programs".
- Click on "Windows Explorer".

Start FlashloadCE

- "SDCard" (double-click)
- "TOOLS" (double-click)
- "FlashloadCE" (double-click)

Monitor the output window

 After the program start, messages that the COM3 and CAN-bus required for flashing have been opened must appear:

"CAN opened successfully!"

"COM3: opened successfully!"

Start the bootloader

Click on the menu item "Flash > Reset BIOS".

Monitor FlashloadCe

A message that the connection between FlashloadCE and the bootloader was established appears in the output window (to the right):

"Device is connected!"

Various information can be read in the status window (to the left), such as the version of the bootloader.

Load flow computer BIOS

- Click on the menu item "File > Open".
- Select the BIOS file on the "SDCard" in the subdirectory "Bin".

Such files have the name extension ".mot", e.g. "F2 008.mot".

Then confirm the file selection with the "OK" button.

Monitor the output window:

The file is now checked for validity.

This takes a few seconds and the following message appears

"Scanning file. Please wait ..."

If the file is valid, some information is displayed:

"Motorola file"

"Number of lines"

"Bytes to program"

"Checksum"

Delete flash memory

Click on the menu item "Flash > Clear".

Monitor the output window:

 After the deletion process is successfully completed, a message that the flash memory was deleted appears:

"Flash memory is blank"

Program the flash memory

Click on the menu item "Flash > Program".

Monitor the output window:

The following message appears

"Programming memory ..."

with a progress indicator. It is possible that the bar makes large jumps. This only means that part of the flash memory does not have to be programmed.

• When the programming process is completed, the following message appears:

"Device programmed!"



Note

Please check the checksum.

Activate new BIOS

 Click on the menu item "Flash > Make valid" in order to activate the now programmed and verified BIOS. 125

Note

Attention: This step is important.

Monitor the output window

• The following message appear after the activation:

"Target has been made valid!"

Start the software

- Click on the menu item "Flash > Start target".
- A window appears in which the program start must be confirmed again with "Yes". In this case, the entire ERZ2000-DI is restarted.

A.5 Activation after software update



There is an activation key for each software package, which must be entered after a software update of the ERZ2000-DI. The device calculates a checksum internally and compares it with the key that has been entered. The ERZ2000-DI is only ready for operation if the result of this comparison is positive. If the activation key is missing or incorrect, the ERZ2000-DI switches permanently to fault status and issues the alarm "A 98-8 Inval. Act. key". The computing functions are executed normally, but the disturbance meters run.



B) Totalizer in the browser view

The following figures and comments show how the totalizers are handled in the browser display.

Access	Line	Designation	Value	Unit	Variable
Z *	1	Vol. at base cond.	76810	*100 m3	Vn1
Z *	2	Vol.base fraction	.239998	*100 m3	Vn1R
Z *	3	Vol.at.base ovfl	0		OfVn1
Z *	4	Energy	81792	MWh	<u>E1</u>
Z *	5	Energy fraction	.596735	MWh	E1R
Z *	6	Energy Overflow	0		OfE1
Z *	7	Corr.vol.meas.	111118	m3	Vk1
Z *	8	Corr.vol.meas.frac.	.048975	m3	Vk1R
Z *	9	Corr.vol.meas.ovfl.	0		OfVk1
Z *	10	Vol. at meas.cond.	111118	m3	Vu1
Z *	11	Vol.meas.fraction	.048975	m3	Vu1R
Z*	12	Vol.at.meas ovfl	0		OfVu1
Z *	19	Original totalizer	0	m3	Vo1
Z *	20	Orig.tot.fraction	.000000	m3	Vo1R
F	61	Vol. at base cond.	76810	*100 m3	fVn1
F	62	Vol.base fraction	.239998	*100 m3	fVn1R
F	63	Energy	81792	MWh	<u>fE1</u>
F	64	Energy fraction	.596735	MWh	fE1R
F	65	Corr.vol.meas.	111118	m3	fVk1
F	66	Corr.vol.meas.frac.	.048975	m3	fVk1R
F	67	Original totalizer	0	m3	fVo1
F	68	Orig.tot.fraction	.000000	m3	fVo1R
F	69	Vol. at meas.cond.	111118	m3	fVu1
F	70	Vol.meas.fraction	.048975	m3	fVu1R

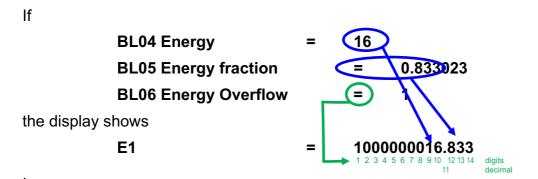
Figure 92: Menu BL Totalizer, billing mode 1

The totalizers of the 2 billing modes are shown in the menu **B Flow computer** under the sub-menus **BL Totalizer BM 1** and **BN Totalizer BM 2**; the corresponding disturbance totalizer are found in sub-menus **BM Disturbance totalizer BM 1** and **BO Disturbance totalizer AM 2**. Since the structure of these menus is the same, only **BL Totalizer BM 1** is shown here in detail.

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The representation is explained based on the example of energy **BL04 Energy**, **BL05 Energy fraction** and **BL06 Energy Overflow** The setting is optimized for the metering of large amounts and has 14 digits plus 3 decimal places



The menu **BP Totalizer undef. BM** also has a similar structure. Then this meter counts if the billing mode is invalid (e.g. in case of an incorrect switch position).

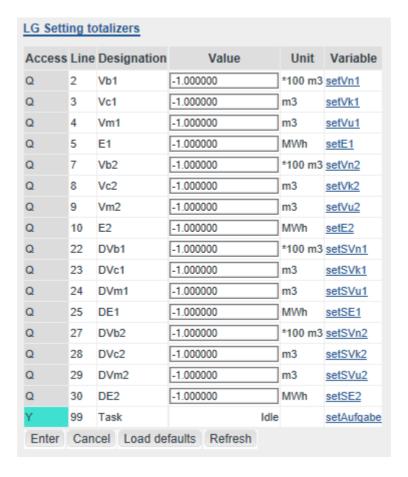


Figure 93: Menu LG Setting totalizers



The values of the 2 meters can be set in the coordinates **LG02 Vb1** to **LG30 DE2**. A negative value means that this meter is not set. The coordinate **LP99 Task** defines the various assignments that can be viewed in the table below.

Idle	Nothing happens!
All TOT = 0	All totalizers (main+disturbance) and fractions are set to 0. The totalizers are also set to 0 for undefined billing mode.
All DTOT = 0	All disturbance totalizers and fractions are set to 0. The totalizers are also set to 0 for undefined billing mode. The main totalizers remain unaffected
Vm = Vo	All Vm totalizers (uncorrected operating volume) are set to the current value of the assigned Vo totalizer (original total- izer). All other totalizers remain unaffected.
Vc = Vm	All Vc totalizers (corrected operating volume) are set to the current value of the assigned Vm totalizer (uncorrected operating volume). All other totalizers remain unaffected.
Custom	All totalizers that were programmed with a non-negative value in the totalizer settings list are set to this value. In this connection, the portion after the decimal is written to the fraction totalizer. Then the relevant input field in the settings list is set to -1. All totalizers that are negative in the totalizer settings list (explicitly -1) remain unaffected.
All overflow = 0	All overflows are set to 0.



C) Archive assignment, depth and identification

C.1 Archive groups

Multiple menus can be assigned to archives.

Note

In order to display mean values for pressure, temperature, etc. in the archives or archive groups, a setting not equal to "off" must be selected for the relevant measurement operating mode.

If a measurement input works in the "Random" operating mode, no entries are created in the archives or log book when alarms are generated and deleted.

There are various archive groups in which the specified values, including time stamp (date and time) and indenture numbers are specified.

Archive group 1: counters and measured values billing mode 1 Ordinal No. 6965 ... 6988 * Totalizer Absolute pressure BM1 / Energy / Mean for DSfG * Totalizer BM1 / * Totalizer BM1 / * Totalizar BM1 / Gas temperature / Mean for DSfG General DSfG / * Totalizer BM1 / Time stamp Own bit string Vol. at meas.com Original totalized Corr.vol.meas /ol. at base cond caagd/baae 965 0.55 00000001 13-12-2017 0.55 966 00000001 967 1.55 00000001 6968 0.55 00000401 969 0.55 3-12-2017 6970 0.55 00000001 13-12-2017 6971 0.55 00000001 6972 0.55 00000001 6973 00000401 6974 00000401 81792 111118 6975 111118 76810 00000400 5:45:04 13-12-2017 81792 111118 6976 111118 76810 00000401 13-12-2017 111118 76810 81792 0.55 293.15 00000001 111118 13-12-2017 6978 111118 76810 81792 0.55 00000401 111118 111118

Figure 94: Archive group 1

The channel status is specified with color-coding (black, gray, blue, green, turquoise and yellow).



Channel status

- Okay
- · Stop
- Default value
- Fixed value
- Holding value
- Revision

Figure 95: Archive group 1 channel status

TSV file						
Ordinal No.	Number	state	from	to		
6501 6988	488	grows	03-06-2017 20:00:00	14-12-2017 15:00:00		
6001 6500	500	complete	12-05-2017 12:00:00	03-06-2017 19:00:00		
5501 6000	500	complete	22-04-2017 14:00:00	12-05-2017 11:00:00		
5001 5500	500	complete	01-04-2017 23:00:00	22-04-2017 13:00:00		
4501 5000	500	complete	12-03-2017 02:00:00	01-04-2017 22:00:00		
4001 4500	500	complete	19-02-2017 09:00:00	12-03-2017 01:00:00		
3501 4000	500	complete	31-03-2016 12:00:00	19-02-2017 08:25:44		
3001 3500	500	complete	17-02-2015 12:00:00	31-03-2016 11:00:00		
2501 3000	500	complete	30-09-2014 10:17:58	17-02-2015 11:00:00		
2001 2500	500	complete	17-06-2014 07:19:38	30-09-2014 09:50:14		
1501 2000	500	complete	21-03-2014 16:00:00	16-06-2014 15:53:18		
1001 1500	500	complete	16-12-2013 14:15:46	21-03-2014 15:00:00		
<u>501 1000</u>	500	complete	20-09-2013 13:00:00	16-12-2013 14:15:43		
<u>1 500</u>	500	complete	18-01-2023 16:04:49	20-09-2013 12:00:00		

Figure 96: Archive group 1

The bottom display in the menu **Archive group 1 / Totalizer BM1** shows that the data is saved in TSV files (Excel-compatible format). The files can be read and downloaded by double-clicking on the indenture numbers, e.g. 1 ... 500.

The other archives have a similar structure. There are additional archive groups:

- JA Archive group 1 Main totalizer for BM 1 plus measurements
- JB Archive group 2 Disturbance totalizer for BM 1
- JC Archive group 3 Main totalizer for BM 2 plus measurements
- JD Archive group 4 Disturbance totalizer for BM 2
- JI Archive group 9 Instance F 1b
- JJ Archive group 10 Instance F 2a
- JK Archive group 11 Instance F 2b+c
- JM Archive group 13 Totalizer for undefined AM
- JN Archive group 14 Programmable archive



- JO Archive group 15 Freely programmable archive
- JQ Archive group 17 Revision part 1
- JR Archive group 18 Revision part 2
- JS Archive group 19 Revision part 3
- JU Archive group 21 Log book
- JV Archive group 22 Highest load per day, hourly value
- JW Archive group 23 Highest load per month, hourly and daily value
- JX Archive group 24 Highest load per year, hourly and daily value

.C.1.1 JN Freely programmable archive

Access	Line	Designation	Value	Unit	Variable
В	1	Record cycle	Gas quality ~		fpagZyk
В	2	Name Archive grp 15	AG15		ag15Name
В	10	Assign.Channel 1 = CB01	<u>Edit</u>	kWh/m3	fpagk1
В	11	Assign.Channel 2 = CB02	<u>Edit</u>	kg/m3	fpagk2
В	12	Assign.Channel 3 = BL10	<u>Edit</u>	m3	fpagk3
В	13	Assign.Channel 4 = BM04	<u>Edit</u>	MWh	fpagk4
В	14	Assign.Channel 5 = BM01	<u>Edit</u>	*100 m3	fpagk5
В	15	Assign.Channel 6 = YW01	<u>Edit</u>		fpagk6
В	16	Assign.Channel 7 = BL07	<u>Edit</u>	m3	fpagk7
В	17	Assign.Channel 8 = BN01	<u>Edit</u>	*100 m3	fpagk8
В	18	Assign.Channel 9 = BN10	<u>Edit</u>	m3	fpagk9
В	19	Assign.Channel 10 = BO04	<u>Edit</u>	MWh	fpagk10
В	20	Assign.Channel 11 = BO01	<u>Edit</u>	*100 m3	fpagk11
В	21	Assign.Channel 12 = BO10	<u>Edit</u>	m3	fpagk12
В	22	Assign.Channel 13 = BJ01	<u>Edit</u>	kW	fpagk13
В	23	Assign.Channel 14 = BI01	<u>Edit</u>	m3/h	fpagk14
В	24	Assign.Channel 15 = BF01	<u>Edit</u>	m3/h	fpagk15
В	25	Assign.Channel 16 = BC01	<u>Edit</u>	MPa	fpagk16
В	26	Assign.Channel 17 = BD01	<u>Edit</u>	K	fpagk17
В	27	Assign.Channel 18 = CB01	<u>Edit</u>	kWh/m3	fpagk18
В	28	Assign.Channel 19 = CB02	<u>Edit</u>	kg/m3	fpagk19
В	29	Assign.Channel 20 = CB02	<u>Edit</u>	kg/m3	fpagk20

Figure 97: Menu JN Freely programmable archive



In order for the freely programmable archive to be detected when loading file as an archive group, an assignment not equal to "off" must be selected in coordinate **JN01 Record cycle** (e.g. "every minute").

C.2 Archive depth

DSfG archive

Archive group 1 to 8	8192 entries, then the oldest entry is overwritten.
Archive group 9 to 11	8192 entries, then the oldest entry is overwritten.
Archive group 12	8192 entries, then the oldest entry is overwritten.
Archive group 13	8192 entries, then the oldest entry is overwritten.
Archive group 14, 15, 16	8192 entries, then the oldest entry is overwritten.
Archive group 17 to 20	4 entries, are rewritten each time.
Archive group 21	8192 entries, then the oldest entry is overwritten.
Archive group 22	180 entries, then the oldest entry is overwritten.
Archive group 23	36 entries, then the oldest entry is overwritten.
Archive group 24	10 entries, then the oldest entry is overwritten.

With the exception of archive group 17-19, the oldest entry is overwritten after the specified number of entries is reached.



D) Test of LED, warning and alarm contact

In the menu **L Factory settings** there is a submenu **LI Hardware test**, which – as superuser – allows the LED functions on the front panel of the ERZ2000-DI to be checked. In normal operation **LI01 hardware test** "no" is active.

If "Power LED" is selected for this menu item, the Power LED (top left) lights up, all other LEDs remain off. The behaviour is analogous when selecting :

- Measuring LED
- Warning LED
- Alarm LED

When set to "Alarm contact" (or "Warning contact"), the "alarm contact" (or "Warning contact") is on for one second each and then off again.

If "contact output" is set, this results in the following dynamic change:

- Contact 1 on for one second, all others off.
- Contact 2 on for one second, all others off.
- Contact 3 on for one second, all others off.
- Contact 4 on for one second, all others off.
- Contact 5 on for one second, all others off.
- Contact 6 on for one second, all others off.
- Contact 7 on for one second, all others off.
- Contact 8 on for one second, all others off.

Also "pulse output" can be checked, it results in:

- Pulse output 1, 1 pulse per second
- Pulse output 2, 2 pulse per second
- Pulse output 3, 3 pulse per second
- Pulse output 4, 4 pulse per second



E) Optional Ex input card

E.1 Instructions for the installer

Code:

Type: EX1-NAMUR-2 / V1 or V2



II(2)G [Ex ia] IIC

TÜV 06 ATEX 553139 X

Tamb = -20°C +60°C

Data: see EC Type approval certificate

Use:

Use of the assembly takes place in combination with the device ERZ2000-DI only. The assembly is intended for galvanic isolation of MSR signals, such as 20 mA current loops or adaptation and/or standardization of signals. The different intrinsically safe current circuits are provided to operate intrinsically safe field devices within explosion-prone areas. The applicable laws and directives for the use and/or planned use must be observed. Version V1 is the standard version for a 1-rail flow computer, version V2 is designed for a 2-rail flow computer (optional expansion level).

Multiple transmitters/sensors can be connected to the EX1-NAMUR-2 card.

2 volume transmitters, with pulse sensors similar to DIN 19234,

1 electronic meter (ENCO),

1 pressure transducer (4 to 20mA or HART),

1 temperature sensor (4 to 20mA or HART),

optionally 1 temperature sensor (PT100 4-wire).

Installation and commissioning in connection with Ex areas:

Installation and commissioning must be carried out exclusively be specially trained and qualified personnel. The device is designed with protection rating IP20 in accordance with EN 60259 and appropriate measures must be taken in unfavorable environmental conditions that exceed contamination degree 2. External heating due to solar radiation or other heat sources must be prevented. The installation of intrinsically safe current circuits must be carried out according to the applicable installation regulations. For connection of intrinsically safe field devices with the intrinsically safe current circuits of the corresponding devices of the ERZ2000-DI, the highest values of the field device and the corresponding device must be observed in consideration of explosion protection.

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The EC conformity certificate and/or EC type approval certificate must be observed. Compliance with any "Special conditions" contained therein is especially important.

Commissioning:

The connector plug must be installed correctly in the mating plug intended for this purpose and secured mechanically. Operation must take place in a completely enclosed housing.

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Service / maintenance:

The fuses in the devices must only be replaced when in a de-energized state. Repairs of the device must be carried out exclusively by RMG Messtechnik GmbH.

Disassembly:

When disassembling, it must be ensured that the sensor cable does not come into contact with other live parts. Appropriate protective measures must be taken.



F) Service functions

A

Caution

The removal of seals is necessary for this function. This normally entails considerable expenses!

Therefore, this function reserved for the service department and a calibration official and/or an officially recognized inspection authority. These parties must be present at the measuring station location.

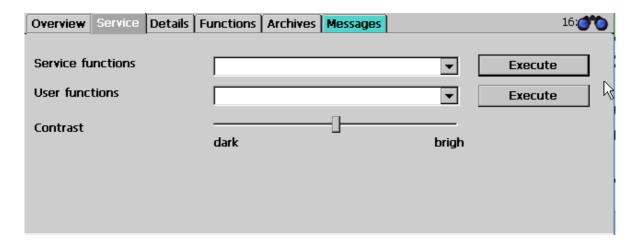


Figure 98: Service menu

If the white field to the right of the "Service functions" is touched, then, the service functions "Official custody transfer commissioning" and "Close program can be selected with the open calibration switch.

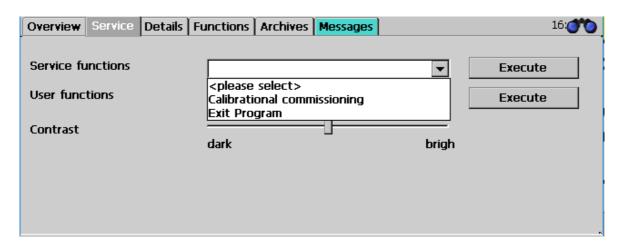


Figure 99: Menu Service / sub-program "Official custody transfer commissioning" and "Close program"



First, an official custody transfer commissioning is initiated with "Execute" in order to reset all parameters of WinCe to the default values (all parameters that are not under the calibration switch). If the ERZ2000-DI application is running, a restart of the kernel is carried out as an essential part of the process and the CRC (cyclic redundancy check) of the complete kernel is calculated and displayed in the matrix element "Kernel CRC IE21". The setpoint is displayed in the matrix element "Kernel CRC, IE22" for comparison.

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In order to adopt the newly calculated values according to this service function, an **additional** restart is necessary, which can be initiated via the service function "Close program" with "Execute" (or by disconnecting the power supply).

Note

Attention:

In menu L Factory settings, LC configuration, the coordinate LC40 Service mode must be set to the default value "no".

The setting "yes" is reserved for the service department when settings should be made in WinCE.

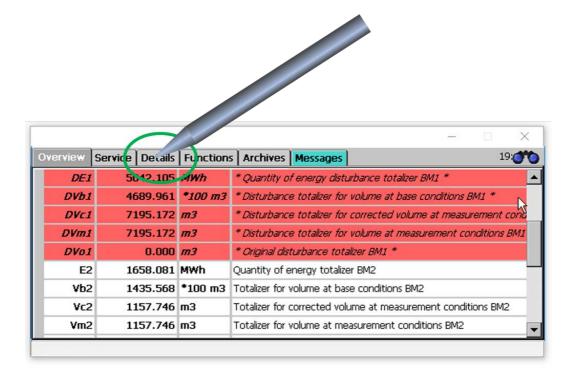
The reason the official custody transfer commissioning is that operating system is a component of the flow computer that must not be replaced without the knowledge of calibration authorities. The setting parameters of the operating system must not be changed without the knowledge of calibration authorities, either. Therefore, the operating system must be set to a status agreed upon with the calibration authority during commissioning. After the commissioning is completed, access to the settings of the operating system is no longer possible.

After a restart, the calibration official checks the CRC; if the check is successful, the calibration switch is closed and the device is sealed by the calibration official. Then the final setup of the ERZ2000-DI can take place. The device is ready for operation when all necessary settings have been made.

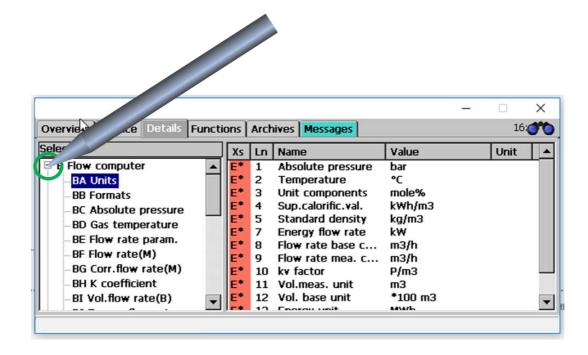


G) Adjustment of the MTU size

Go to **Details**.

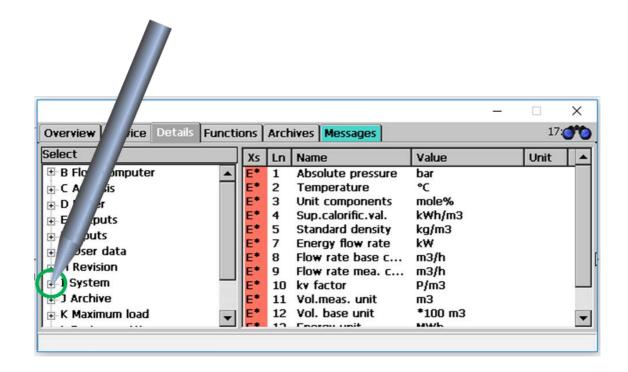


To B Flo computer

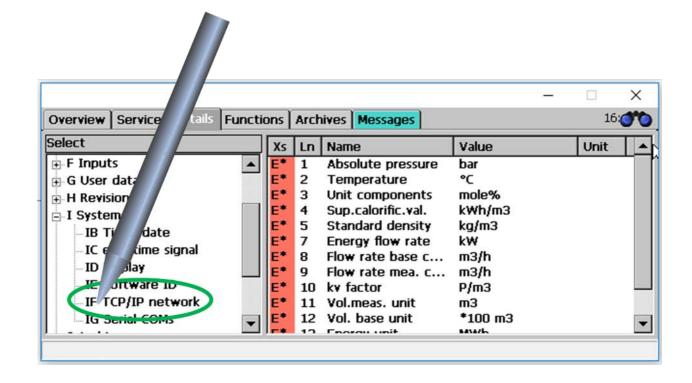




To I System

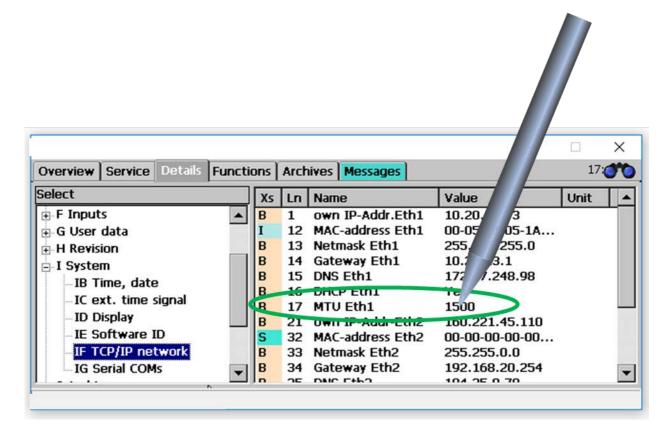


To IF TCP/IP network





To IF32 MTU Eth1



As a superuser (*chapter 2.4 Access protection for data and settings*) you can now change the maximum packet size of the transmission protocol MTU (*chapter 2.7 Display screen*). By scrolling on the right side, you can also access the MTU of Eth2, which you can change analogously if necessary.

Note

Please only make these settings after consulting your IT department if there are connection problems (firewall, mobile phone, ...).



Certificates

EU Type-examination Certificate: Volume conversion device for gas	
Type-examination Certificate: Energy conversion device	
Type-examination Certificate: Load recorder	141





KBS

Konformitätsbewertungsstelle



EU-Baumusterprüfbescheinigung

EU Type-examination Certificate

Ausgestellt für: RMG Messtechnik GmbH

Otto-Hahn-Str. 5 Issued to:

35510 Butzbach

gemäß: Anhang II Modul B der Richtlinie 2014/32/EU des Europäischen In accordance with:

Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von

Messgeräten auf dem Markt.

Annex II Module B of the Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States

relating to the making available on the market of measuring instruments.

Geräteart: Zustands-Mengenumwerter für Gas

Type of instrument: Volume conversion device for gas

Typbezeichnung: ERZ2000-DI

Type designation:

Nr. der Bescheinigung: DE-17-MI002-PTB008, Revision 1

Certificate No.:

Gültig bis: 10.07.2027

Valid until:

Anzahl der Seiten: 37

Number of pages:

Geschäftszeichen: PTB-1.42-4093129

Reference No.:

Notifizierte Stelle: 0102

Notified Body:

Zertifizierung:

Dr. Rainer Kramer

Braunschweig, 07.11.2018

Im Auftrag
On behalf of PTB Siegel

Bewertung: Im Auftrag
On behalf of PTB

Dr. Roland Schmidt





KBS

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Konformitätsbewertungsstelle



Baumusterprüfbescheinigung

Type-examination Certificate

Ausgestellt für:

RMG Messtechnik GmbH

Issued to:

Otto-Hahn-Str. 5 35510 Butzbach

gemäß:

Anlage 4 Modul B der Mess- und Eichverordnung vom 11.12.2014

In accordance with:

(BGBI. I S. 2010) Annex 4 Modul B of the Measures and Verification Ordinance dated 11.12.2014

(Federal Law Gazette I, p. 2010)

Geräteart:

Brennwert-Mengenumwerter Energy conversion device

Type of instrument:

Typbezeichnung: Type designation.

Nr. der Bescheinigung:

DE-17-M-PTB-0036, Revision 1

Gültig bis:

10.07.2027

ERZ2000-DI

Valid until

Anzahl der Seiten:

Number of pages: Geschäftszeichen:

PTB-1.42-4093130

Reference No.:

Nr. der Stelle:

0102

Body No.:

Zertifizierung:

Braunschweig, 07.11.2018

Bewertung:

Im Auftrag
On behalf of PTB

Siegel

Im Auftrag
On behalf of PTB



Dr. Roland Schmidt

R. P. Dimitt

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KBS

Konformitätsbewertungsstelle



Baumusterprüfbescheinigung

Type-examination Certificate

Ausgestellt für:

RMG Messtechnik GmbH

Otto-Hahn-Str. 5 35510 Butzbach

gemäß: In accordance with: Anlage 4 Modul B der Mess- und Eichverordnung vom 11.12.2014

(BGBI. I S. 2010)

Annex 4 Modul B of the Measures and Verification Ordinance dated 11.12.2014 (Federal Law Gazette I, p. 2010)

Geräteart:

Belastungs-Registriergerät

Type of instrument:

Load recorder

Typbezeichnung:

ERZ2000-DI

Type designation: Nr. der Bescheinigung:

DE-17-M-PTB-0037, Revision 1

Certificate No.:

Gültig bis:

10.07.2027

Valid until:

Anzahl der Seiten:

Geschäftszeichen:

Number of pages:

PTB-1.42-4093131

Reference No.:

Nr. der Stelle:

0102

Body No.:

Zertifizierung:

Im Auftrag On behalf of PTB

Braunschweig, 07.11.2018

Siegel

Bewertung: Im Auftrag
On behalf of PTB

Dr. Rainer Kramer

Dr. Roland Schmidt

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Subject to technical modification

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