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Valid as of version
02.02.00 (Device firmware)



# Operating Instructions
# **LNG bunkering control system**

Mass measurement and energy calculation with integrated gas analysis in LNG bunker transfer operations


Endress+Hauser
People for Process Automation

- Make sure the document is stored in a safe place such that it is always available when working on or with the device.
- To avoid danger to individuals or the facility, read the "Basic safety instructions" section carefully, as well as all other safety instructions in the document that are specific to working procedures.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser sales organization will supply you with current information and updates to this manual.

# Table of contents

# 1 About this document

## 1.1 Document function

These Operating Instructions contain all the information required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to installation, connection, operation and commissioning, through to troubleshooting, maintenance and disposal.

## 1.2 Symbols

### 1.2.1 Safety symbols

**⚠ DANGER**
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

**⚠ WARNING**
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

**⚠ CAUTION**
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in minor or medium injury.

**NOTICE**
This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

### 1.2.2 Electrical symbols

| Symbol | Meaning |
|---|---|
| ⎓ | Direct current |
| ~ | Alternating current |
| ⎓ ~ | Direct current and alternating current |
| ⏚ | **Ground connection**<br>A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system. |
| ⏚ | **Protective earth (PE)**<br>Ground terminals that must be connected to ground prior to establishing any other connections.<br>The ground terminals are located on the interior and exterior of the device:<br>▪ Interior ground terminal: protective earth is connected to the mains supply.<br>▪ Exterior ground terminal: device is connected to the plant grounding system. |

### 1.2.3 Communication-specific symbols

| Symbol | Meaning |
|---|---|
| | **Wireless Local Area Network (WLAN)**<br>Communication via a wireless, local area network |
| A0044513 | **Cellular radio**<br>Bidirectional data exchange via cellular network |

| Symbol | Meaning |
|---|---|
| | **Bluetooth**<br>Wireless data transmission between devices over a short distance via radio technology |
| | **LED**<br>LED is off. |
| | **LED**<br>LED is on. |
| | **LED**<br>LED flashing. |

### 1.2.4 Tool symbols

| Symbol | Meaning |
|---|---|
| | Torx screwdriver |
| | Flat-blade screwdriver |
| | Phillips screwdriver |
| | Allen key |
| | Open-end wrench |

### 1.2.5 Symbols for certain types of information

| Symbol | Meaning |
|---|---|
| | **Permitted**<br>Procedures, processes or actions that are permitted. |
| | **Preferred**<br>Procedures, processes or actions that are preferred. |
| | **Forbidden**<br>Procedures, processes or actions that are forbidden. |
| | **Tip**<br>Indicates additional information. |
| | Reference to documentation |
| | Reference to page |
| | Reference to graphic |
| | Notice or individual step to be observed |
| 1., 2., 3... | Series of steps |
| | Result of a step |
| | Help in the event of a problem |
| | Visual inspection |

### 1.2.6 Symbols in graphics

| Symbol | Meaning |
|---|---|
| 1, 2, 3, ... | Item numbers |
| 1., 2., 3., ... | Series of steps |
| A, B, C, ... | Views |
| A-A, B-B, C-C, ... | Sections |
|  | Hazardous area |
|  | Safe area (non-hazardous area) |
|  | Flow direction |

## 1.3 Highlighting of text

| Emphasis | Meaning | Example |
|---|---|---|
| Grease | Keys, buttons, program icons, tabs, menus, commands | **Start** → **Programs** → **Endress+Hauser**<br>In the **File** menu, select the **Print** option. |

## 1.4 Acronyms used

| Acronym | Meaning |
|---|---|
| BIOS | Basic input/output system |
| BOG | Boil-off gas |
| BTU | British thermal unit |
| CSV | Comma Separated Values |
| EIA (Electronic Industries Alliance) | American association for manufacturers of electronic equipment and installations |
| EU | European Union |
| FWA | Flow-weighted average |
| HMI | Human-machine interface |
| IMO | International Maritime Organization |
| IP address | Internet protocol address |
| IPPC | International Plant Protection Convention |
| LNG | Liquefied natural gas |
| OPC | Open platform communications |
| RoHS | Restriction of Hazardous Substances Directive |
| RTU | Remote terminal unit |
| TCP | Transmission control protocol |
| TIA (Telecommunications Industry Association) | Association of public authorities of the United States and companies in the fields of data technology and telecommunications |
| USB | Universal serial bus |

## 1.5 Valid versions

| Component | Version |
|---|---|
| HMI application, version | From 02.02.xx |
| Flow computer app, name | E+H LNG metering application |

## 1.6 Registered trademarks

**Microsoft®**
Registered trademark of the Microsoft Corporation, Redmond, Washington, USA

All other brand and product names are trademarks or registered trademarks of the companies and organizations in question.

# 2 Safety Instructions

## 2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- Trained, qualified specialists must have a relevant qualification for this specific function and task.
- Are authorized by the plant owner/operator.
- Are familiar with federal/national regulations.
- Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:
- Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- Follow the instructions in this manual.

## 2.2 Intended use

This user manual is intended for **operators** working with the HMI of the LNG bunkering control system. The functionality described in this user manual applies to users with the authorization level **Operator**.

The HMI of the LNG bunkering control system is designed for use with the Proline Promass F/Q 300/500 Coriolis flowmeter and the Raman Rxn4 analyzer. Any other use is regarded as improper use.

The manufacturer is not liable for losses or damages arising from use in violation of the intended use. In such cases, the user bears full responsibility.

Intended use also includes complying with the operating and maintenance conditions specified by the manufacturer.

To ensure that the control system remains in proper condition during operation, pay attention to the following points:
- Observe the specified temperature range.
- Operate the control system only in compliance with the data on the nameplate and the usage conditions listed in the Operating Instructions and supplementary documentation.
- Ensure that the control system is permanently protected against corrosion caused by environmental influences.

## 2.3 Workplace safety

For work on and with the device:
- Wear the required personal protective equipment according to federal/national regulations.

## 2.4 Operational safety

Damage to the device!
- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for the interference-free operation of the device.

**Modifications to the device**

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers!
- If modifications are nevertheless required, consult with the manufacturer.

**Repair**

To ensure continued operational safety and reliability:
- Carry out repairs on the device only if they are expressly permitted.
- Observe federal/national regulations pertaining to the repair of an electrical device.
- Use only original spare parts and accessories.

## 2.5 Product safety

This state-of-the-art device is designed and tested in accordance with good engineering practice to meet operational safety standards. It left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU declaration of conformity.

## 2.6 IT security

The manufacturer warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

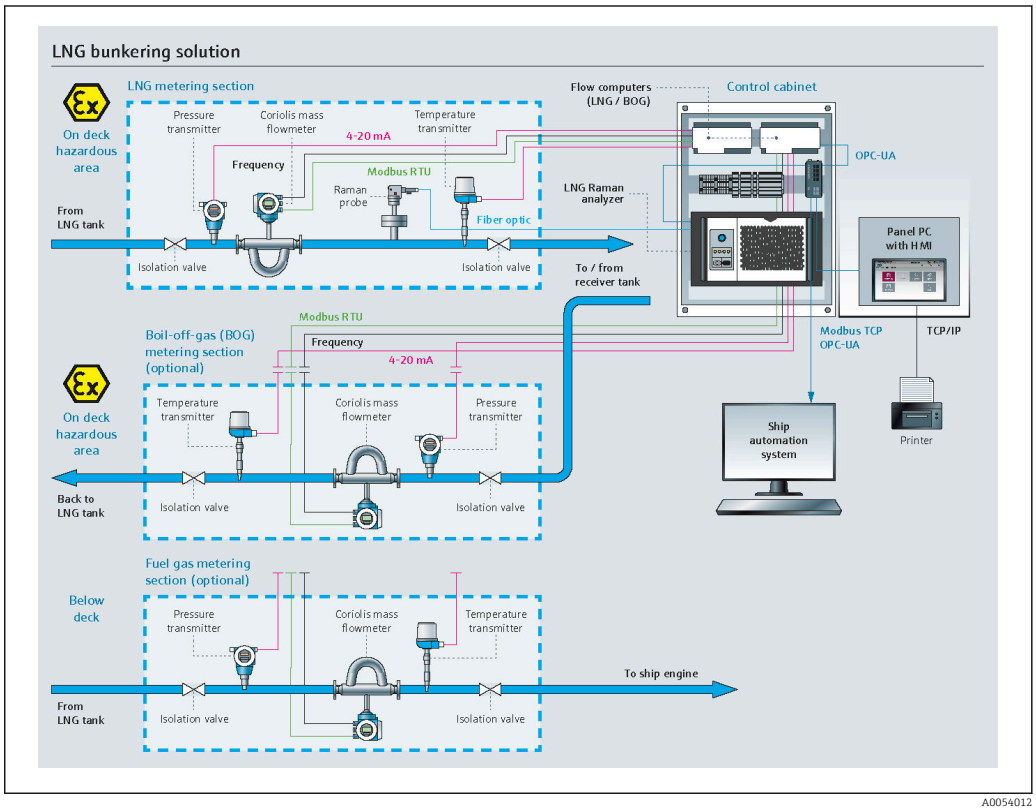
IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

# 3 Product description

The main functions of the LNG bunkering control system are operation, visualization of the bunkering process and data management. The control system's HMI offers user-friendly menu guidance for reliable operation.

## 3.1 System overview

The following is an overview of the entire LNG bunkering solution.

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*1 System overview*

## 3.2 System design

As the heart of the system, the LNG/BOG/fuel gas flow computer acquires various process data from the respective LNG/BOG/fuel gas flowmeters. Various signal types are transmitted between the flow computer and the field devices and the Raman analyzer via an Ethernet switch.

The system supports an LNG temperature range between -143 and -180 °C.

All real-time signals are synchronized on the panel PC and displayed to the operator via the touch-enabled HMI. Reports including measurement results are also stored and can be retrieved, displayed and exported.

## 3.3 Changes to the control system

Only appropriately trained and qualified personnel are permitted to make changes to the control system. If you require further support, contact your local Endress+Hauser Sales Center.

## 3.4 Operating the LNG bunkering system

To ensure error-free operation and the best possible measuring accuracy, the specified installation instructions must be observed. For installations involved in custody transfer operations, care must be taken to operate the LNG Bunkering System only within the defined custody transfer limits.

# 4 Incoming acceptance and product identification

## 4.1 Incoming acceptance

Upon receipt of goods, check the following:
- Check the packaging for visible damage arising from transportation.
- To avoid damage, remove the packaging with care.
- Check the delivery and ensure that it is complete and consistent with the order.
- Retain all accompanying documents.

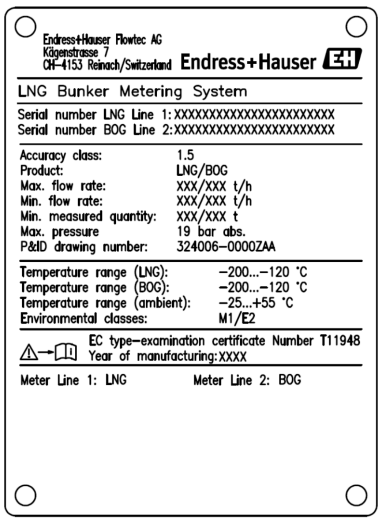
The documentation is included in the scope of delivery of the control cabinet and comprises:
- These Operating Instructions
- Wiring drawing for the LNG bunkering control system

The control system must not be put into operation if it has been established that the delivery is damaged. In this case, please contact the Endress+Hauser Sales Center. Return the control system to Endress+Hauser in the original packaging where possible.

## 4.2 Product identification

### 4.2.1 Nameplates on the control cabinet of the control system

There are two nameplates on the control cabinet, which serve to identify it clearly.

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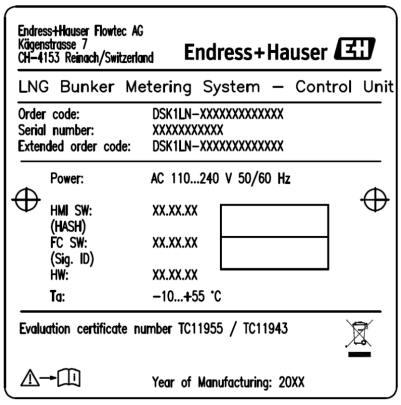
2 *Nameplate for LNG bunkering system*

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3 *Nameplate for control system*

# 5 Storage and transport

## 5.1 Storage conditions

Observe the following notes for storage:
- ▶ Store in the original packaging for protection against impacts.
- ▶ Protect from direct sunlight to avoid unacceptably high surface temperatures.
- ▶ Store in a dry and dust-free place.
- ▶ Do not store outdoors.
- ▶ Storage temperature: −25 to +60 °C (−13 to +140 °F)

## 5.2 Transporting the product

Observe the following notes during transport:
- ▶ Store in the original packaging for protection against impacts.
- ▶ Protect from direct sunlight to avoid unacceptably high surface temperatures.
- ▶ Transport to the location of use in the transport box in which it was delivered.

## 5.3 Packaging disposal

All packaging materials are environmentally friendly and 100% recyclable:
- Outer packaging of device
  Stretch wrap made of polymer in accordance with EU Directive 2002/95/EC (RoHS)
- Packaging
  - Wood crate treated in accordance with ISPM 15 standard, confirmed by IPPC logo
  - Cardboard box in accordance with European packaging guideline 94/62/EC, recyclability confirmed by Resy symbol
- Transport material and fastening fixtures
  - Disposable plastic pallet
  - Plastic straps
  - Plastic adhesive strips
- Filler material
  Paper pads

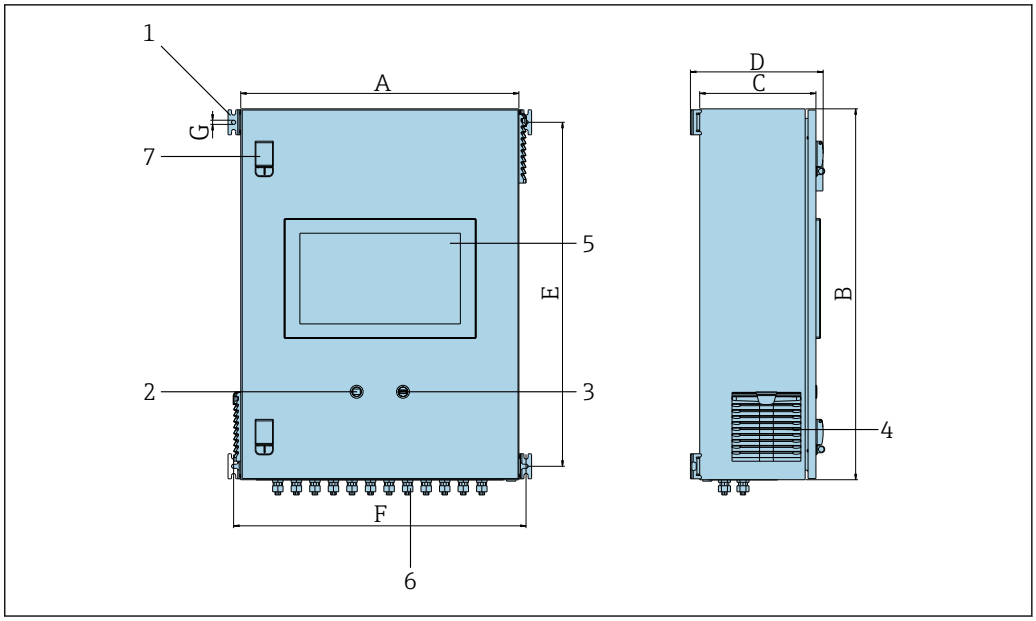
# 6 Installation procedure

## 6.1 Mounting the control system control cabinet

The control system control cabinet is supplied with brackets for wall mounting and must be installed on a stable wall using suitable fastening materials.

The different versions of the control system with their associated mounting brackets are shown below.

### 6.1.1 Control cabinet without Raman analyzer




*1 Fixing tabs*
*2 Ethernet port*
*3 USB port*
*4 Filter*
*5 Display*
*6 Cable glands*
*7 Door lock*

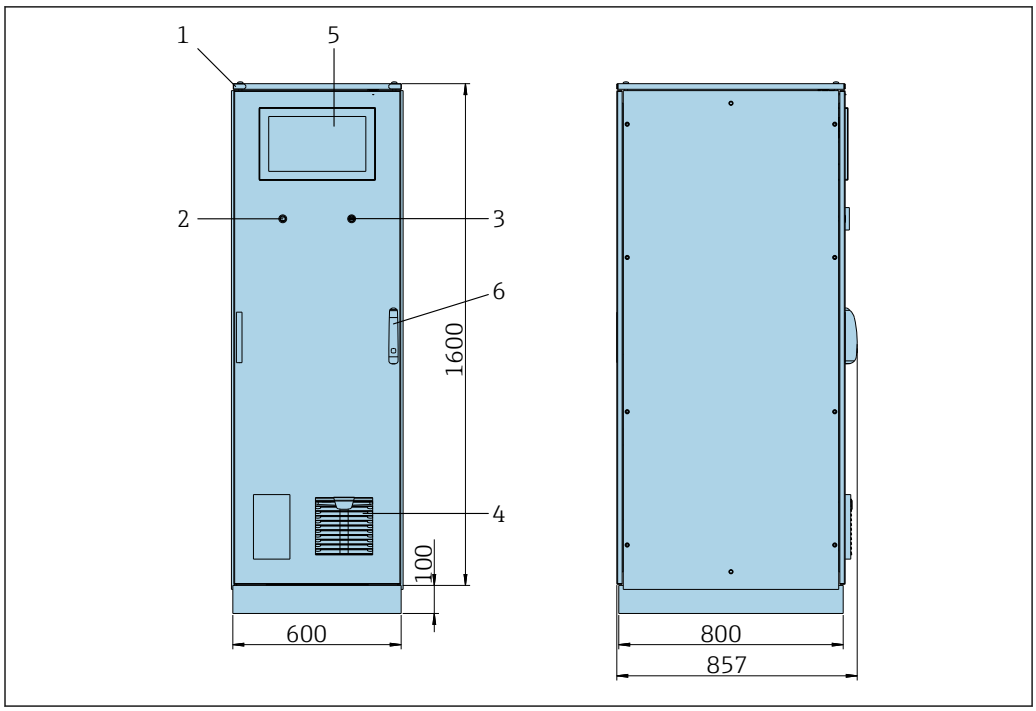
*Dimensions in SI units*

| Version | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | G [mm] |
|---|---|---|---|---|---|---|---|
| LNG/LNG+BOG | 600 | 800 | 250 | 286 | 742 | 631 | 9 |
| LNG+BOG+Fuel Gas | 800 | 1000 | 300 | 336 | 942 | 831 | 9 |

*Dimensions in US units*

| Version | A [in] | B [in] | C [in] | D [in] | E [in] | F [in] | G [in] |
|---|---|---|---|---|---|---|---|
| LNG/LNG+BOG | 23.6 | 31.5 | 9.85 | 11.26 | 29.21 | 24.85 | 0.36 |
| LNG+BOG+Fuel Gas | 31.5 | 39.4 | 11.82 | 13.23 | 37.09 | 32.72 | 0.36 |

### 6.1.2 Control cabinet with Raman analyzer




*1 Lifting eyes*
*2 Ethernet port*
*3 USB port*
*4 Filter*
*5 Display*
*6 Door lock*

## 6.2 Sealing/locking

### 6.2.1 Locking of settings

The settings of the system are locked by a hardware switch inside the control cabinet. If the switch is set to **Sealed**, no custody-transfer-relevant settings can be changed. If the switch is set to **Unsealed**, the HMI displays a corresponding error message.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4 *Custody transfer switch*

### 6.2.2 Sealing of the control cabinet

The cable entries in the control cabinet must be protected against unauthorized access. The plates with the cable entries are secured with sealing screws. The sealing screws must be sealed in accordance with the following diagram:

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5 *Positions of the cable entries*

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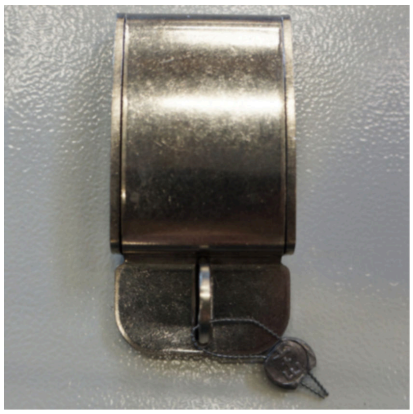
6 *Sealing screws with tamper-proof seal*

After system commissioning, the door lock can be sealed in accordance with the following diagram:



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*7 Door lock with tamper-proof seal*

### 6.2.3 USB/Ethernet interfaces

The Ethernet interface must be sealed for custody transfer. If access to the USB interface is not permitted, this can also be sealed.

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*8 USB/Ethernet connections*

## 6.3 Connecting requirements

### 6.3.1 Required tools

- For cable entries: use suitable tools
- For securing clamp (stainless steel housing): 8 mm wrench
- Wire stripper
- When using standard cables: use a crimper for wire end ferrules
- Crimper for keystone jack and plug cat. 6A
- Universal measuring device for cable testing

### 6.3.2 Connecting cable

**⚠ WARNING**

**Since the cabinet is installed in a maritime environment,**
the connecting cables and cable entries must meet special requirements.
▶ The requirements in these Operating Instructions must be met.

All network and signal cables used must be approved for use in the maritime industry in accordance with the latest technology and generally recognized rules of technology:
- All cables laid must be specifically designed for use in the maritime industry. In addition, they must meet requirements relating to ship class and have other necessary approvals.
- The use of armored cables is recommended, and these should be laid in fixed or flexible conduits to protect them from mechanical damage.
- All signal cables must be grounded. If multi-core cables are used, the individual signal cables must be grounded individually.
- All Ethernet connection cables must be Cable Type S/FTP Category 7 (individual pairs with braided shield and overall cable with foil shield).
- Required wire cross-sections:
  - Signal cable: 0.75 $mm^2$
  - Power cable for AC: 1.5 $mm^2$

### 6.3.3 Ethernet connection

The RJ-45 Ethernet connections of the Ethernet cables must meet the following specifications: Keystone jack cat. 6A

### 6.3.4 Cable entries and distribution box

The cable entries must meet all safety requirements applicable at the place of installation. These may include:
- Protection against climatic conditions
- Protection against corrosion
- Sealing off of any unused cable entries using dummy plugs

Additional use of a sealing compound to seal off connection seams or joints is common practice and has proven to be effective.

## 6.4 Special connection instructions

**Wiring the cabinet**

All field devices are directly powered by the LNG bunkering control system.

An uninterruptible power supply (UPS) is recommended for the LNG bunkering control system and the accompanying devices.

Required ratings → 65

# 7 Commissioning

## 7.1 Software update

If an update is required for any of the following programs, it must take place before commissioning.
- HMI
- Flow computer app

## 7.2 System settings

The system settings generally include user settings (e.g. time and date, file path), communication (e.g. IP address) and other configurations.

For further information → 21

## 7.3 Setting the time and date of Windows

Set the date and time in Windows as follows:

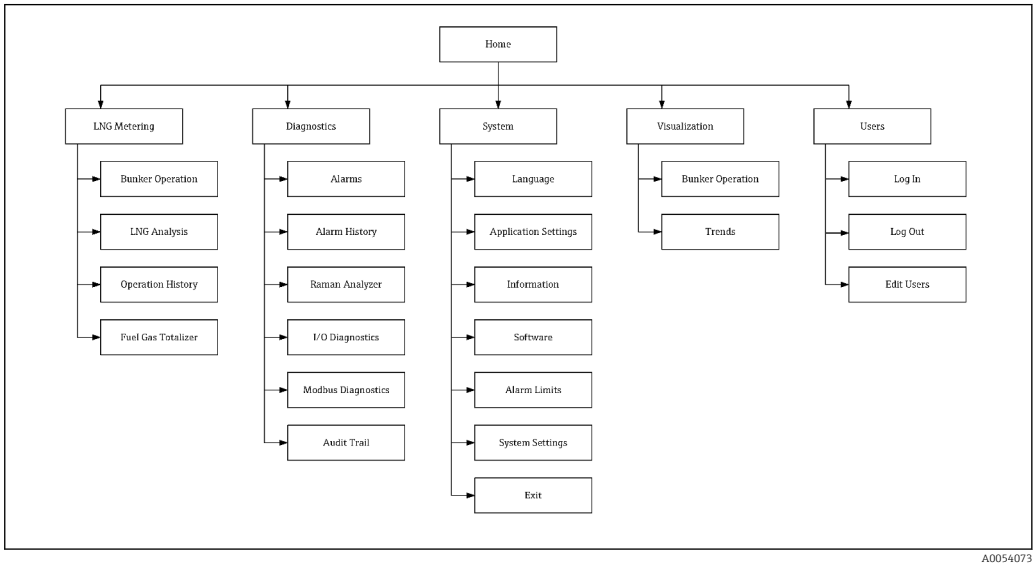
Requirements
- Access to Windows as an operator
- Keyboard with Windows key
- Mouse (if necessary)
- USB extension (if necessary)

1. Connect the keyboard and mouse to the USB ports to change system settings.
2. Log in with user access. User name: operator, password: operator.
3. Open the Settings window. To do so, press the Windows key and search for settings.
4. Click Time and Language in the Settings window. Click the Date and Time item.
5. Set the date and time here.
6. Click OK and Save.
7. Close the settings window and return to the LNG-HMI.
8. If a Windows password is required to configure these settings, use the system admin password, available from the Endress+Hauser Service contact.

# 8 Operation

## 8.1 HMI navigation

The following overview shows how the user can navigate between the screens. Depending on the user group, some screens may not be available and are therefore grayed out.

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## 8.2 General information

### 8.2.1 Status bar

The status bar is located at the top edge of the screen and contains the following information:

- System name
- Customer name
- System date, system time
- Endress+Hauser


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### 8.2.2 Navigation bar

The navigation bar is located at the top edge of the screen, directly below the status bar, and enables navigation between the individual displays.

The current screen is highlighted in blue.

The current screen also shows the currently logged-in user, the status of the custody transfer switch and the system status (OK, warning, error).


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## 8.3 Access rights

Certain functions are only available to users with higher-level access rights.

*The following user levels are available:*

| User name | Password |
|---|---|
| operator | operator |
| supervisor | supervisor |
| administrator | administrator |

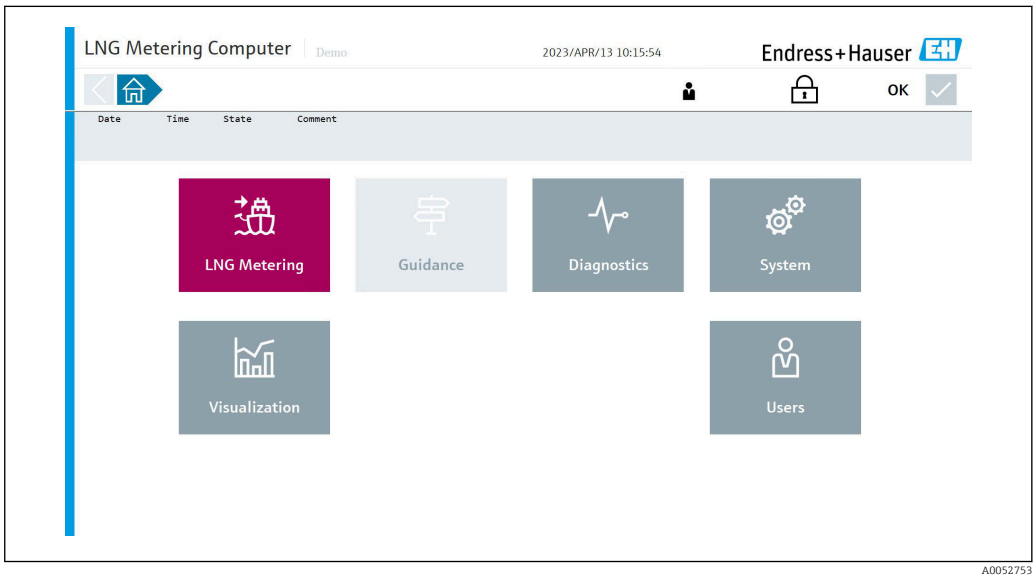
For more information → 54

## 8.4 "Home" screen

Each time the LNG bunkering control system is switched on or restarted, the HMI program is automatically loaded and the start screen then displayed.

The operator can navigate from here to the following main sections:
- **LNG Metering**
- **Diagnostics**
- **System**
- **Visualization**
- **Users**

The grayed out main area **Guidance** is temporarily not available.

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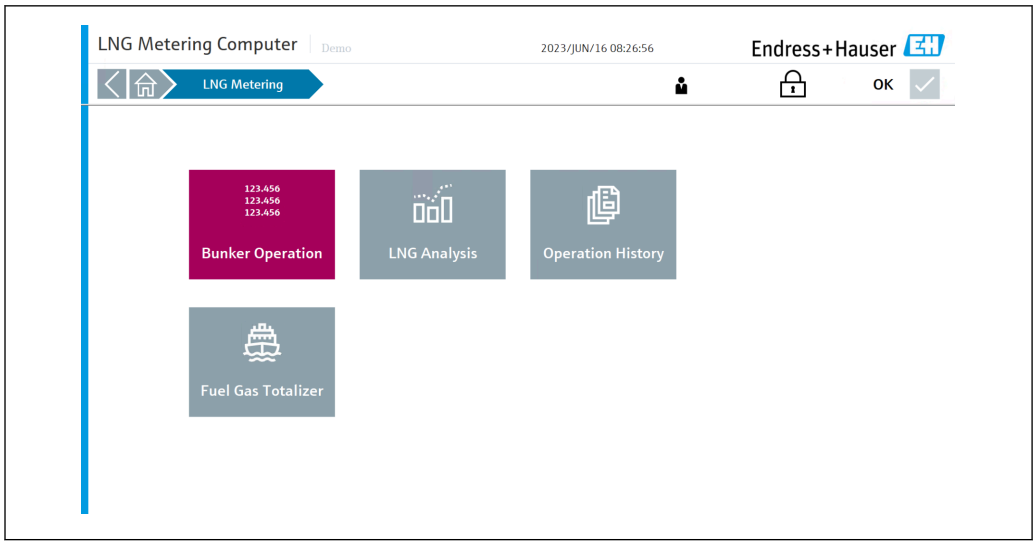
## 8.5 "LNG Metering" screen

The "LNG Metering" screen shows the details of a bunkering operation.

On the "Home" screen, tap **LNG Metering**. The "LNG Metering" screen opens.

From here, the operator can navigate to the following subsections:
- **Bunker Operation**
- **LNG Analysis**
- **Operation**
- **Fuel gas totalizer**

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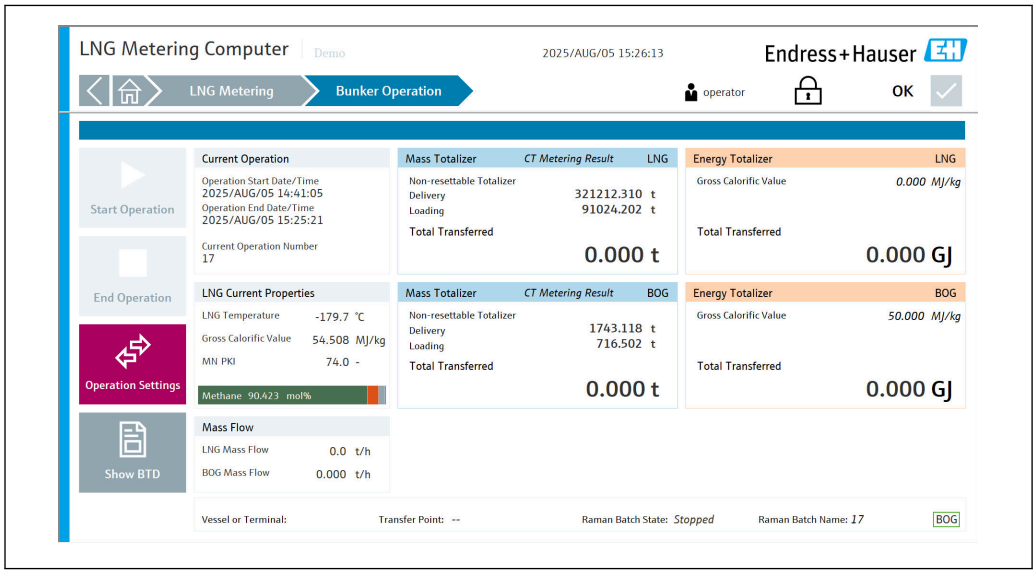
## 8.5.1 "Bunker Operation" screen

Bunker Operation is the main screen in the software where the operator can manage and perform measurements.

On the "LNG Metering" screen, tap **Bunker Operation**. The "Bunker Operation" screen opens.

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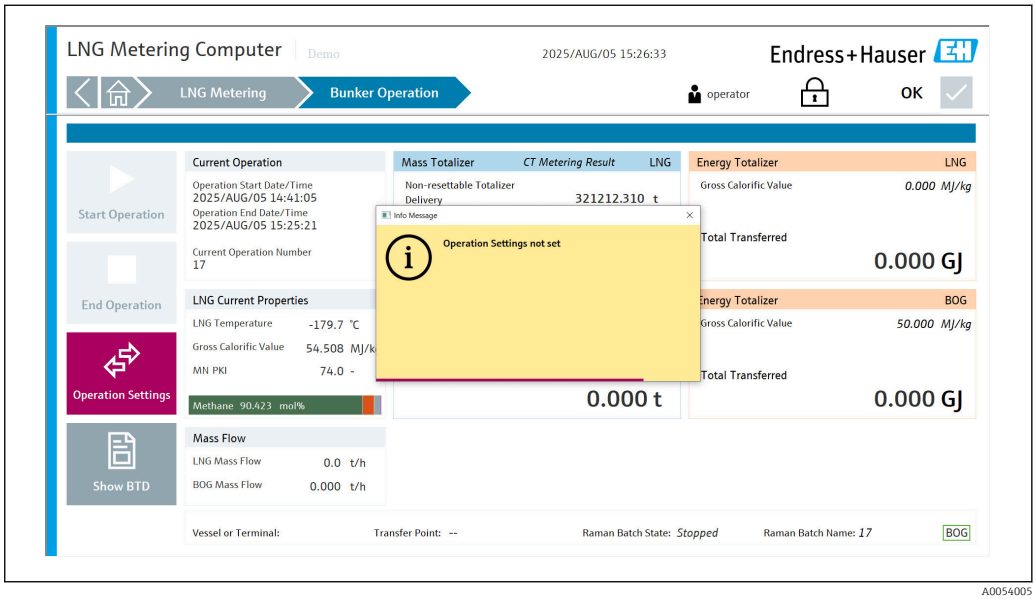
The buttons for starting/ending the operation are located on the left. The start/end time/date of the operation and the current operation number are displayed accordingly. The respective mass/energy counters in the LNG and BOG measurement are displayed on the right-hand side. Information about Raman batch status and Raman batch name is visible on the bottom right-hand side of the screen.

The measurement and totalizers for BOG/energy/MMBTU/methane number can be switched on and off if necessary. For further information → 38

In Operation Settings, the operator can configure the following parameters:
- Name of receiving vessel
- Transfer point
- Enable/disable BOG
- Gross calorific value of the BOG

The system has the following interlocks for starting the measurement process:
- Operating settings confirmed
- Flow must be zero
- No system error active

If not all start conditions are met, this is indicated to the operator.

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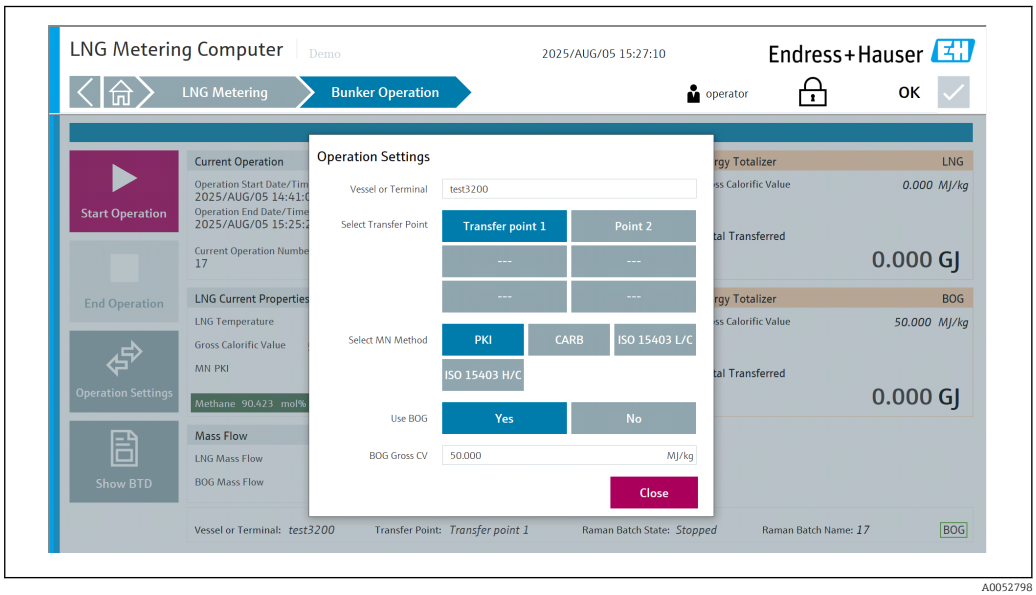
When all conditions are fulfilled, press "Start Metering". Measurement commences and the corresponding totalizer also starts to count.

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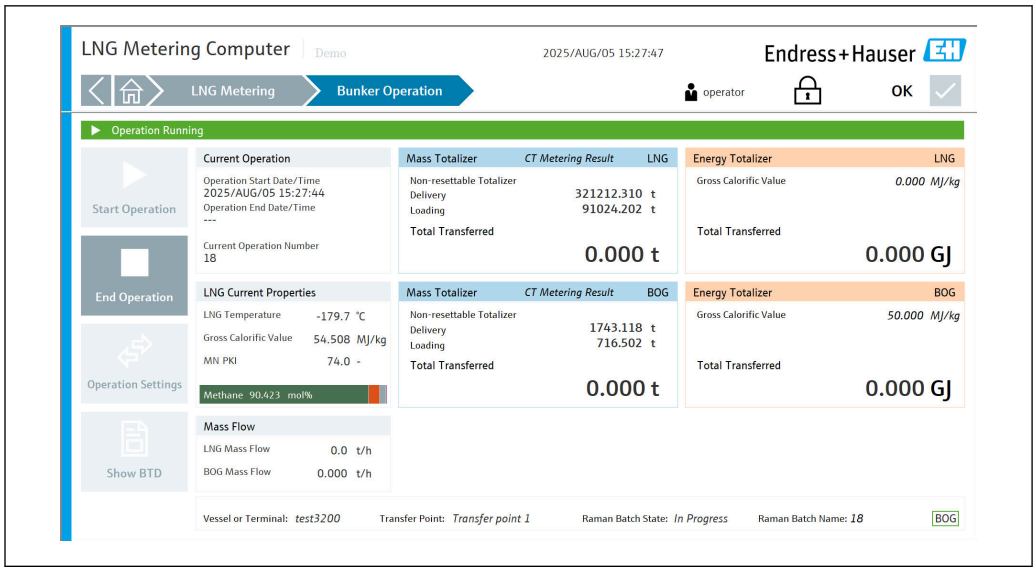
The measurement can only be finished if the measured flow is zero. This is also an interlock, designed here as a stop condition.

When the flow is zero and the measurement has finished, press "Stop Metering".

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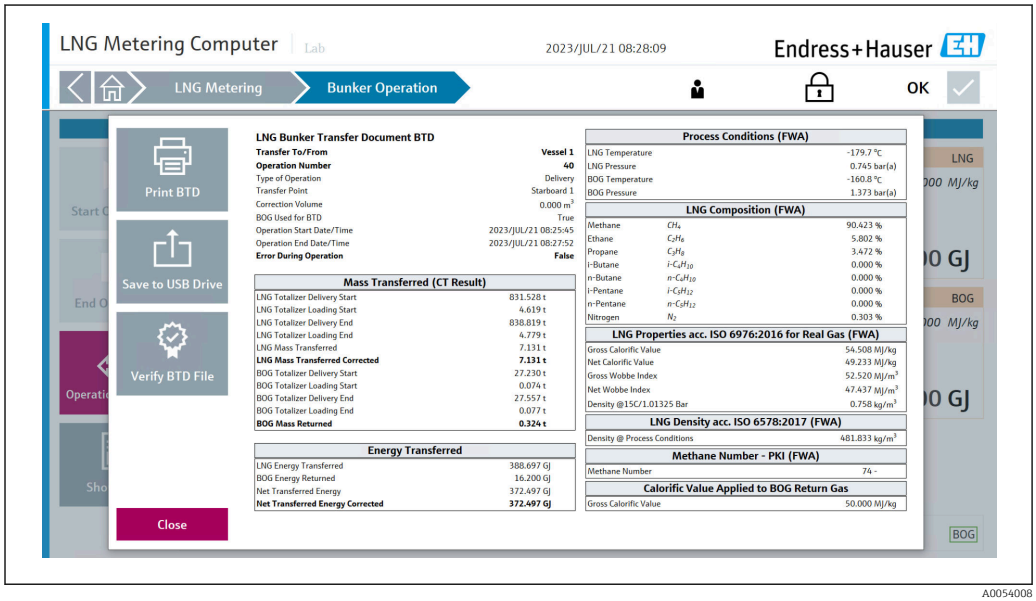
When the measurement has finished, the operator can display, save and print out a "Bunker Transfer Document (BTD)" by pressing "Show BTD".

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**LNG Bunker Transfer Document**

Endress+Hauser

**EXAMPLE BARGE**

| | |
|---|---|
| IMO Number | **9812345** |
| Local Registration ID | **QG5277U** |
| Operation Number | **43** |

**Operation Information**

| | |
|---|---|
| Transfer To/From | Demo Vessel |
| Operation Start Date/Time | 2023/SEP/06 11:52:53 |
| Operation End Date/Time | 2023/SEP/06 15:48:28 |
| Type of Operation | Delivery |
| Transfer Point | Starboard 2 |
| Correction Volume | 0.723 $m^3$ |
| Error During Operation | No |
| BOG Used for BTD | Yes |

**Mass Totalizer (CT Result)**

| | |
|---|---|
| LNG Totalizer Delivery Start | 3155.719 t |
| LNG Totalizer Loading Start | 5.772 t |
| LNG Totalizer Delivery End | 5115.572 t |
| LNG Totalizer Loading End | 5.772 t |
| BOG Totalizer Delivery Start | 140.789 t |
| BOG Totalizer Loading Start | 0.087 t |
| BOG Totalizer Delivery End | 238.588 t |
| BOG Totalizer Loading End | 0.087 t |

**Mass Transferred (CT Result)**

| | |
|---|---|
| LNG Mass Transferred | 1959.853 t |
| Correction Mass | 0.348 t |
| **LNG Mass Transf. Corr.** | **1959.505 t** |
| **BOG Mass Returned** | **97.799 t** |

**Energy Transferred**

| | |
|---|---|
| LNG Energy Transferred | 106827.667 GJ |
| Correction Energy | 18.989 GJ |
| **LNG Energy Transf. Corr.** | **106808.678 GJ** (101253.079 MMBTU) |
| **BOG Energy Returned** | **4889.950 GJ** (4634.778 MMBTU) |

**Net Results (LNG - BOG)**

| | |
|---|---|
| Net Transferred Mass | 1861.706 t |
| Net Transferred Energy | 101918.728 GJ (96600.303 MMBTU) |

**Process Conditions (FWA)**

| | |
|---|---|
| LNG Temperature | -179.7 °C |
| LNG Pressure | 0.744 bar(a) |
| BOG Temperature | -160.8 °C |
| BOG Pressure | 1.373 bar(a) |

**LNG Composition (FWA)**

| | |
|---|---|
| Methane | 90.423 % |
| Ethane | 5.802 % |
| Propane | 3.472 % |
| i-Butane | 0.000 % |
| n-Butane | 0.000 % |
| i-Pentane | 0.000 % |
| n-Pentane | 0.000 % |
| Nitrogen | 0.303 % |

**LNG Properties acc. ISO 6976:2016 for Real Gas (FWA)**

| | |
|---|---|
| Gross Calorific Value | 54.508 MJ/kg |
| Net Calorific Value | 49.233 MJ/kg |
| Gross Wobbe Index | 52.520 $MJ/m^3$ |
| Net Wobbe Index | 47.437 $MJ/m^3$ |
| Density @15C/1.01325 Bar | 0.758 $kg/m^3$ |

**LNG Density acc. ISO 6578:2017 (FWA)**

| | |
|---|---|
| Density @ Process Conditions | 481.846 $kg/m^3$ |

**Methane Number - PKI**

| | |
|---|---|
| Methane Number | 74 - |

**Calorific Value Applied to BOG Return Gas**

| | |
|---|---|
| Gross Calorific Value | 50.000 MJ/kg |

Cargo Officer Approval
Date:
Signature:

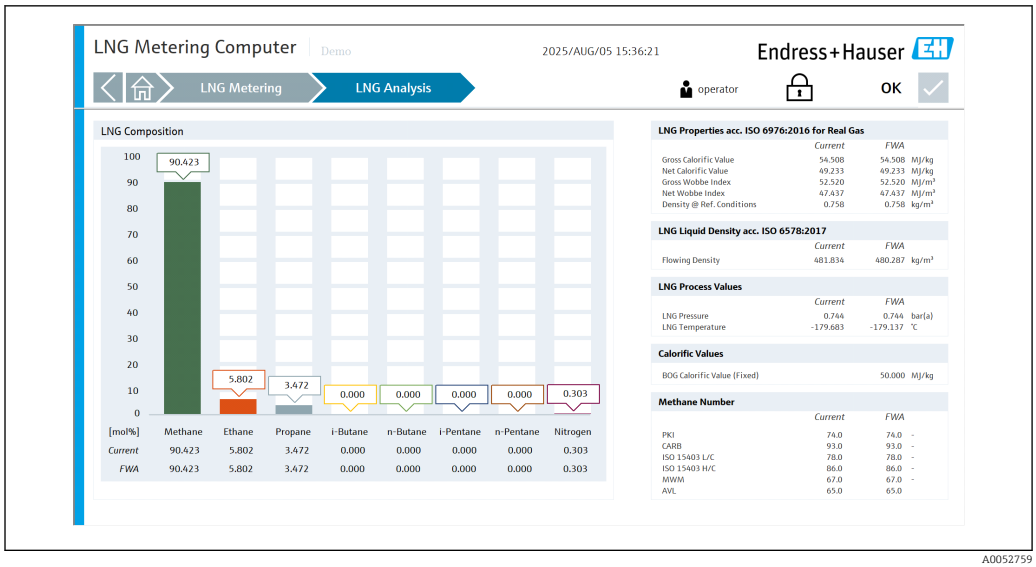
Chief Engineer Approval
Date:
Signature:

1 / 1

A0054009

## 8.5.2 "LNG Analysis" screen

On the "LNG Metering" screen, tap **LNG Analysis**. The "LNG Analysis" screen opens. The gas composition and further parameters for calculating the energy are displayed here.

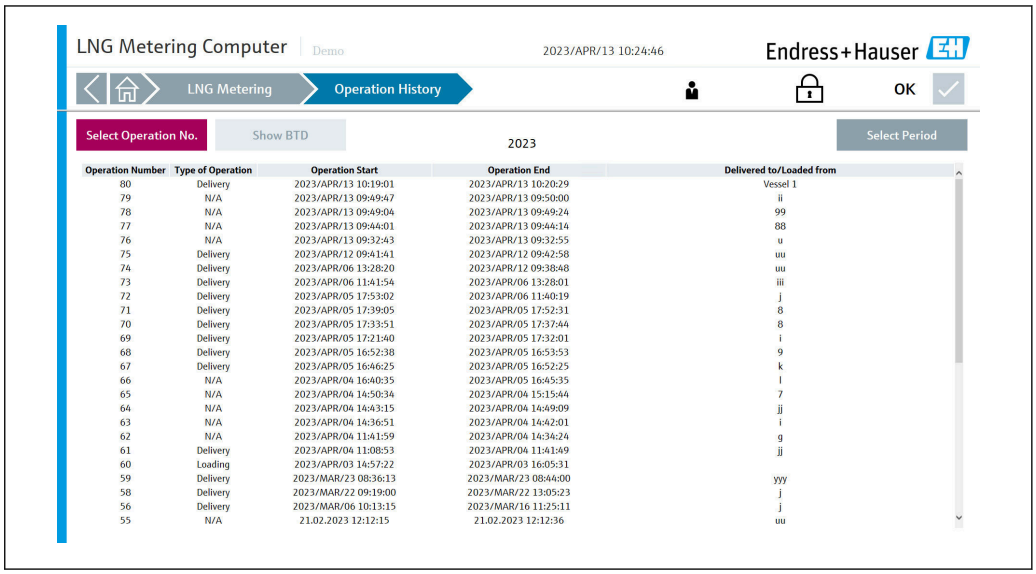

LNG Metering Computer
Demo
2025/AUG/05 15:36:21
Endress+Hauser
LNG Metering
LNG Analysis
operator
OK
LNG Composition
100
90
80
70
60
50
40
30
20
10
0
90.423
5.802
3.472
0.000
0.000
0.000
0.000
0.303
[mol%] Methane Ethane Propane i-Butane n-Butane i-Pentane n-Pentane Nitrogen
Current 90.423 5.802 3.472 0.000 0.000 0.000 0.000 0.303
FWA 90.423 5.802 3.472 0.000 0.000 0.000 0.000 0.303
LNG Properties acc. ISO 6976:2016 for Real Gas
Current FWA
Gross Calorific Value 54.508 54.508 MJ/kg
Net Calorific Value 49.233 49.233 MJ/kg
Gross Wobbe Index 52.520 52.520 MJ/m³
Net Wobbe Index 47.437 47.437 MJ/m³
Density @ Ref. Conditions 0.758 0.758 kg/m³
LNG Liquid Density acc. ISO 6578:2017
Current FWA
Flowing Density 481.834 480.287 kg/m³
LNG Process Values
Current FWA
LNG Pressure 0.744 0.744 bar(a)
LNG Temperature -179.683 -179.137 °C
Calorific Values
BOG Calorific Value (Fixed) 50.000 MJ/kg
Methane Number
Current FWA
PKI 74.0 74.0 -
CARB 93.0 93.0 -
ISO 15403 L/C 78.0 78.0 -
ISO 15403 H/C 86.0 86.0 -
MWM 67.0 67.0 -
AVL 65.0 65.0

A0052759

### 8.5.3 "Operation History" screen

On the "LNG Metering" screen, tap **Operation History**. The "Operation History" screen opens. From here, the operator can retrieve, display and export reports on previous operations.

The individual report files are saved in .txt format and can be opened in the File Explorer and exported to an external drive in accordance with the instructions.

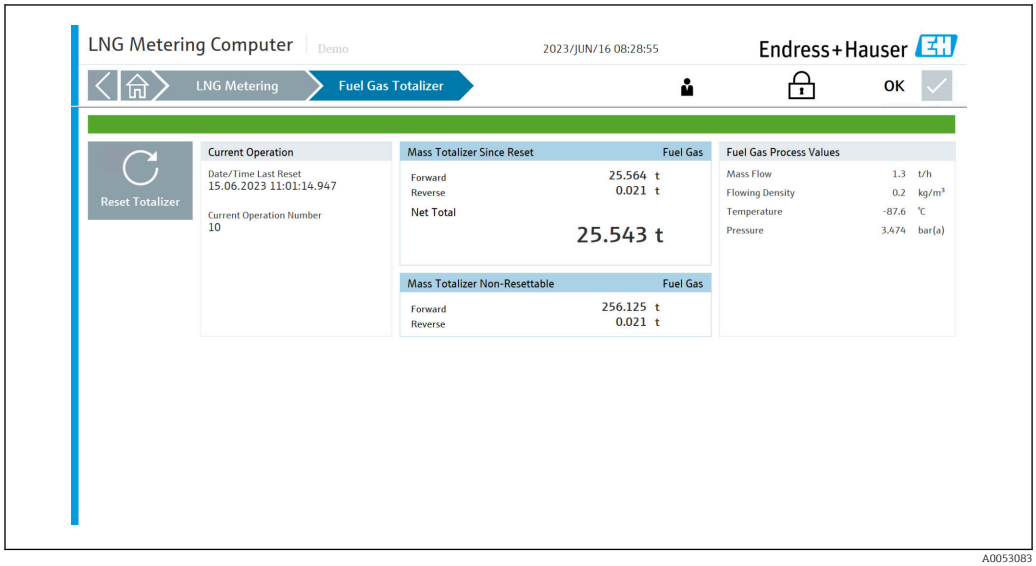



A0052760

### 8.5.4 "Fuel Gas Totalizer" screen

On the "LNG Metering" screen, tap **Fuel Gas Totalizer**. The "Fuel Gas Totalizer" screen opens. From here, the operator can retrieve, display and reset the totalizers for the fuel gas measurement.

Only available if a flowmeter is installed for fuel gas.

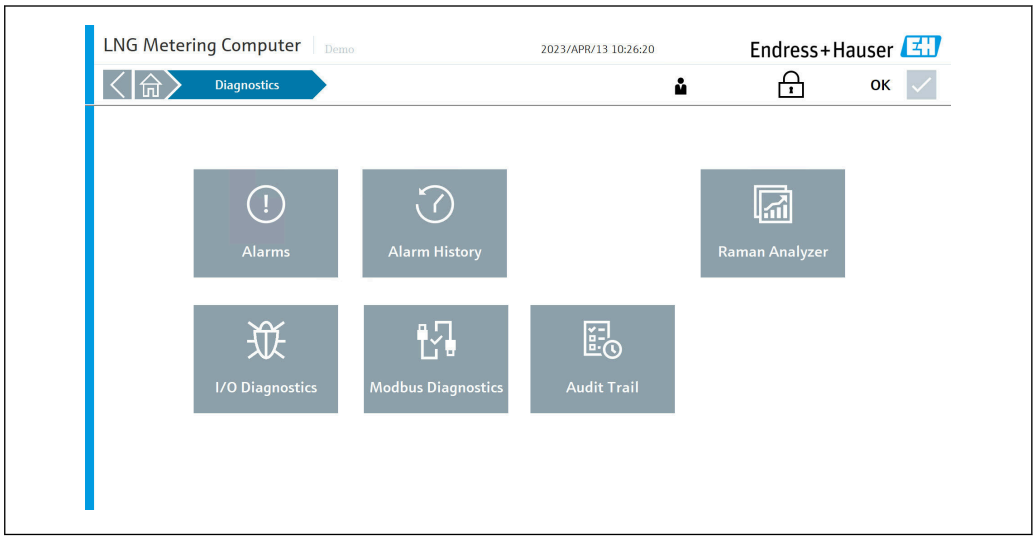



A0053083

## 8.6 "Diagnostics" screen

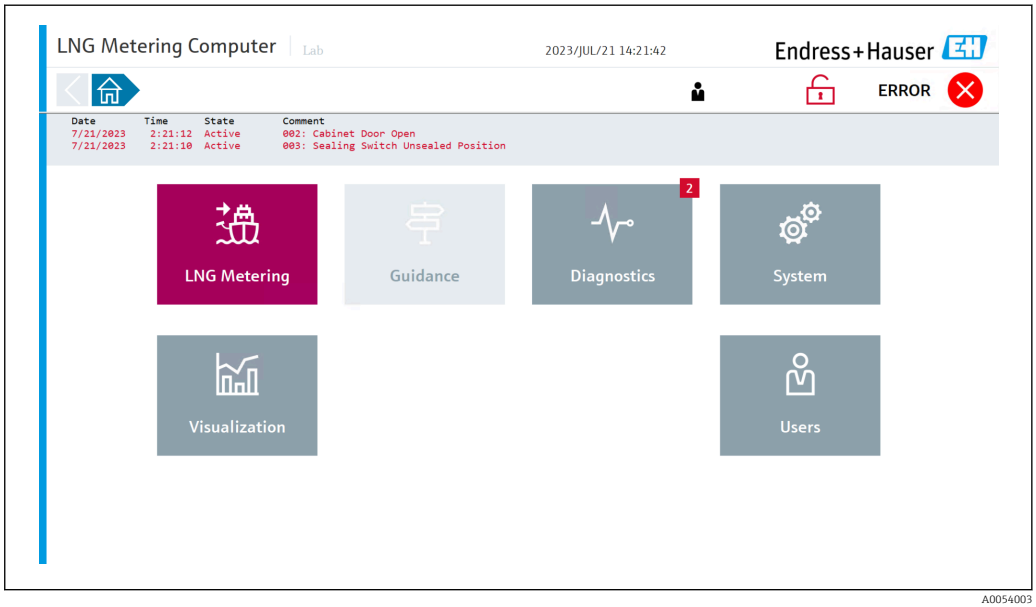
On the "Home" screen, tap **Diagnostics**. The "Diagnostics" screen opens.

From here, the operator can navigate to the 6 following subsections:
- Alarms
- Alarm History
- Raman Analyzer
- I/O Diagnostics
- Modbus Diagnostics
- Audit Trail




A0052761

When alarms occur, the number of alarms in the "Diagnostics" area and in the "Alarms" sub-area are displayed in red. The system status changes to "Warning" or "Error".

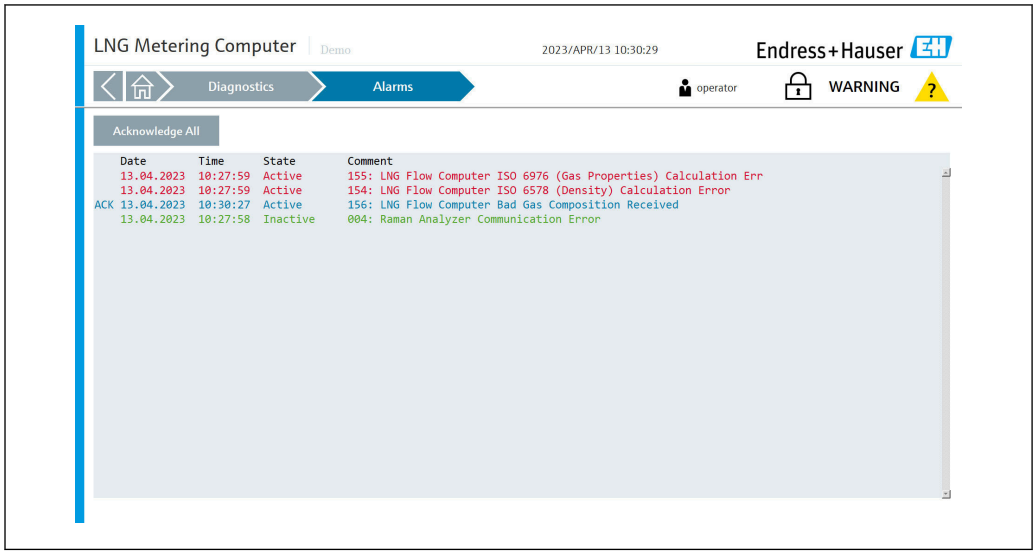



A0054003

### 8.6.1 "Alarms" screen

On the "Diagnostics" screen, tap **Alarms**. The "Alarms" screen opens.

All active alarms are displayed as a list. Tap **Confirm All** to switch the status of the alarms from "Active" to "Inactive" and the system status from "Warning" to "OK". This is only possible if alarms are no longer active.

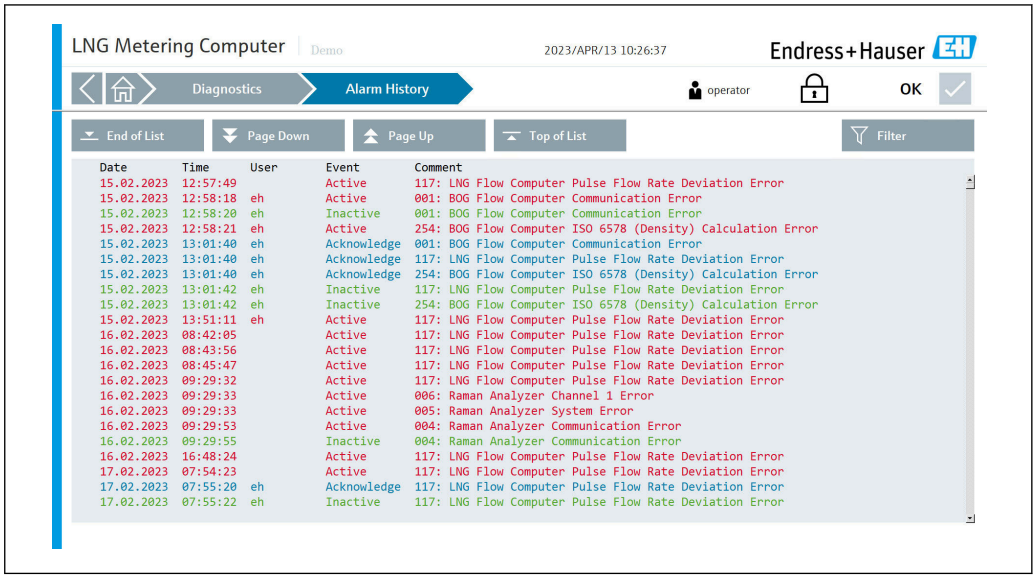



A0052762

## 8.6.2 "Alarm History" screen

On the "Diagnostics" screen, tap **Alarm History**. The "Alarm History" screen opens.

Past alarms of a chosen state are displayed as a list and can be filtered to the operator's needs.

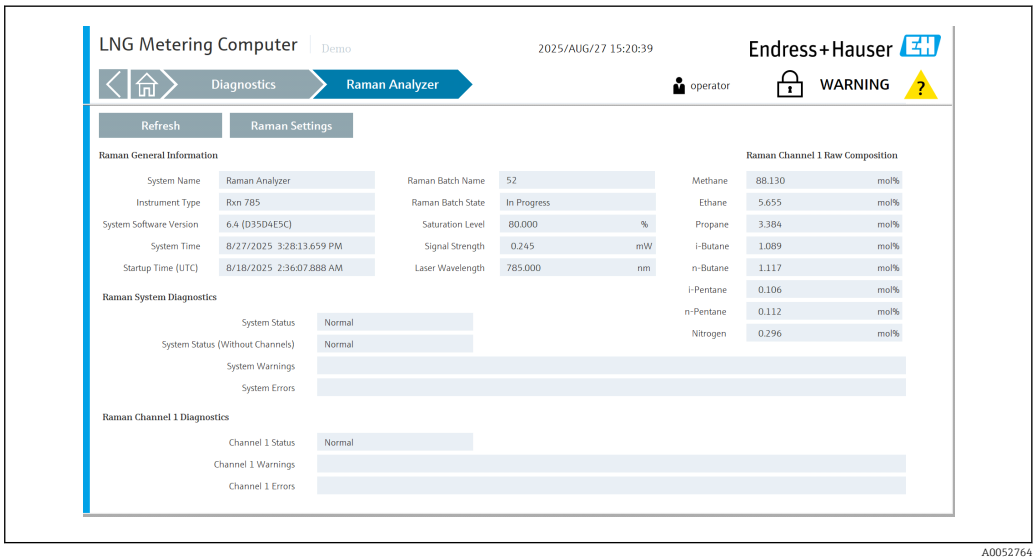



A0052763

## 8.6.3 "Raman Analyzer" screen

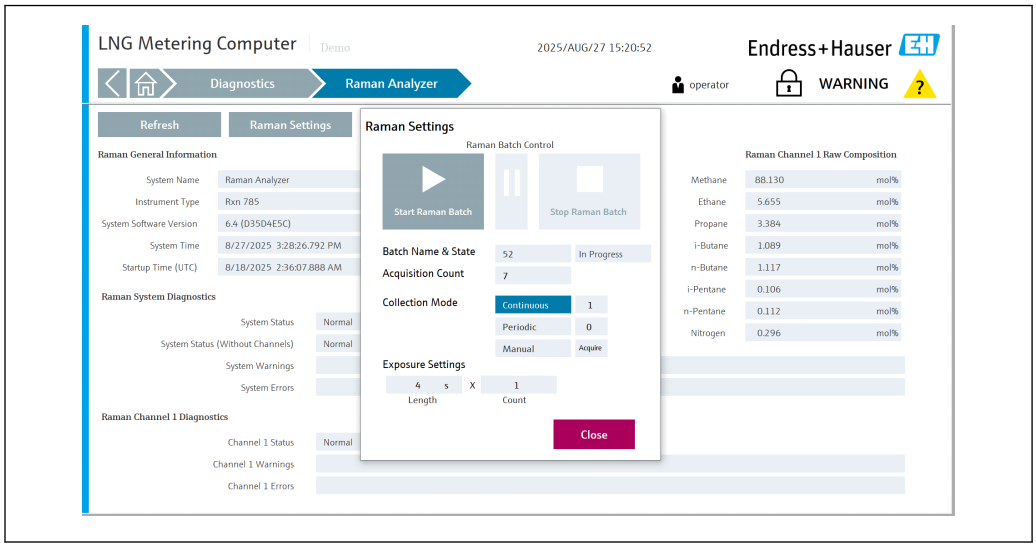
On the "Diagnostics" screen, tap **Raman Analyzer**. The "Raman Analyzer" screen opens.

The diagnostics information for the Raman analyzer are displayed here.




A0052764

### Setting the Raman

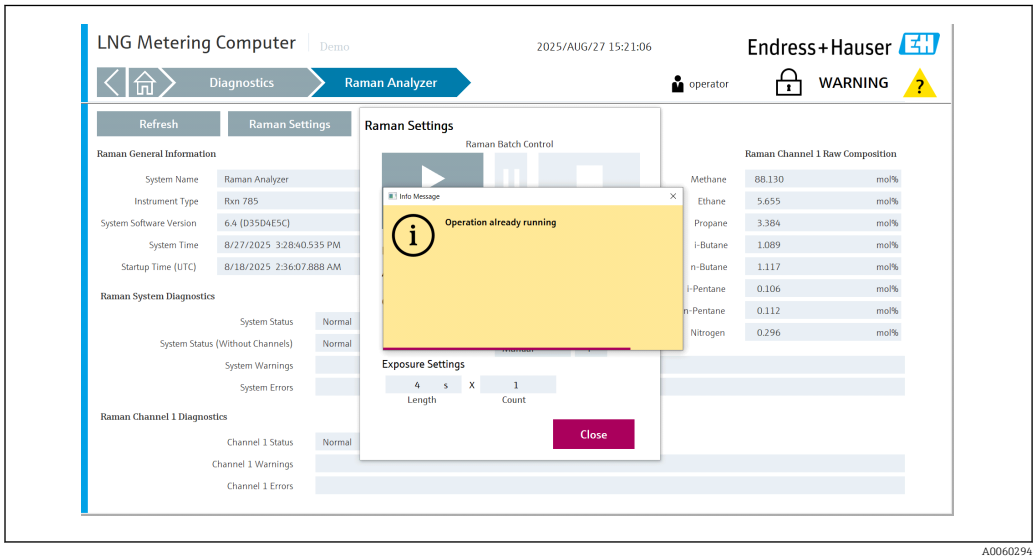



A0060293

The Raman Settings window opens when the Raman Setting field is clicked on in the Raman Analyzer screen.

The Raman settings window allows the Raman batch to be manually set if Bunker Operation is not active.

This window also displays information about the current Raman batch such as: Acquisition Count, Collection Mode, and Exposure Settings.

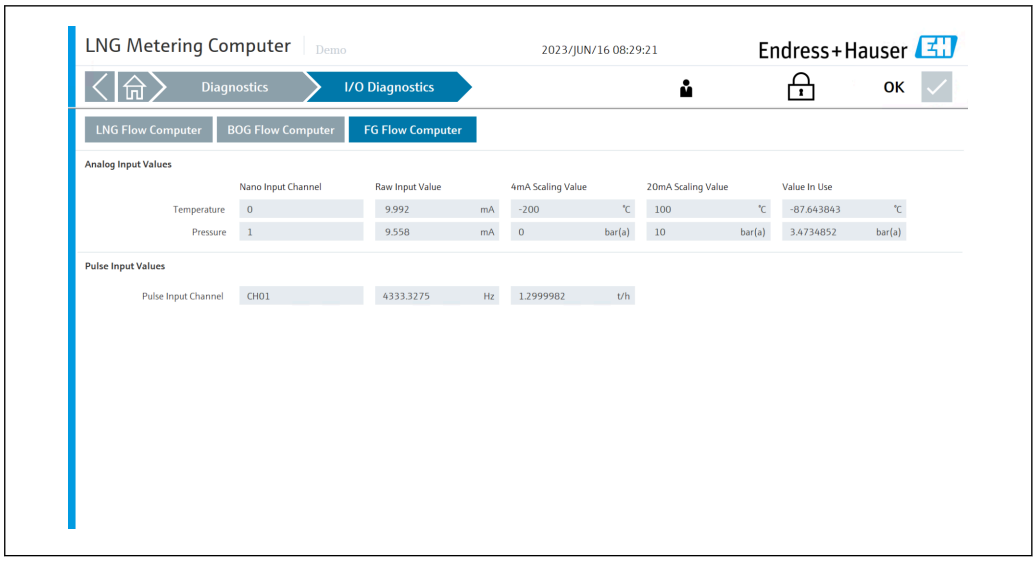



A0060294

## 8.6.4 "I/O Diagnostics" screen

On the "Diagnostics" screen, tap **I/O Diagnostics**. The "I/O Diagnostics" screen opens.

The "I/O Diagnostics" screen shows the process parameters transmitted by the relevant field device.

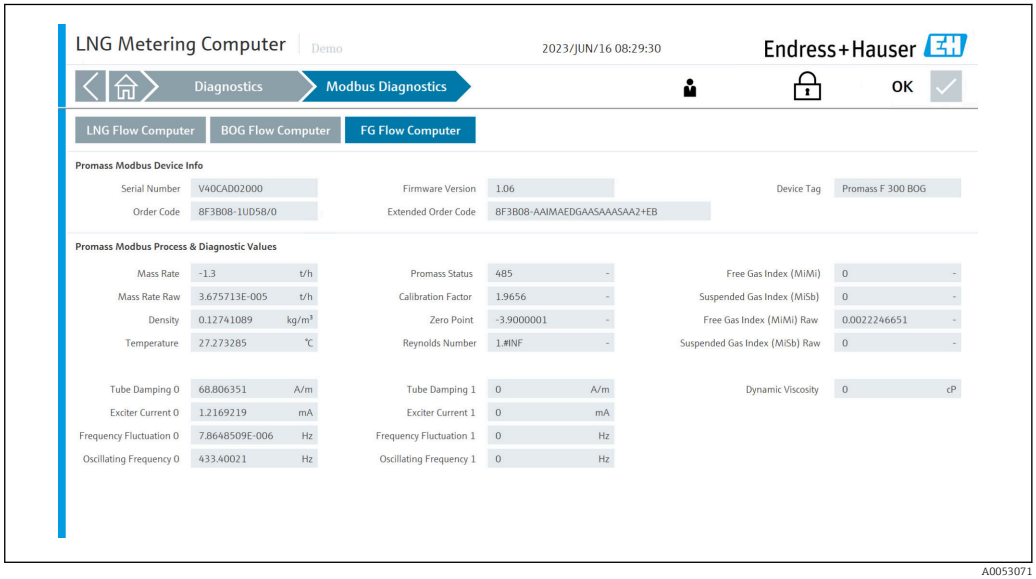



A0053070

## 8.6.5 "Modbus Diagnostics" screen

On the "Diagnostics" screen, tap **Modbus Diagnostics**. The "Modbus Diagnostics" screen opens.

The "Modbus Diagnostics" screen shows the process parameters transmitted by the relevant LNG/BOG/fuel gas flow meter via Modbus once Modbus communication has been successfully established. These advanced diagnostic parameters make it possible to assess the prevailing process conditions.

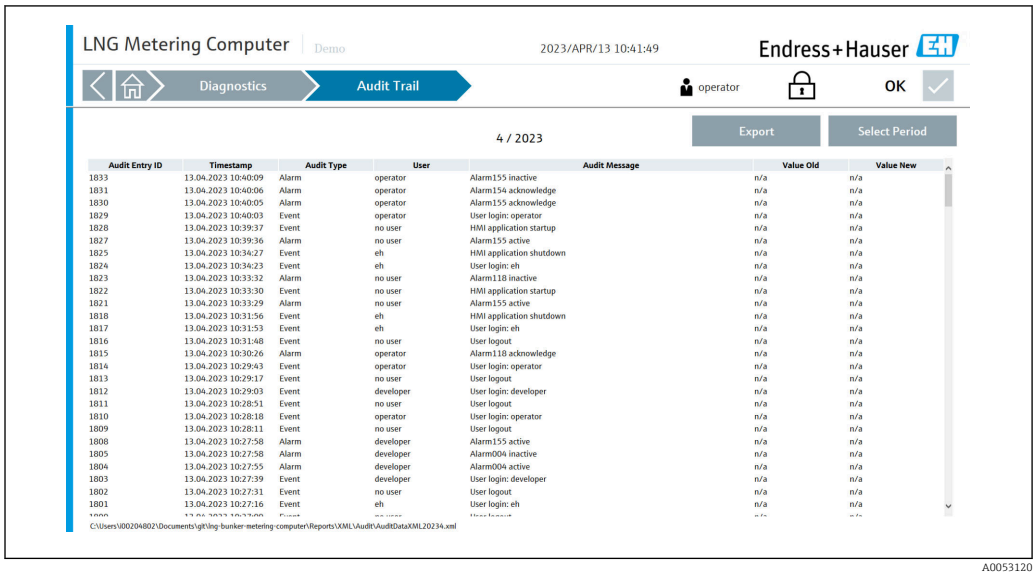



A0053071

### 8.6.6 "Audit Trail" screen

On the "Diagnostics" screen, tap **Audit Trail**. The "Audit Trail" screen opens.

The "Audit Trail" screen shows all the process-related changes made in the system.



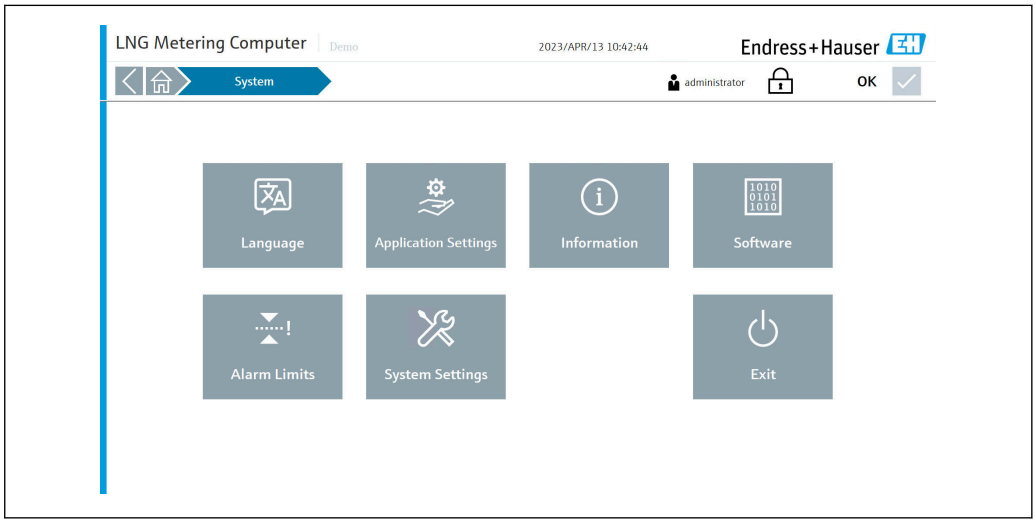

A0053120

## 8.7 "System" screen

On the "Home" screen, tap **System**. The "System" screen opens.

From here, the operator can navigate to the following seven subsections:
- Language
- Settings
- Information
- Software
- Alarm limit values
- System settings
- Exit

All HMI settings are configured in this section.

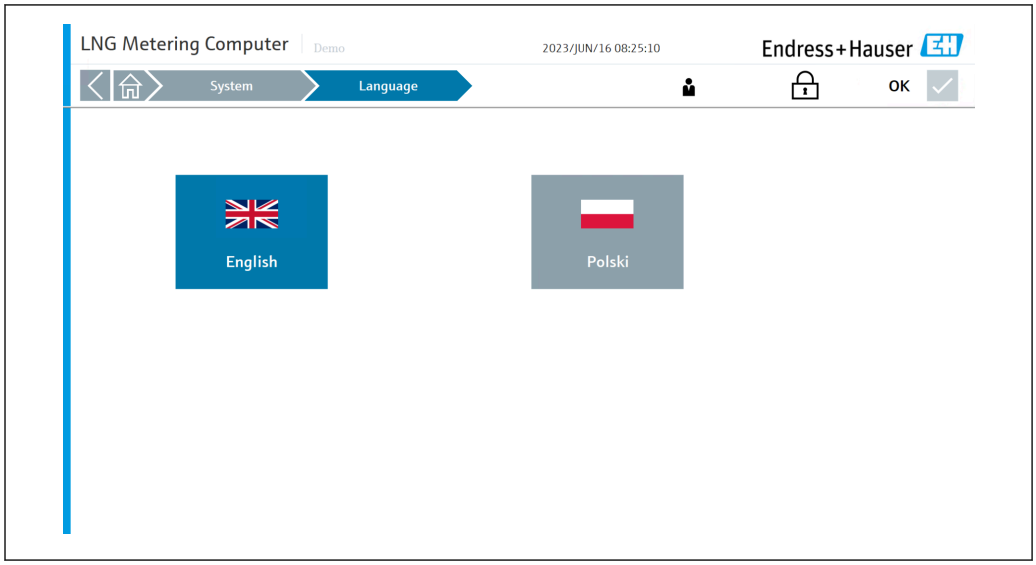



A0052768

### 8.7.1 "Language" screen

On the "System" screen, tap **Language**. The "Language" screen opens.

Here, the operator can choose between English and Polish as the menu language. The default system language at startup is English.




### 8.7.2 "Settings" screen

On the "System" screen, tap **Settings**. The "Settings" screen opens.

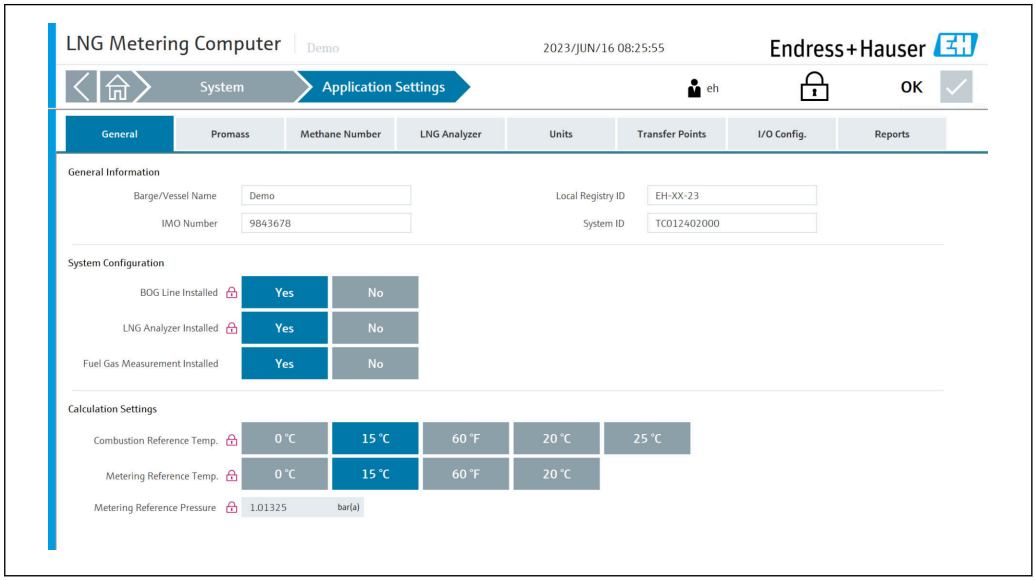
From here, the operator can navigate to the following eight subsections:
- General
- Promass
- Methane Number
- LNG Analyzer
- Units
- Transfer point
- I/O configuration
- Reports

During the commissioning phase, before the control system can be put into operation, all settings must first be configured in accordance with the actual application .

### "General" tab

Here, the operator define the "Vessel Name", which is displayed in the status bar on every page, as well as the "IMO Number", the "Local Registry ID" and the "System ID".

In addition, this tab also enables you to define the activation and deactivation of the BOG measuring path, the LNG analyzer, the fuel gas measurement and the calculation settings (including combustion temperature and measurement reference temperature).




A0053074

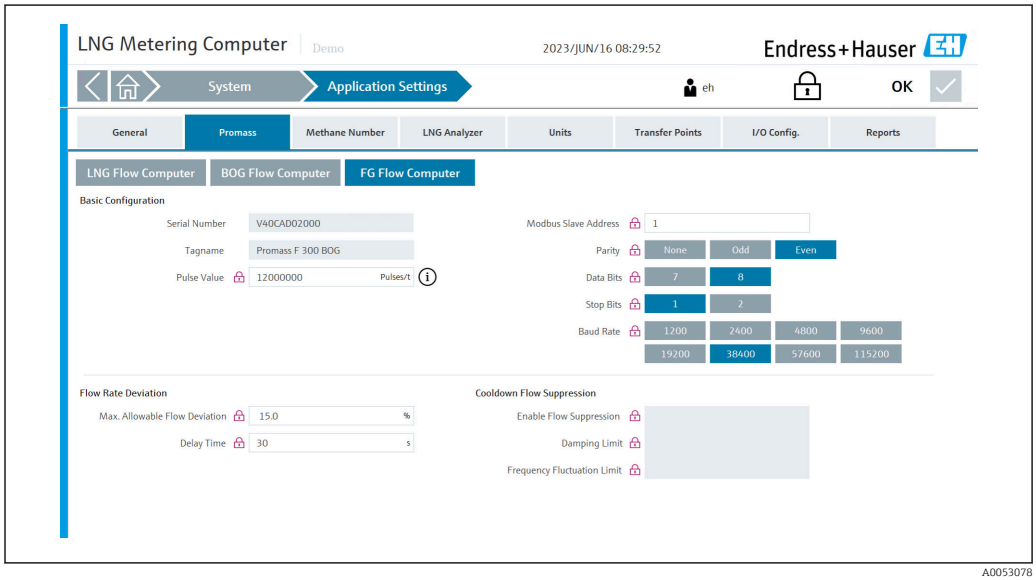
### "Promass" tab

Here, the operator can configure the following parameters for the LNG/BOG/fuel gas flowmeter:

- Serial Number (not configurable, only shown)
- Tag Name (not configurable, only shown)
- Pulse Value (the pulse value must be entered as a mass pulse per tonne)
- Slave Address
- Parity
- Data Bits
- Stop Bits
- Baud Rate

The parameter settings pulse value, slave address, parity, data bits, stop bits and baud rate must match the settings in the flowmeter.

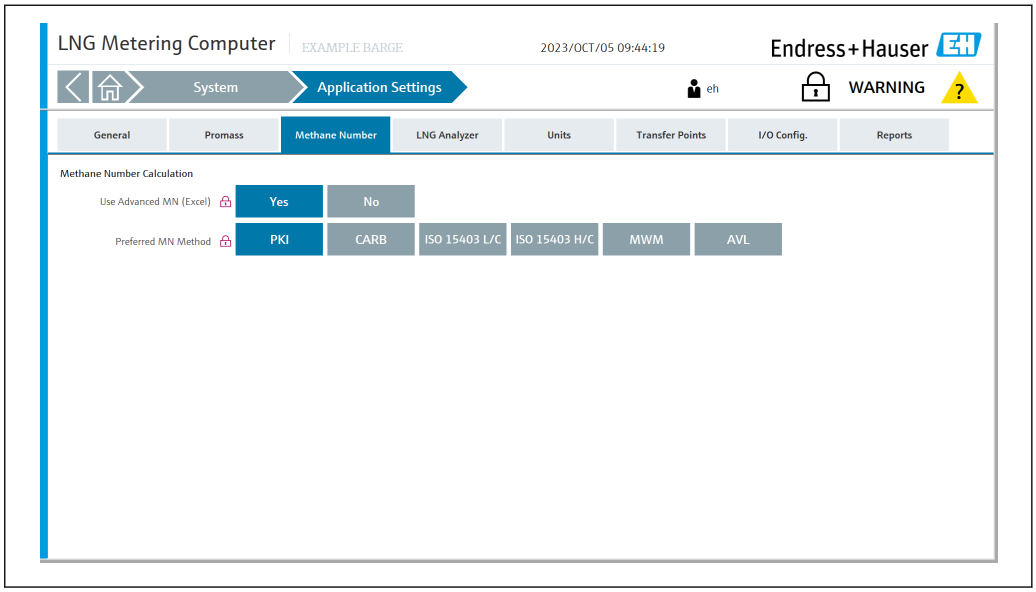
The settings for "Flow rate deviation" and "Cooldown flow suppression" may only be changed in consultation with Endress+Hauser.




A0053078

### "Methane Number" tab

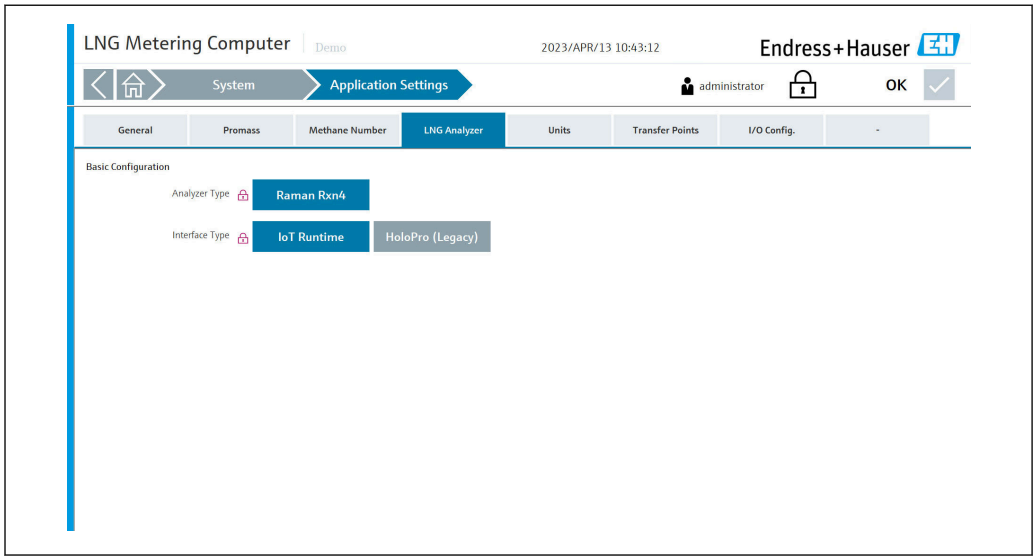
Here, the operator can select the use of the advanced methane number and the desired methane number calculation method.




A0054006

### "LNG Analyzer" tab

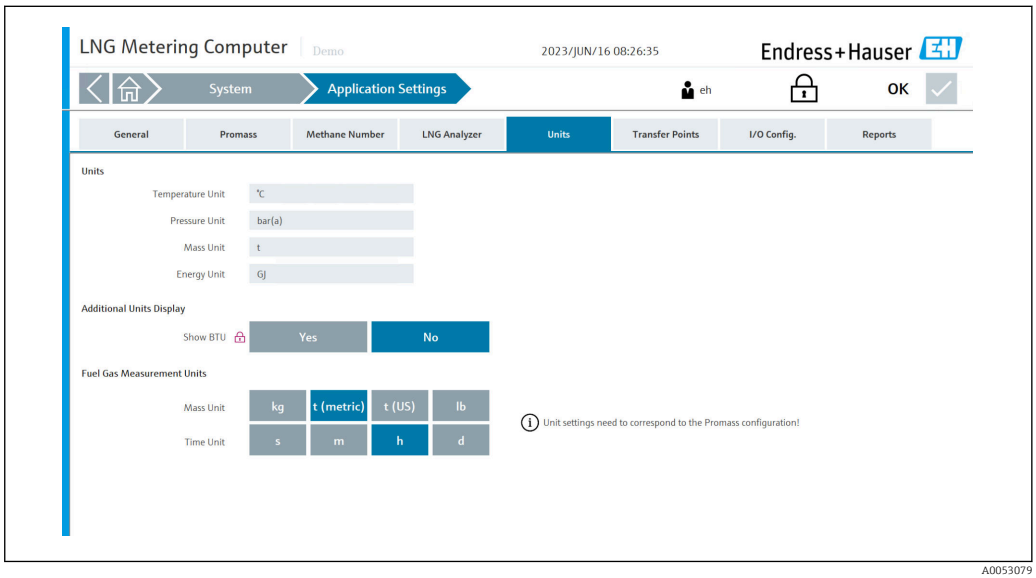
Here, the operator can select the LNG analyzer type.




A0052771

### "Units" tab

Here, the operator can configure the units for the following process variables:
- Temperature (not configurable, only shown)
- Pressure (not configurable, only shown)
- Mass (not configurable, only shown)
- Energy (not configurable, only shown)
- Enable/disable BTU
- Fuel Gas Measurement Units (mass and time)



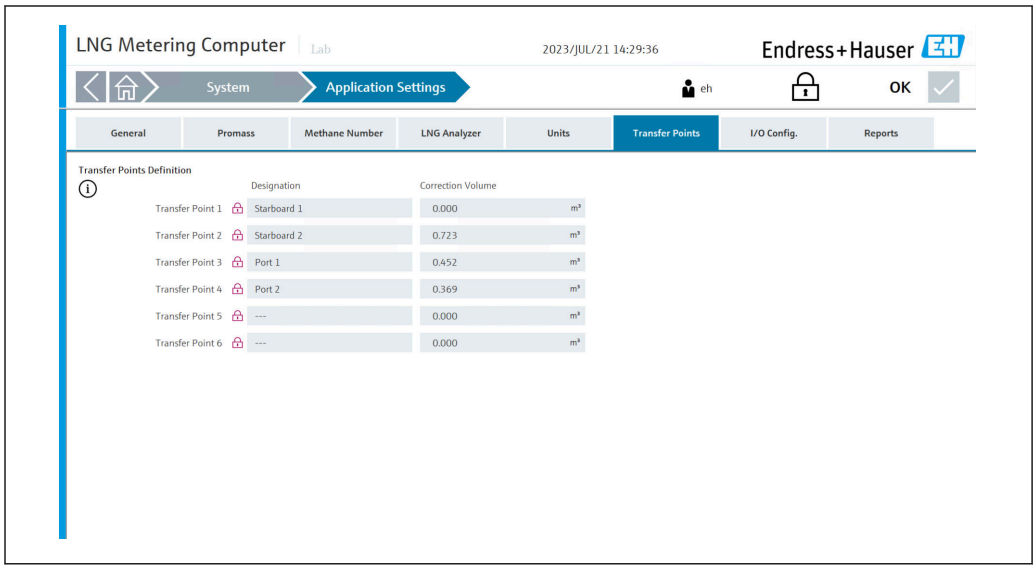

A0053079

### "Transfer Points" tab

Here, the administrator can predefine up to a maximum of six different transfer points together with the corresponding correction volume.

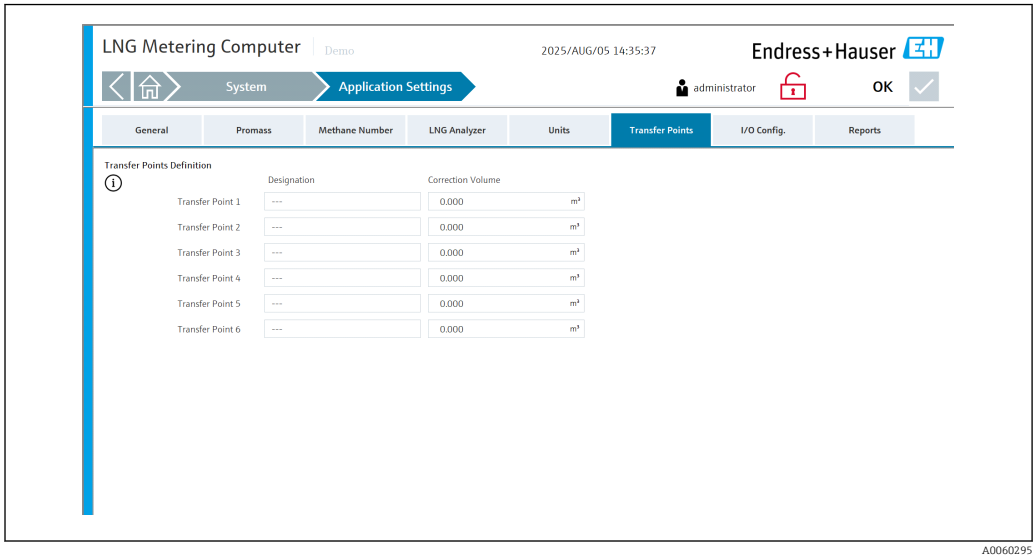
The correction volume is used when a certain volume is measured but is not supplied at the end of an operation via the transfer point.

For delivery operations, the correction volume at the end of an operation is subtracted from the final result. For loading operations, the correction volume at the end of an operation is added to the final result.



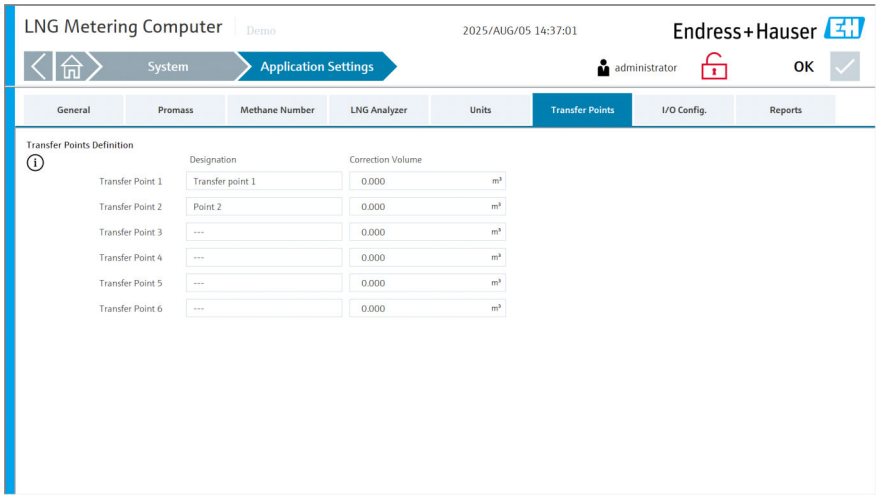

A0052775

To set the designation and values of the Correction Volume, set the locking switch from **Sealed** to **Unsealed** → 16

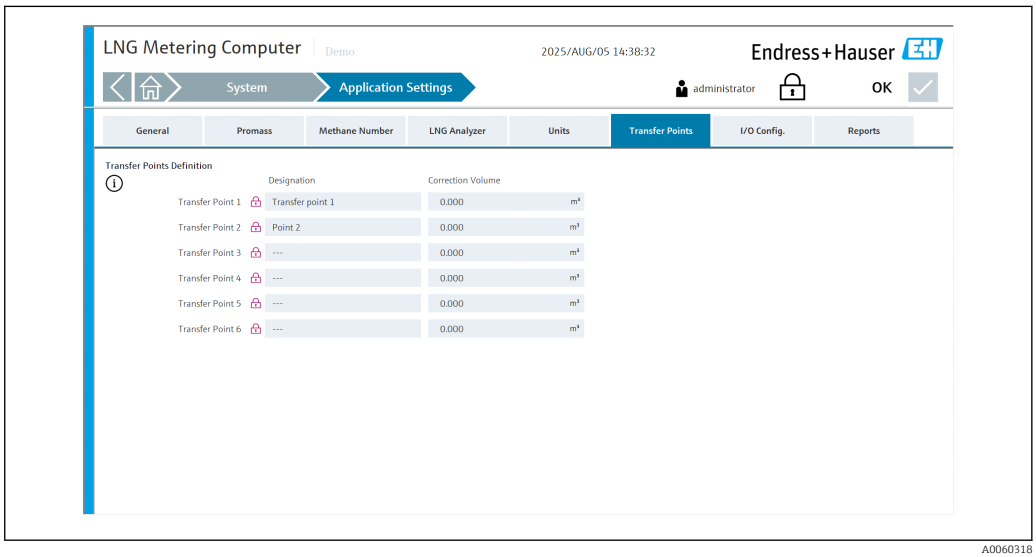



A0060295

Enter the required details.




After entering the information for the transfer points, reset the interlock switch to **Sealed**.

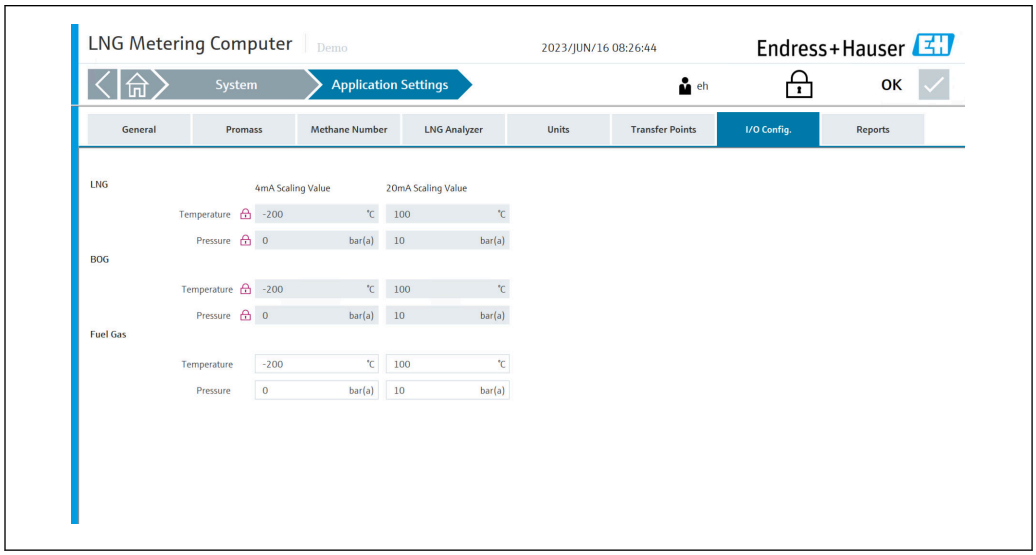



A0060318

### "I/O Config." tab

Here, the operator can configure the following parameters for the field devices:
- LNG Temperature
- LNG Pressure
- BOG Temperature
- BOG Pressure
- Fuel Gas Temperature
- Fuel Gas Pressure

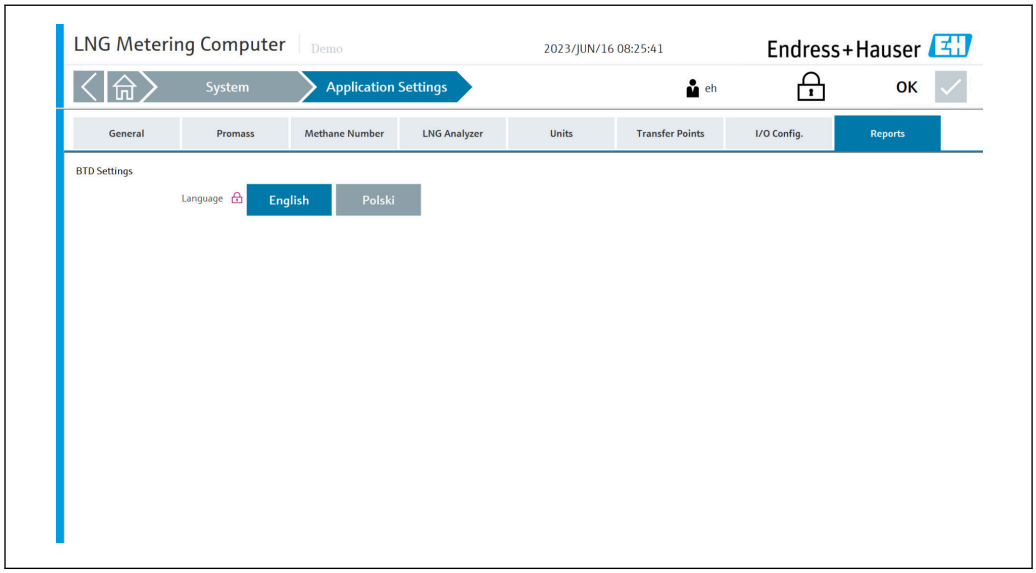
These parameter settings must match the settings of the field devices.




A0053080

### "Reports" tab

Here, the operator can select various language settings.

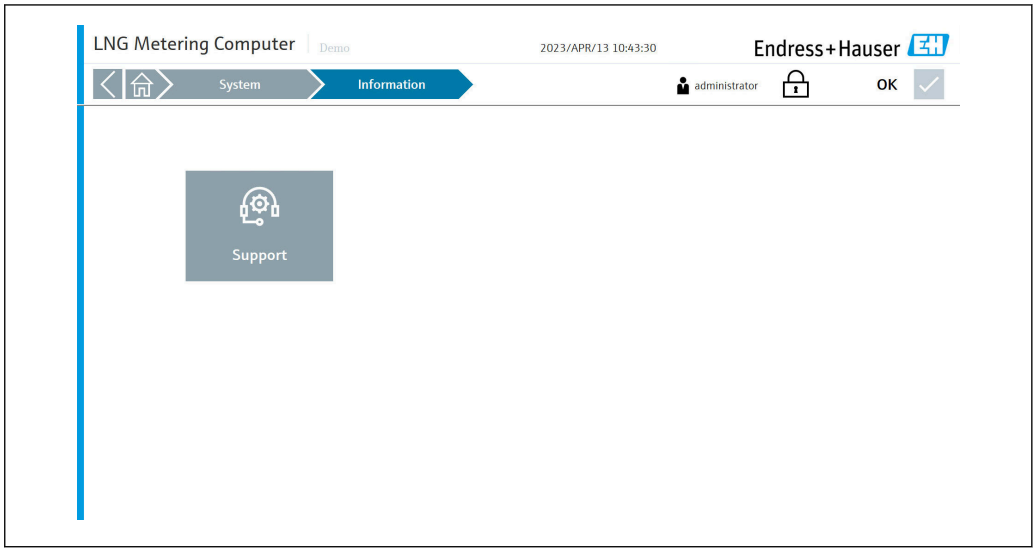



A0053081

### 8.7.3 "Information" screen

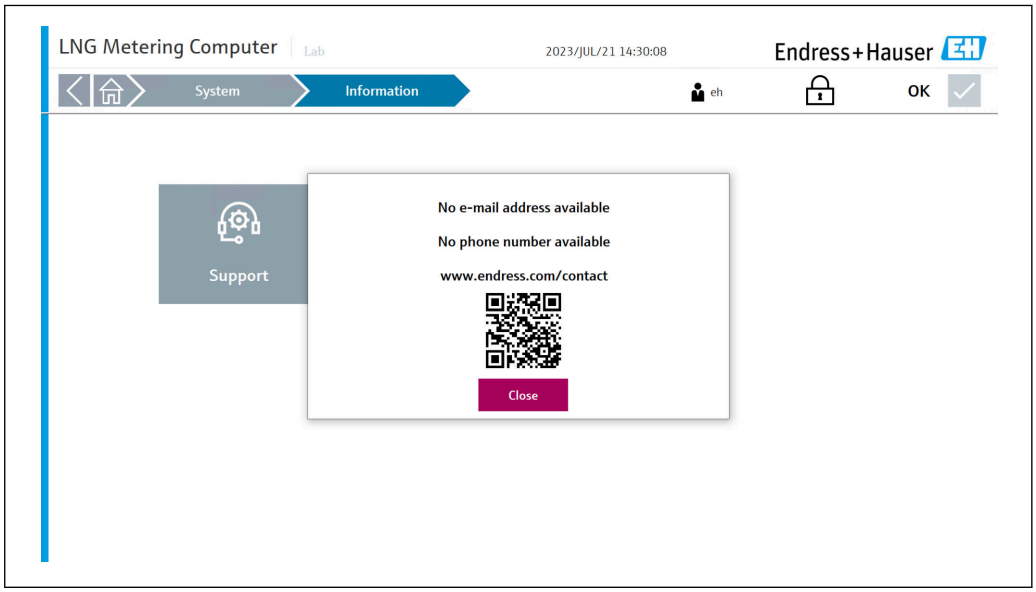
On the "System" screen, tap **Information**. The "Information" screen opens.

This is where the manufacturer's contact details are provided, which the operator can use if assistance is required.




A0052776

Scan the QR code to get details of the contact information.

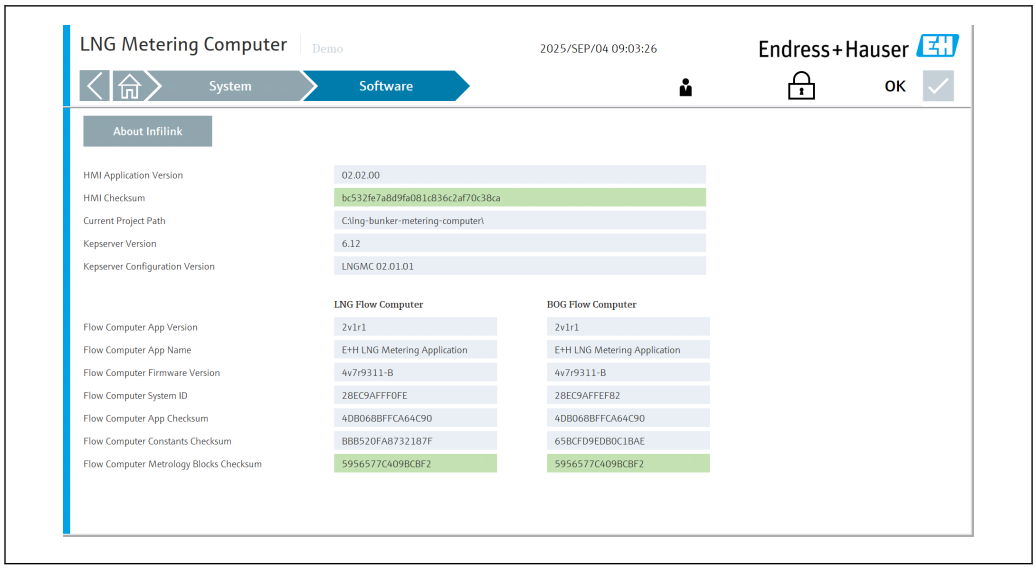



A0054011

### 8.7.4 "Software" screen

On the "System" screen, tap **Software**. The "Software" screen opens.

This section displays important information such as the HMI application version, the flow computer app version, the firmware version and various checksums.

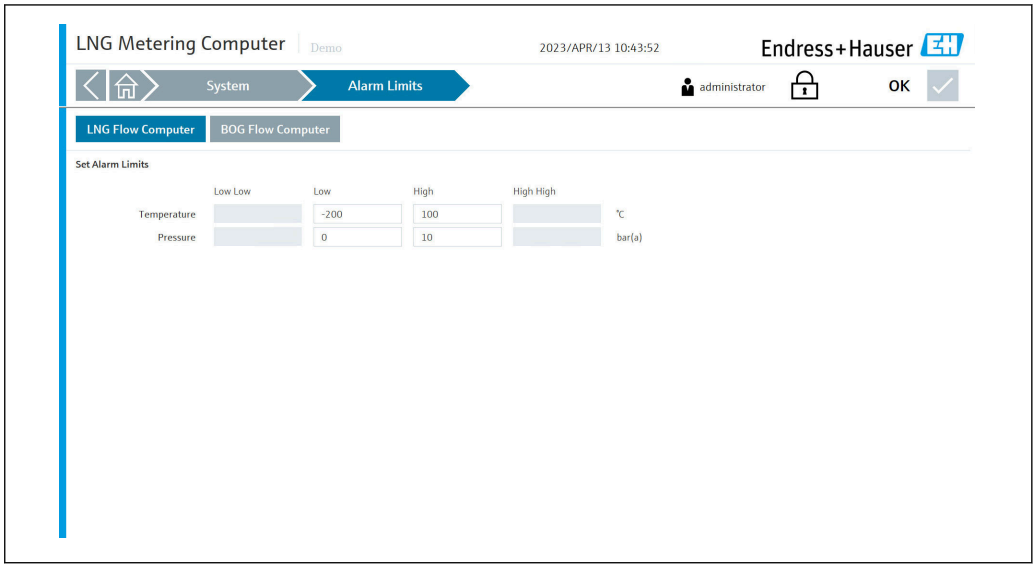

LNG Metering Computer
Demo
2025/SEP/04 09:03:26
Endress+Hauser
System
Software
OK
About Infilink
HMI Application Version
02.02.00
HMI Checksum
bc532fe7a8d9fa081c836c2af70c38ca
Current Project Path
C:\lng-bunker-metering-computer\
Kepserver Version
6.12
Kepserver Configuration Version
LNGMC 02.01.01
LNG Flow Computer
BOG Flow Computer
Flow Computer App Version
2v1r1
2v1r1
Flow Computer App Name
E+H LNG Metering Application
E+H LNG Metering Application
Flow Computer Firmware Version
4v7r9311-B
4v7r9311-B
Flow Computer System ID
28EC9AFFF0FE
28EC9AFFEF82
Flow Computer App Checksum
4DB068BFFCA64C90
4DB068BFFCA64C90
Flow Computer Constants Checksum
BBB520FA8732187F
65BCFD9EDB0C1BAE
Flow Computer Metrology Blocks Checksum
5956577C409BCBF2
5956577C409BCBF2

A0053082

### 8.7.5 "Alarm Limits" screen

On the "System" screen, tap **Alarm Limits**. The "Alarm Limits" screen opens.

Here, the operator can configure the required pressure limits and temperature limits for the LNG/BOG measuring path.




A0052777

### 8.7.6 "System Settings" screen

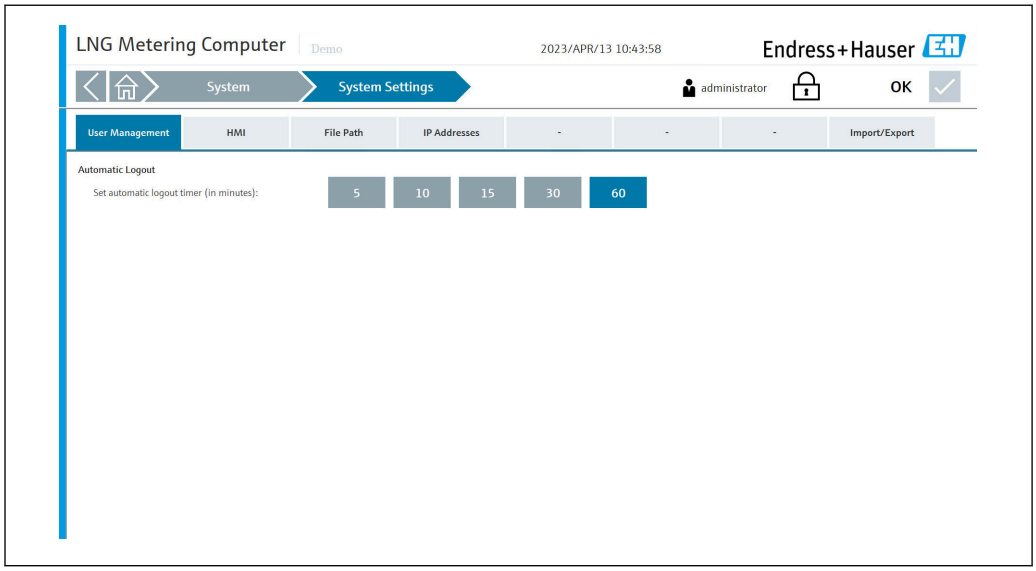
On the "System" screen, tap **System Settings**. The "System Settings" screen opens.

From here, the operator can navigate to the 5 following sections:
- User management
- HMI
- File Path
- IP Addresses
- Import/Export

During the commissioning phase, before the system can be put into operation, all settings must first be configured in accordance with the actual application in the field.

### "User Management" tab

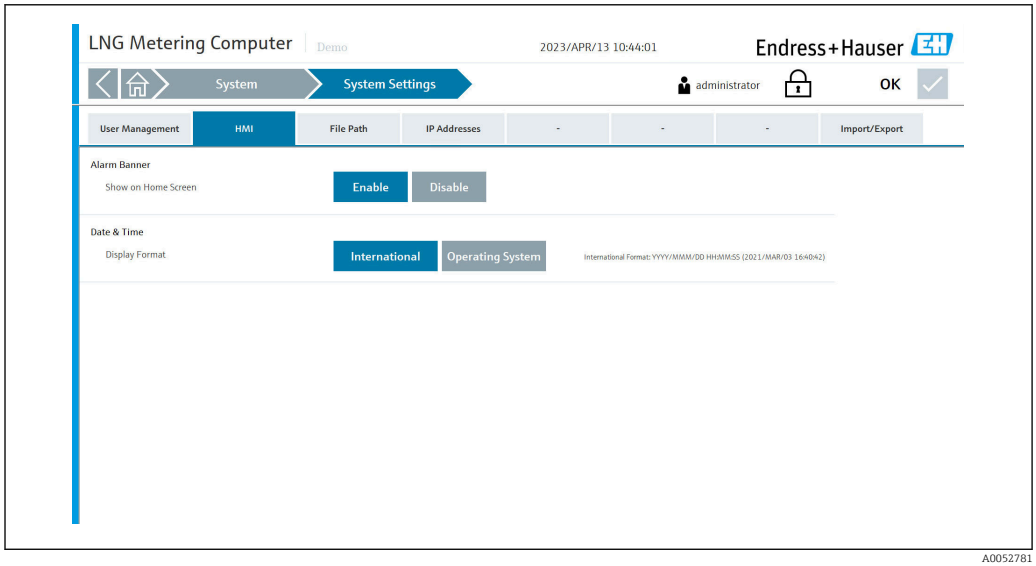
Here, the operator can set the automatic logout timer (in minutes).




A0052779

### "HMI" tab

Here, the operator can configure whether the alarm banner should be shown on the home screen and can select the display format for the system date and time.

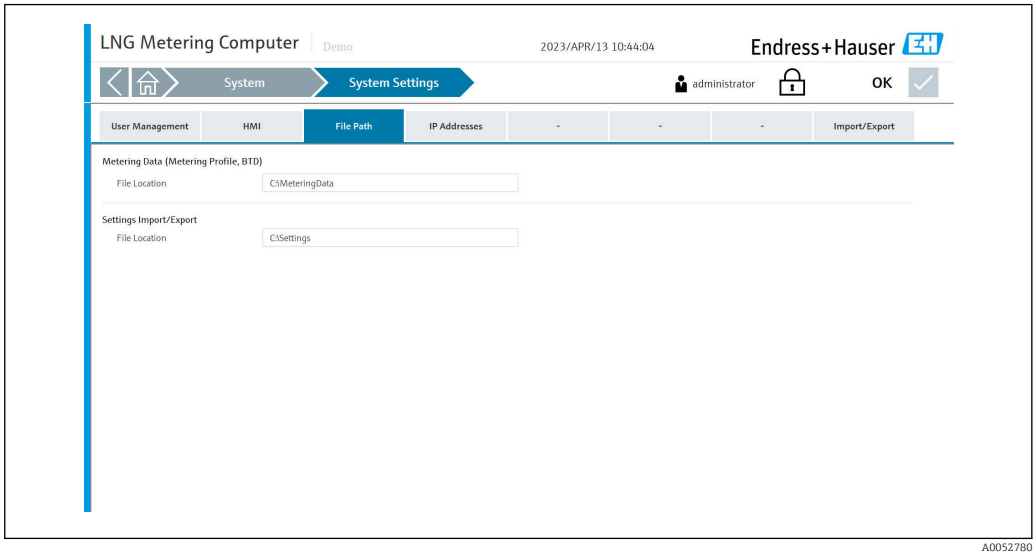



A0052781

### "File Path" tab

Here, the operator can select the file path for "Metering Data" and "Settings Import/Export".

These settings may only be changed after consultation with Endress+Hauser.

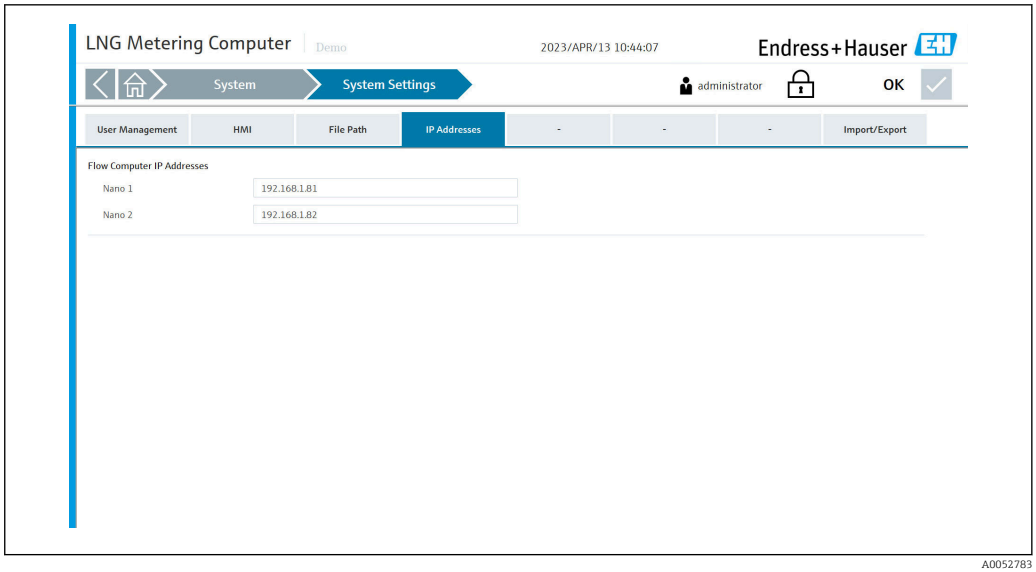



A0052780

### "IP Addresses" tab

Here, the operator can define or change the IP address for the flow computer(s) .

These settings may only be changed after consultation with Endress+Hauser.

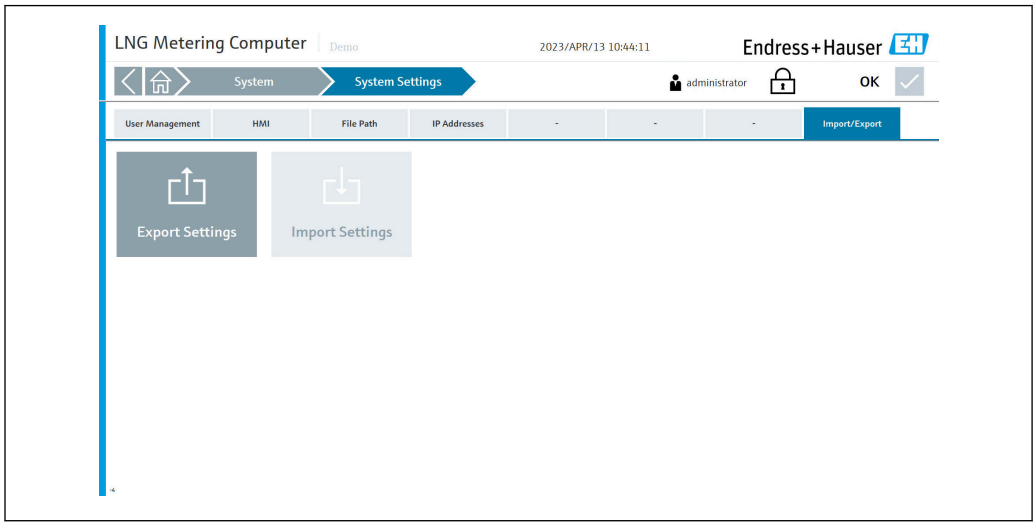



A0052783

**"Import/Export" tab**

From here, the operator can import or export settings.

Only users with the highest access authorization level are permitted to import settings.

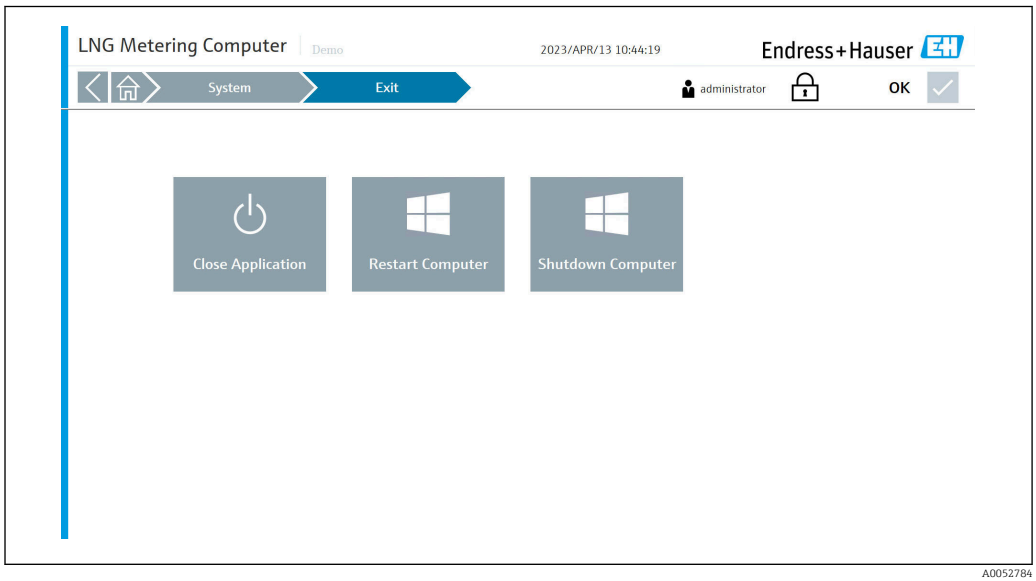



A0052782

## 8.7.7 "Exit" screen

On the "System" screen, tap **Exit**. The "Exit" screen opens.

Only users with the "Administrator" authorization level or higher can close the application and return to the Windows desktop.

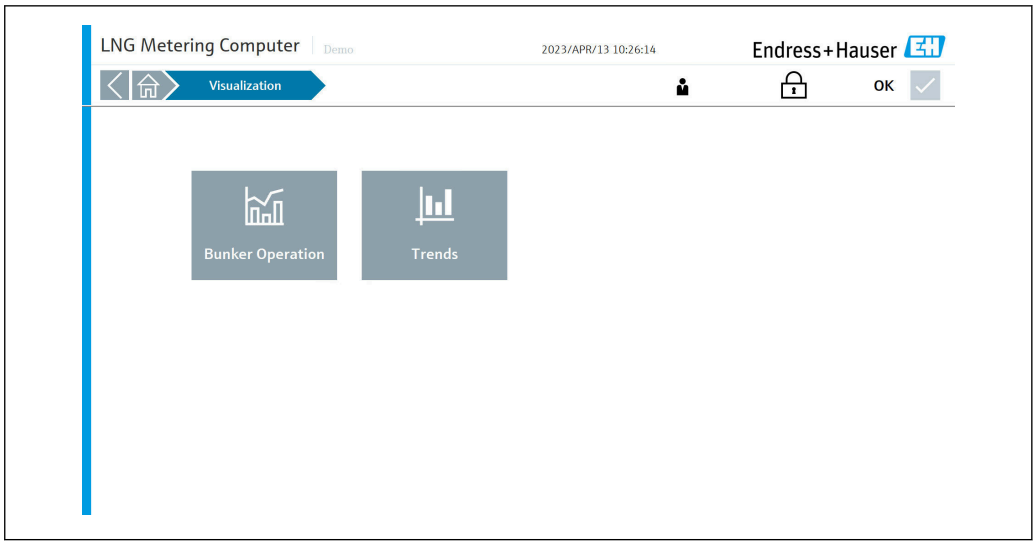



A0052784

# 8.8 "Visualization" screen

On the "Home" screen, tap **Visualization**. The "Visualization" screen opens.

From here, the operator can navigate to the 2 following subsections:
- Bunker Operation
- Trends

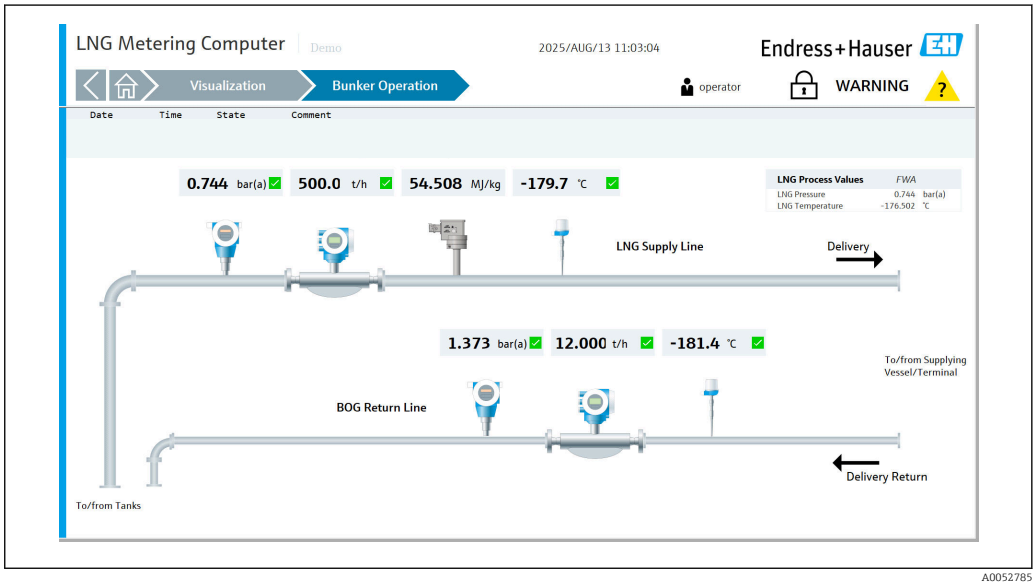



A0052786

## 8.9 "Bunker Operation" screen

On the "Visualization" screen, tap **Bunker Operation**. The "Bunker Operation" screen opens.

Here, the operator can observe the real-time measured values and the status of the various field devices in the LNG/BOG measuring paths.

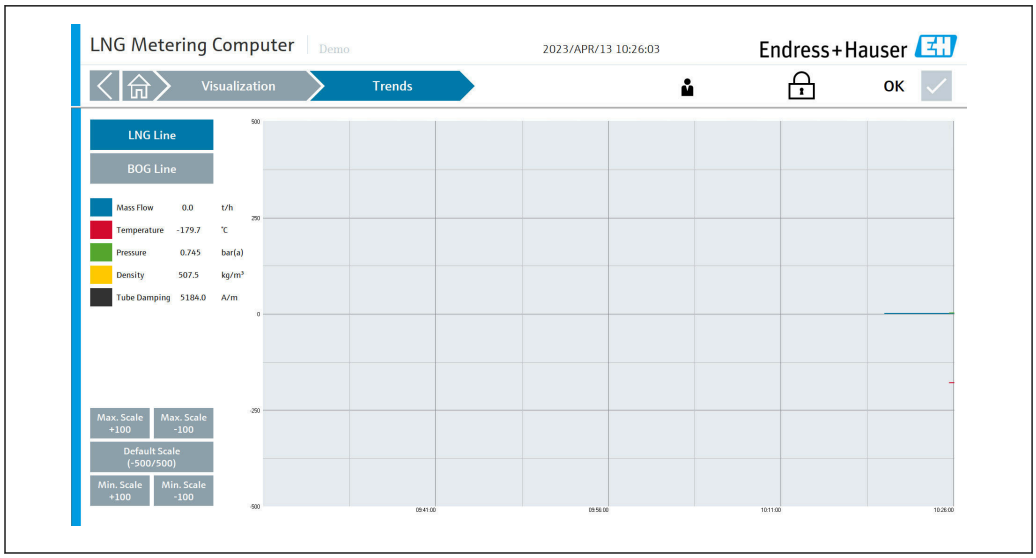



A0052785

## 8.10 "Trends" screen

On the "Visualization" screen, tap **Trends**. The "Trends" screen opens.

The course followed by process variables of the LNG/BOG measuring path is displayed in the form of real-time diagrams.

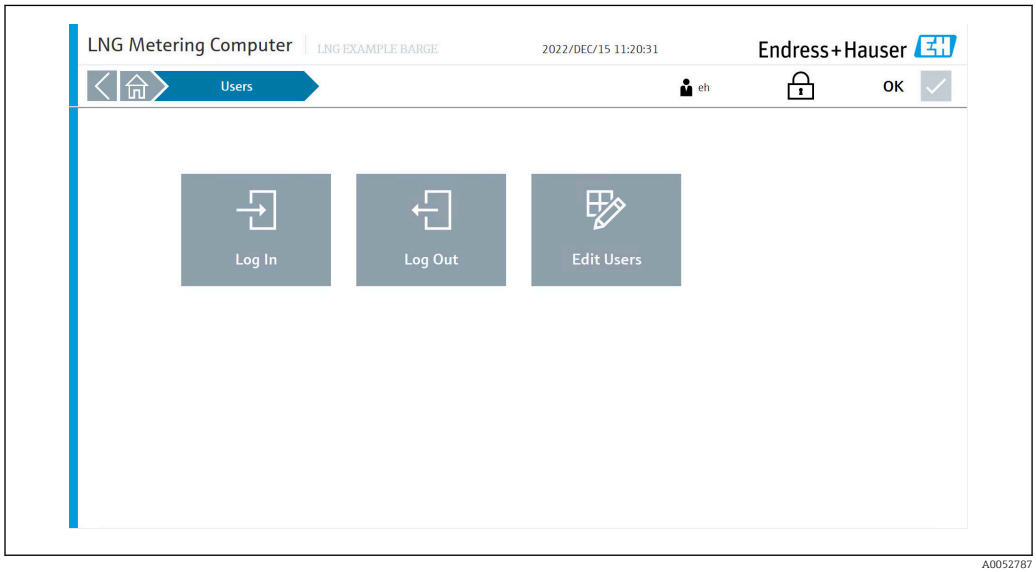



A0052788

## 8.11 "Users" screen

On the "Home" screen, tap **Users**. The "Users" screen opens.

Here, the operator can log users in or out, or edit users.




A0052787

### 8.11.1 User management

The user management comprises three customer levels:
- Operator (basic operation)
- Supervisor (as above plus advanced operation, customer settings, operator management)
- Administrator (as above plus supervisor management)

### 8.11.2 User access matrix

| Authorization | Non-registered user | Operator | Supervisor | Administrator |
|---|---|---|---|---|
| View screens | ☑ | ☑ | ☑ | ☑ |
| Start and end of processes | ☑ | ☑ | ☑ | ☑ |
| Access to the operation history | ☑ | ☑ | ☑ | ☑ |

| Authorization | Non-registered user | Operator | Supervisor | Administrator |
|---|---|---|---|---|
| Acknowledge alarms | ☒ | ☑ | ☑ | ☑ |
| Scroll through and filter alarm history | ☒ | ☑ | ☑ | ☑ |
| Access to diagnostic data | ☑ | ☑ | ☑ | ☑ |
| System: Change language | ☑ | ☑ | ☑ | ☑ |
| Display & modify settings | ☒ | ☒ | ☑ | ☑ |
| Display & modify system settings | ☒ | ☒ | ☒ | ☑ |
| System: Exit HMI application | ☒ | ☒ | ☒ | ☑ |
| System: Restart the computer | ☒ | ☒ | ☑ | ☑ |
| System: Shut down the computer | ☒ | ☒ | ☒ | ☑ |
| System: Display support information | ☑ | ☑ | ☑ | ☑ |
| System: Change alarm limit values | ☒ | ☒ | ☑ | ☑ |
| System: Display software information | ☑ | ☑ | ☑ | ☑ |
| System: Export settings | ☒ | ☒ | ☒ | ☑ |
| Change user settings | ☒ | ☒ | ☒ | ☑ |

# 9 Diagnostics and troubleshooting

## 9.1 List of error messages

Diagnostic behavior:
- Fault
- Warning

| Diagnosis no. | Event text | Diagnostic behavior | Possible cause | Remedial action |
|---|---|---|---|---|
| 000 | LNG Flow Computer Communication Error | Fault | Communication between HMI and flow computer is interrupted. | Ensure that flow computer is operational and that Ethernet cables are connected. |
| 001 | BOG Flow Computer Communication Alarm | Fault | Communication between HMI and flow computer is interrupted. | Ensure that flow computer is operational and that Ethernet cables are connected. |
| 002 | Cabinet Door Open | Fault | The control cabinet door is open. | Close the cabinet door. |
| 003 | Custody transfer switch pressed | Fault | The custody transfer switch (sealing switch) has been activated and is in the "unsealed" position. | Set custody transfer switch to "sealed" position. |
| 004 | Raman Analyzer Communication Error | Fault | Communication between HMI and Raman analyzer is interrupted. | Check that the Raman analyzer is operational and that Ethernet cables are connected.<br>If error persists, contact Endress+Hauser. |
| 007 | Raman Analyzer Laser Not OK | Fault | Raman analyzer laser error. | Check the status of the Raman analyzer. |
| 008 | Raman Analyzer Stream Not OK | Fault | Raman analyzer current error. | Check the status of the Raman analyzer. |
| 050 | File Read/write Error | Warning | The HMI could not read or write to the file. | Restart HMI computer. |
| 051 | Power Supply 1 fault | Warning | No 24 V signal available at Power Supply 1. | Ensure that Power Supply 1 is switched on.<br>Replace power supply if necessary. |
| 052 | Power Supply 2 fault | Warning | No 24 V signal available at Power Supply 2. | Ensure that Power Supply 2 is switched on.<br>Replace power supply if necessary. |
| 053 | Raman Analyzer System Warning | Warning | Raman analyzer system warning. | Check the status of the Raman analyzer. |
| 054 | Raman Analyzer Channel 1 Warning | Warning | Raman analyzer channel 1 warning. | Check the status of the Raman analyzer. |
| 055 | LNG Temperature > Analyzer Limit | Warning | Process conditions exceed alarm limit. | Check process conditions. |
| 056 | Methane Number Calculation - Excel Error | Warning | Excel has crashed. | Restart HMI computer.<br>If error persists, contact Endress+Hauser. |
| 057 | Fuel Gas Flow Computer Communication Error | Warning | Communication between HMI and flow computer is interrupted. | Ensure that flow computer is operational and that Ethernet cables are connected. |
| 058 | Software Checksum Error | Warning | Problem with software program or flow computer application. | Restart control system. If error persists, contact Endress+Hauser. |
| 059 | Raman Analyzer System Error | Warning | Raman analyzer system error. | Check the status of the Raman analyzer. |
| 060 | Raman Analyzer Channel 1 Error | Warning | Error from channel 1 of Raman analyzer. | Check the status of the Raman analyzer. |
| 100 | LNG Flow Computer Totalizer Fault | Fault | A totalizer error has occurred in the flow computer. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 101 | LNG Flow Computer Temperature Transmitter Fail | Fault | No signal received at analog input of temperature sensor. | Check wiring of 4 to 20 mA signal at analog input.<br>Check sensor. |

| Diagnosis no. | Event text | Diagnostic behavior | Possible cause | Remedial action |
|---|---|---|---|---|
| 102 | LNG Flow Computer Pressure Measuring Cell Fail | Fault | No signal received at analog input of pressure measuring cell. | Check wiring of 4 to 20 mA signal at analog input.<br>Check sensor. |
| 104 | LNG Flow Computer FLASH Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 105 | LNG Flow Computer FRAM Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 106 | LNG Flow Computer I/O Comms Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 109 | LNG Flow Computer Invalid Hardware Version | Fault | The application was installed on an incompatible flow computer. | Install application on a 3rd generation or newer flow computer. |
| 110 | LNG Flow Computer System Restart | Fault | The flow computer has been restarted. | This is normal behavior following an intended restart.<br>In any other case, contact Endress+Hauser. |
| 111 | LNG Flow Computer Promass Communications Fail | Fault | Modbus RTU communication between the flow computer and the LNG Promass has failed. | Check wiring of Modbus RTU (RS-485) cables. Ensure that Promass is switched on. Check Modbus RTU communication settings. |
| 112 | LNG Flow Computer RAM Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 113 | LNG Flow Computer RTC Error | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 114 | LNG Flow Computer SD Card Error | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 115 | LNG Flow Computer Task Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 117 | LNG Flow Computer Pulse Flow Rate Deviation Error | Fault | The pulse input signal of the Promass does not correspond to the Modbus mass flow signal. | Check the pulse input of the Promass and Modbus RTU communication.<br>Check settings for flow discrepancy.<br>If error persists, contact Endress+Hauser. |
| 150 | LNG Flow Computer Temperature High | Warning | Upper temperature limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 151 | LNG Flow Computer Temperature Low | Warning | Lower temperature limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 152 | LNG Flow Computer Pressure High | Warning | Upper pressure limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 153 | LNG Flow Computer Pressure Low | Warning | Lower pressure limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 154 | LNG Flow Computer ISO 6578 (Density) Calculation Error | Warning | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 155 | LNG Flow Computer ISO 6976 (Gas Properties) Calculation Error | Warning | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 156 | LNG Flow Computer Bad Gas Composition Received | Warning | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 161 | LNG Flow Computer Printer 1 Error | Warning | An error has occurred in a connected printer. | Check printer connection and settings. |
| 162 | LNG Flow Computer Printer 2 Error | Warning | An error has occurred in a connected printer. | Check printer connection and settings. |
| 163 | LNG Flow Computer Printer 3 Error | Warning | An error has occurred in a connected printer. | Check printer connection and settings. |

| Diagnosis no. | Event text | Diagnostic behavior | Possible cause | Remedial action |
|---|---|---|---|---|
| 164 | LNG Flow Computer Printer Spool Full | Warning | Flow computer printer spool is full. | Check connected printers. |
| 165 | LNG Flow Computer FTP Error | Warning | The flow computer could not save the data to the HMI computer. | Check FTP settings on flow computer and HMI. Contact Endress+Hauser. |
| 200 | BOG Flow Computer Totalizer Fault | Fault | A totalizer error has occurred in the flow computer. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 201 | BOG Flow Computer Temperature Transmitter Fail | Fault | No signal received at analog input of temperature sensor. | Check wiring of 4 to 20 mA signal at analog input.<br>Check sensor. |
| 202 | BOG Flow Computer Pressure Measuring Cell Fail | Fault | No signal received at analog input of pressure measuring cell. | Check wiring of 4 to 20 mA signal at analog input.<br>Check sensor. |
| 204 | BOG Flow Computer FLASH Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 205 | BOG Flow Computer FRAM Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 206 | BOG Flow Computer I/O Comms Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 209 | BOG Flow Computer Invalid Hardware Version | Fault | The application was installed on an incompatible flow computer. | Install application on a 3rd generation or newer flow computer. |
| 210 | BOG Flow Computer System Restart | Fault | The flow computer has been restarted. | This is normal behavior following an intended restart.<br>In any other case, contact Endress+Hauser. |
| 211 | BOG Flow Computer Promass Communications Fail | Fault | Modbus RTU communication between flow computer and BOG Promass has failed. | Check wiring of Modbus RTU (RS-485) cables. Ensure that Promass is switched on. Check Modbus RTU communication settings. |
| 212 | BOG Flow Computer RAM Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 213 | BOG Flow Computer RTC Error | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 214 | BOG Flow Computer SD Card Error | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 215 | BOG Flow Computer Task Fail | Fault | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 217 | BOG Flow Computer Pulse Flow Rate Deviation Error | Fault | The pulse input signal of the Promass does not correspond to the Modbus mass flow signal. | Check the pulse input of the Promass and Modbus RTU communication. Check settings for flow discrepancy.<br>If error persists, contact Endress+Hauser. |
| 250 | BOG Flow Computer Temperature High | Warning | Upper temperature limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 251 | BOG Flow Computer Temperature Low | Warning | Lower temperature limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 252 | BOG Flow Computer Pressure High | Warning | Upper pressure limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 253 | BOG Flow Computer Pressure Low | Warning | Lower pressure limit has been exceeded. | Check process conditions.<br>Check settings for alarm limits. |
| 256 | BOG Flow Computer Bad Gas Composition Received | Warning | An internal flow computer error has occurred. | Restart flow computer.<br>If error persists, contact Endress+Hauser. |
| 261 | BOG Flow Computer Printer 1 Error | Warning | An error has occurred in a connected printer. | Check printer connection and settings. |

| Diagnosis no. | Event text | Diagnostic behavior | Possible cause | Remedial action |
|---|---|---|---|---|
| 262 | BOG Flow Computer Printer 2 Error | Warning | An error has occurred in a connected printer. | Check printer connection and settings. |
| 263 | BOG Flow Computer Printer 3 Error | Warning | An error has occurred in a connected printer. | Check printer connection and settings. |
| 264 | BOG Flow Computer Printer Spool Full | Warning | Flow computer printer spool is full. | Check connected printers. |
| 265 | BOG Flow Computer FTP Error | Warning | The flow computer could not save the data to the HMI computer. | Check FTP settings on flow computer and HMI. Contact Endress+Hauser. |
| 354 | Fuel Gas Flow Computer Temperature Transmitter Fail | Warning | No signal received at analog input of temperature sensor. | Check wiring of 4 to 20 mA signal at analog input.<br>Check sensor. |
| 355 | Fuel Gas Flow Computer Pressure Measuring Cell Fail | Warning | No signal received at analog input of pressure measuring cell. | Check wiring of 4 to 20 mA signal at analog input.<br>Check sensor. |
| 357 | Fuel Gas Flow Computer System Restart | Warning | The flow computer has been restarted. | This is normal behavior following an intended restart.<br>In any other case, contact Endress+Hauser. |
| 358 | Fuel Gas Flow Computer Promass Communications Fail | Warning | Modbus RTU communication between flow computer and fuel gas Promass has failed. | Check wiring of Modbus RTU (RS-485) cables. Ensure that Promass is switched on. Check Modbus RTU communication settings. |
| 359 | Fuel Gas Flow Computer Pulse Flow Rate Deviation Error | Warning | The pulse input signal of the Promass does not correspond to the Modbus mass flow signal. | Check the pulse input of the Promass and Modbus RTU communication. Check settings for flow discrepancy. |

## 9.2 Troubleshooting

This section describes the actions that the user should take to rectify common computer problems caused by hardware or software errors.

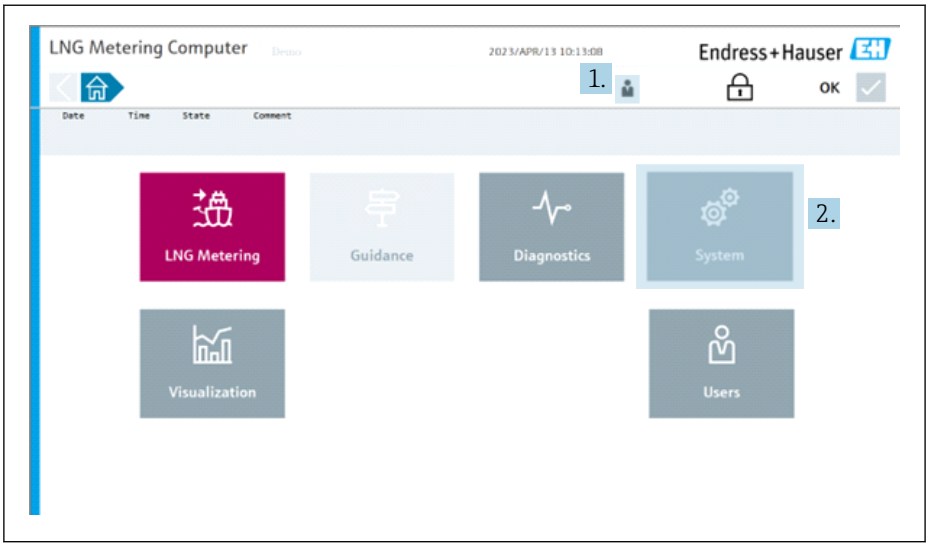
If a problem occurs, the following first steps must be observed before further action is taken:

- On the panel PC, identify and isolate the component causing the problem.
- Before you switch on the panel PC, ensure that all peripheral devices have been switched on.
- In the event of problems with external devices, ensure that the cable connections are correct and secure.
- Ensure that the correct configuration information is configured in the BIOS setup program.
- Ensure that all device drivers are correctly installed.
- Take note of the user's observations. Are messages displayed on the display? Are indicator lamps lit? Are there any beeping sounds? If the user needs help, detailed descriptions for the service team are helpful.

If the problem persists after the user has followed the instructions in this section, the user should contact the local Endress+Hauser Sales Center.

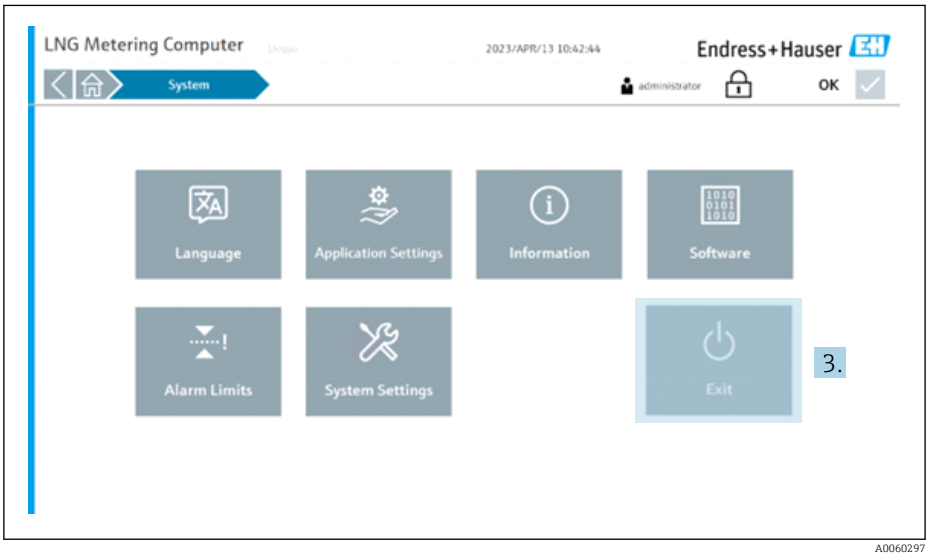
### 9.2.1 Restart panel PC

1. Log in on the home screen with administrator rights. User name: administrator, Password: administrator.



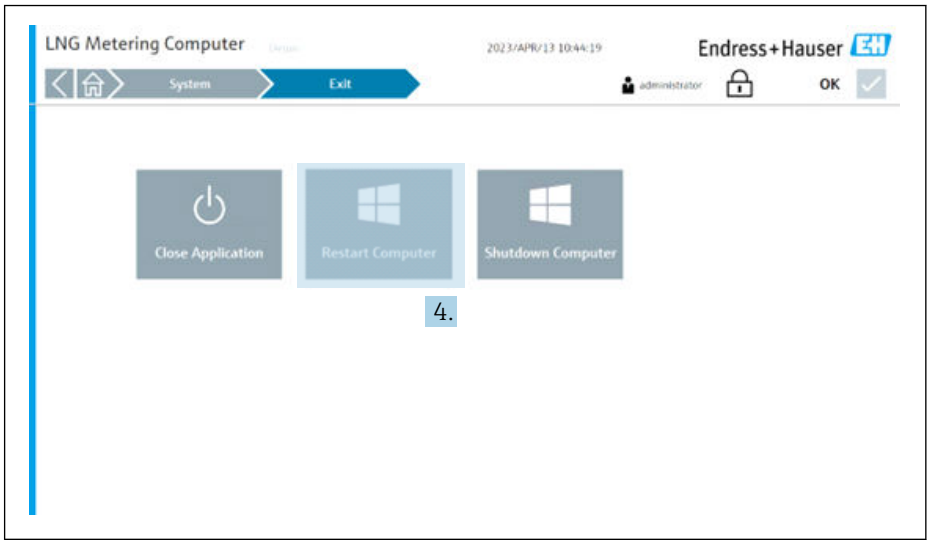

A0060296

2. Click on the System button.
3. Click Exit.




A0060297

4. Click Restart the computer and press Yes to confirm.




A0060298

5. After the restart, the application is automatically started with operator access. This procedure also allows you to close the application or shut down the computer.

### 9.2.2 Data management

It is recommended that preventive maintenance be performed once a year to optimize the memory.

This can be done using administrator access and file explorer.

1. Connect a keyboard to the USB port using the Windows key.
2. Press the Windows button and open the file explorer.
3. Open the directory C:\MeteringData and delete the files for BTD and Metering Profile that are older than one year.
4. Close file explorer again.

# 10 Repairs

## 10.1 General information

- Use only original Endress+Hauser spare parts.
- Observe the relevant standards, national regulations, certificates, and sealing regulations.
- Document all repairs and enter them in the W@M Lifecycle Management database.
- Repairs may be carried out only by Endress+Hauser service employees or by suitably trained customer staff.

## 10.2 Control cabinet fan

The filter mat of the control cabinet fan must be checked regularly. If necessary, clean the filter mat or replace it with the correct mat type.

## 10.3 Air conditioning

**⚠ WARNING**

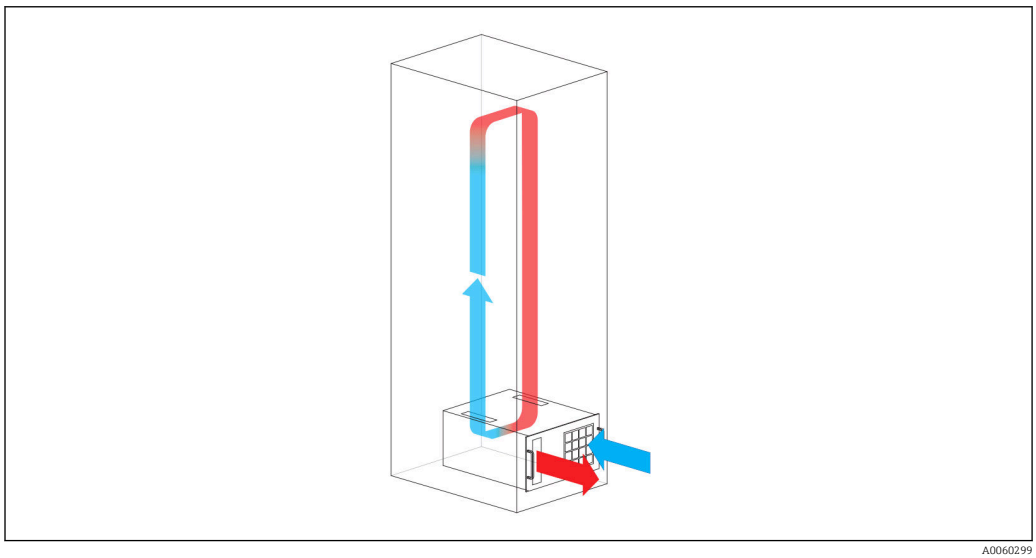
**Live parts!**

Incorrect work on electrical components can result in electrical shock.

► Switch off the power supply before carrying out any work.

Regularly clean the ventilation circuit components using compressed air.

The air conditioning system is installed in the floor of the cabinet to ensure good ventilation and therefore safe functioning of all installed equipment.

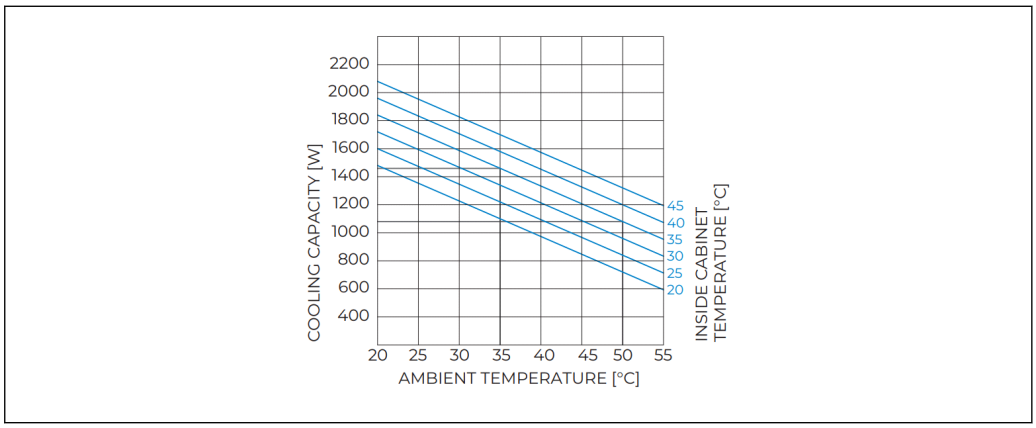


A0060299

The model used is Alfa Electric's ARK150 for 19-inch cabinets.

A0060300

The cooling performance curves compared to outside temperatures and inside temperatures can be found in the following graph:




A0060301

## 10.4 Spare parts

### 10.4.1 Spare parts

| Description | Order number |
|---|---|
| Flow computer | DTSP-DP1PT1 (71607206) |
| Industrial SD memory card 32 GB | DTSP-DP1PT1 (71607209) |
| Ethernet switch | DTSP-DP1PT1 (71607210) |
| Antenna | DTSP-DP1PT1 (71607211) |
| Global 3G/4G/WLAN router | DTSP-DP1PT1 (71607212) |
| 15.6" panel PC | DTSP-DP1PT1 (71607213) |
| Probe with 3.1 material certificate | KR41-8ABBAACACADBBBAGABJA |
| Probe with 3.2 material certificate (Lloyd's Register) | KR41-8ABBAACACADBBBAGABJB |
| Probe with 3.2 material certificate (American Bureau of Shipping) | KR41-8ABBAACACADBBBAGABJC |
| Probe with 3.2 material certificate (Bureau Veritas) | KR41-8ABBAACACADBBBAGABJD |
| Fiber optic cable (15 to 50 m) | KFOC1-BBC |
| Fiber optic cable (55 to 200 m) | KFOC1-BBD |

## 10.5 Endress+Hauser services

It is recommended that the LNG bunkering control system be serviced regularly by the system manufacturer.

Your Endress+Hauser Sales Center can provide detailed information on the services.

## 10.6 Disposal

Incorrect disposal of system components can result in environmental damage.
- Do not dispose of system components as domestic waste.
- Always dispose of system components in accordance with applicable national regulations.
- Ensure proper separation and recycling of system components.

# 11 Technical data

## 11.1 Power supply

| | |
|---|---|
| Supply voltage | 110 to 230 $V_{AC}$ at 50 to 60 Hz |

## 11.2 Input/output

| | |
|---|---|
| LNG/BOG/flue gas flowmeter | Pulse 24 $V_{DC}$, Modbus RTU |
| LNG/BOG/flue gas temperature | Current signal 4 to 20 mA |
| LNG/BOG/flue gas pressure | Current signal 4 to 20 mA |

Detailed information on "Modbus TCP": supplemental documentation → 66

## 11.3 Cables

| | |
|---|---|
| Power cable | Standard installation cable is sufficient. |
| Signal cable, current signal 4 to 20 mA | Shielded cable required. |
| Modbus RS485 cable | The EIA/TIA-485 standard specifies two cable types (A and B) for the bus line, which can be used for all transmission rates.<br>Cable type A is recommended. |
| Pulse/frequency output | Shielded cable required. |

## 11.4 Environment

| | |
|---|---|
| Ambient temperature range | –10 to +55 °C (+14 to +131 °F) |
| Relative humidity | 25 to 75 % |

## 11.5 Degree of protection

| | |
|---|---|
| Control cabinet without Raman analyzer | IP54 |
| Control cabinet with Raman analyzer | IP20 |

## 11.6 Weight

| | |
|---|---|
| Control cabinet without Raman analyzer | 50 kg |
| Control cabinet with Raman analyzer | 219 kg |

## 11.7 Control cabinet standards

- Low voltage directive 2014/35/EU
- Electromagnetic compatibility 2014/30/EU
- RoHS directive 2011/65/EU

## 11.8 Custody transfer approval

- OIML R117
- MID MI-005

## 11.9 Supplemental documentation

| Contents | Documentation code |
|---|---|
| Technical Information Raman Rxn4 | TI01645C |
| Operating Instructions Raman Rxn4 | BA02178C |
| Technical Information Proline Promass F 300 | TI01221D |
| Operating Instructions Proline Promass F 300 | BA01496D |
| Technical Information Proline Promass F 500 | TI01222D |
| Operating Instructions Proline Promass F 500 | BA01540 |
| Technical Information Proline Promass Q 300 | TI01277D |
| Operating Instructions Proline Promass Q 300 | BA01501D |
| Technical Information Proline Promass Q 500 | TI01287D |
| Operating Instructions Proline Promass Q 500 | BA01545D |
| Technical Information Cerabar PMP71B | TI01509P |
| Operating Instructions Cerabar PMP71B | BA02012P |
| Technical Information TR66 resistance thermometer (RTD) | TI01032T |
| Data interface description Modbus TCP & OPC-UA | SD02946D |

# Index

## Symbols



## A



## C



## D



## E



## G



## H



## I



## L



## M



## N



## O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